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Alexandru Jurconi is the CEO of Digital Nibs Ltd., where he facilitates strategic discussions among companies, government authorities, and society. With over 25 years of experience in public affairs, government relations, and corporate development, he collaborates with global leaders in various sectors, including energy, fast-moving consumer goods (FMCG), healthcare, and defense. He manages advocacy campaigns and public policy initiatives that have a significant economic and social impact, addressing issues such as energy transition, agricultural support, and access to medical innovation. Jurconi represents Romania in European decision-making bodies and holds key positions in business associations. He provides consultancy services in regulation, sustainability, and corporate diplomacy, actively contributing to the shaping of the European business landscape.

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Socio-demographic trends. Imagining and anticipating the societal futures

Evaluation of the Start-Up Nation Romania Program based on the Perception of Entrepreneurs

Carmen Valentina Rădulescu[1], Ioan I. Gâf-Deac[2], Mădălina Ioana Moncea[3] and Liviu Purcărea[4]

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Abstract

The main objective of the research is to delimit and analyze the perception of entrepreneurs in relation to the Start-up Nation program in Romania. On the other hand, the study proposes to investigate the role of several specific factors imposed by this phenomenon as an integral part of modernity. The Start-Up Nation Romania was conceived as a tool to stimulate entrepreneurship and support new businesses through non-reimbursable grants. This paper analyses the effectiveness of the program from the beneficiaries' perspective, focusing on entrepreneurs' perceptions of the economic impact, administrative procedures, accessibility of funds and sustainability of the funded businesses. The study is based on questionnaire data collected from a sample of participating entrepreneurs, highlighting both the positive aspects of the this - such as the funding opportunity and support for private initiative - and the difficulties encountered, such as excessive bureaucracy, delays in disbursement or lack of post-implementation advice. The research results provide a realistic picture of how the program is perceived by beneficiaries and make recommendations for improving future editions.

At the same time, it is noted by various models or broad principles existing both at national and global levels. Through systematic research of the specialized literature, it was possible to confirm a niche gap in the field - the one represented by the deficit of scientific information resources regarding economic performance and the need to configure studies that capture the essence of the indicators that lead to performance in the field. In a vast specialized literature, this research is positioned both within the framework of theoretical and applied research, which provides clues regarding the connection between this established program and the development of modern techniques for promoting future economic principles. The originality of the article lies in the fact that the research targeted by this paper has an applied importance, given the fact that it presents the information described from the perspective of the primary data source for the analysis carried out. Through this paper, it attempted to change the perception for the product to become, the fact that in its development the main role is not played by banks, but by the state and private financing companies, which would automatically make it riskier.

Keywords:

Development, entrepreneurs, start-up, Romania.

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Introduction

The purpose of this article is to analyze the implementation process of the Start-up Nation program from the perspective of the beneficiaries of this program in order to understand how the program contributes to stimulating entrepreneurship in Romania.

This program has been implemented for several years in Romania and it is important to understand how it has evolved over time, the aspects that contribute to the success of the companies established through the program, but also the barriers to the development of business ideas. According to Schumpeter, entrepreneurship aims to identify market opportunities, introduce new goods, innovative techniques and methods, and secure new sources of supply (Korez-Vide&Tominc, 2016).

This circular flow is seen by the author as an innovative activity influenced by an economic balance (Alvord, Brown and Letts, 2004). The significance of the concept of entrepreneurship is also analyzed from the point of view of content and can be viewed as an interdisciplinary field.

Entrepreneurship has in its structure economic activities, management, politics, finance, strategic planning, business history, geography, sociology, psychology, human resources, marketing, etc. From this perspective, entrepreneurship occurs when there is a transfer of concepts and methodologies between one or more fields (Asgary, Ozdemir and Özyürek, 2020). Entrepreneurship is a dynamic process with a complex action in identifying and capitalizing on opportunities. In addition, entrepreneurship involves uncertainty, risks and requires innovation, creativity and flexibility. From a conceptual point of view, entrepreneurial activity takes place in an economic balance, is based on the sum of several fields of science and brings together their resources to capitalize on opportunities.

1. Review of the scientific literature

Entrepreneurship plays an important role for both the national and international economy (Rădulescu et al., 2020). Over time, theorists have increasingly developed this subject. Thus, there are currently numerous studies showing that private firms bring added value regardless of the core activity they perform (Croci, 2016). Entrepreneurship helps create and increase jobs. At the European level, according to a report prepared by the European Commission in 2003, 66% of the total 32 jobs were provided by SMEs. The situation is similar in Romania, where SMEs employ approximately two-thirds of the total number of employees.

Entrepreneurship stimulates competitiveness. In general, competitiveness represents a combination of macroeconomic and microeconomic factors of a country, which ultimately lead to economic growth (Ben-Ari and Vonortas, 2007). The establishment of a new company imposes pressure on competition, which will react by improving the business. Innovative activities require human and material resources in particular, they lead to an increase in the number of jobs and the diversification of the supply of goods and services (Wonglimpiyarat, 2011).

All these aspects ultimately generate market stabilization and a favorable climate for consumers (Minniti and Lévesque, 2008). The impact that the entrepreneurial environment has on society is not limited to the creation of new jobs or the products and services offered by companies. Social entrepreneurship is a subfield that encourages the development of the entrepreneurial environment. In this case, the objectives of entrepreneurs focus on achieving social goals, because they assume commitments and look at things in the long term (Hagedoorn, 1996). Relevant examples in this case can be nature-friendly businesses, where entrepreneurs pursue technological processes that are as little harmful to the environment as possible. Entrepreneurship is able to unlock personal potential, and individuals manage to make the most of their qualities (Rahaman et al., 2021).

The benefits offered by the entrepreneurial environment are accompanied by risk-taking (Bodislav et al., 2020). Entrepreneurs expose themselves to risk even when they choose to promote their business idea in a new market or choose to invest in innovative ideas (Bran et al., 2023). At the same time, resources are limited, and their allocation represents another business risk (Korez-Vide and Tominc, 2016). Entrepreneurs take risks due to competitive pressure. Risk-taking is the key factor in identifying opportunities and progress (Bran et al., 2020). When a market player takes the risk of trying something new or different, which other market players are not willing to take, he has a chance to become a market leader in his field (Wang, 2016). The performance of a business is influenced by risk-taking. Xu (2015) showed that SMEs that take risks have higher growth and better long-term profitability compared to companies that are not willing to take risks.

Kim and Vonortas (2014) present a distinct approach to the subject in which risk must be viewed from three perspectives: technological risk, market risk and financial risk (Kim and Vonortas, 2014). Technological risk involves new technological systems and techniques that are based on artificial intelligence. The degree of uncertainty is given primarily by the reaction of the end customer, since the technological process can affect the product/service offered.

The entrepreneur cannot anticipate whether the new system will be of interest to customers. Another cause may be the inability of the company to adapt to the process, employees are not prepared, are not willing or do not want to evolve (Massa and Testa, 2008). Market risk focuses on the importance of entrepreneurial marketing. The customer is the main subject and the entire activity is carried out around him. Entrepreneurs who are market-oriented identify customer needs and pursue customer satisfaction.

At the same time, they invest in marketing campaigns that provide them with timely information about the competition and customers (Mu, Peng and MacLachlan, 2009). Intuitively, financial risk affects the monetary resources of the firm. Entrepreneurs assume a particular risk when they choose to invest, thus, the tangible value that is lost can affect the entire activity of the company (Neequaye et al., 2017).

2. Research methodology

The general objective of the study aimed to analyze the perception of entrepreneurs regarding the measures developed by the Romanian Government to stimulate entrepreneurship through the Start-up Nation grant program. Although such a program is implemented at the national level, which should help the economic development of the country, there are still dissatisfactions from entrepreneurs, and the program does not seem to be fully effective, as demonstrated by the number of enterprises that close their activity even before the implementation of the project, respectively during the development or after the completion of this project.

The specific objectives of this study were: (1) identifying the extent to which Romanian entrepreneurs are satisfied with the Start-up Nation program; (2) identifying the main barriers to accessing the Start-up Nation grant program; and (3) identifying the extent to which entrepreneurial education can influence the performance of a new business. The research population is represented by people who have applied to at least one of the editions of the Start-up Nation Romania grant program. Due to the existing limitations, a non-probability sampling method was adopted. The sociological survey was used as the data collection method and the data collection tool was the questionnaire administered online.

The questionnaire was distributed via social networks. 65 private messages were distributed via the Facebook platform, and the communities in which people who applied for the Start-up Nation grant program are active were tracked. The questionnaire was distributed in the following Facebook groups: "All about business", "Group of entrepreneurs in HoReCa", "Group of entrepreneurs in Romania", "Start-up Nation Romania", "Start-up Nation - Information and answers", "START-UP NATION 2023 - European funds", "START-UP NATION ROMANIA 2022–2027", "START UP NATION", "Student questionnaires". At the same time, through hashtags we identified five suppliers of technological equipment for start-ups, and through messages sent by email we requested their help, being at their choice whether or not to distribute the questionnaire to the clients who could be included in the research sample.

Two consulting firms gave us access to the databases of clients who signed up for the editions of the Start-up Nation Romania grant program, and we subsequently distributed the questionnaire link to the people who accepted to be part of this study. In this way, we managed to distribute 80 questionnaires, with most responses (40) being obtained through this method. At the same time, in distributing the questionnaire we also received help from the NGO Civitas, which also works in the field of entrepreneurship and social economy. So, 150 questionnaires were directly distributed, and in the end, we obtained 60 completed and valid questionnaires.

3. Results and discussion

The sample size taken for the research was 55 people. In this regard, male respondents accounted for 52 per cent and female respondents accounted for 48 per cent The majority of the respondents were from urban areas (65.4 per cent), while only 34.6 per cent of the respondents were from rural areas. In terms of age distribution, the majority of respondents (44.2%) were aged between 26 and 35 years. In descending order, the next largest category is 30.8 per cent with respondents aged 36-45 years.

Of the total number of respondents, 17.3% were between 18 and 25 years old. The fewest respondents (7.7%) were people aged between 46-60 years old. Taking into account all the answer options, none of the respondents were over 60 years of age. The majority of people (51.9%) who took part in this study are graduates of higher education, bachelor's level. In descending order, 17.3% of the respondents graduated from high school, 15.4% are graduates of vocational technical education, and 13.5% have graduated from higher education, master's level.

Of the total number of respondents, only one person (1.9%) is a graduate of higher education, doctoral level. None of the respondents has a secondary school education as their level of education. At the same time, most of the respondents (26%) are graduates of economic sciences, an equal share (16%) have respondents who graduated from exact sciences, respectively natural sciences.

Also with an equal share (4%) are respondents who graduated from legal sciences and arts. Of the total number of respondents, 10% graduated in social and political sciences, 6% of respondents graduated in humanities, and 18% of them graduated in fields other than those presented above.

In terms of field of activity, most of the respondents (23.1%) have businesses in the field of trade, 21.2% work in the field of construction, 15.4% work in the field of services/creative industries, 13.5% work in the field of services and 11.5% work in the field of the food industry.

With an equal weight of 1.9% are the respondents whose field of activity is transport and storage, respectively the IT field. Of the total number of respondents, 3.8% are active in the health and social assistance field, respectively 7.7% of the respondents are active in the metallurgical industry. None of the respondents has the extractive industry or agriculture (including forestry and fishing) as their business activity field.

The majority of respondents (61.5%) currently have between 1 and 5 employees, while only 1.9% of them have between 16-30 employees. Of the total number of respondents, 36.5% of them have between 8-15 employees. None of the people who took part in this study has a number of employees in the category of 31-50 employees, respectively over 50 employees. We also wanted to find out whether the entrepreneurs had another business before applying for the Start-up Nation program.

To analyze entrepreneurs' perception of the availability of entrepreneurial financing in Romania, we used two variables (Table no. 1). The highest mean value (3.04) is obtained by the item referring to the availability of credit for new and growing businesses. Most respondents state that they partially agree with this statement. In the case of the following variable "At the national level, there are sufficient government subsidies available for new and growing businesses", the mean was 2.48. Two equal weights were obtained, with most respondents (26.92%) being in total disagreement, respectively neither agreeing nor disagreeing with this statement.

Therefore, taking into account the two factors analyzed (Table no. 1), most respondents partially agree that at the national level there is sufficient financing through loans for new and growing businesses, but most of them express total disagreement, namely neither agreement nor disagreement with the statement that at the national level there are sufficient government subsidies available for new and growing businesses.

Table no. 1. Perceptions related to the availability of entrepreneurial financing in Romania

	1	2	3	4	5	Average	Standard deviation
At the national level, there is sufficient financing through new and growing business loans	21.16%	19.24%	15.38%	23.08%	21.15%	3.05	1.48
There are sufficient government subsidies available for new businesses nationwide.	26.93%	25%	26.93%	17.4%	3.85%	2.48	1.21

Respondents were asked to select the main barriers to launching and developing a start-up in Romania; they could choose up to 5 answer options. Taking into account the respondents' choices shown in Figure no. 1, most believe that the main barrier to launching and developing a start-up in Romania is, in fact, the

bureaucratic system, with many administrative formalities" this answer being chosen with a frequency of 61.6%. The second factor that makes it difficult to launch and develop new businesses refers to limited access to financing programs for start-ups" and was chosen with a proportion of 57.9%.

A small number of experts in validating ideas and providing mentoring for start-ups is another factor that obtained a high weight from entrepreneurs, thus 55.8% of respondents consider that this factor makes it difficult to launch and develop start-ups. At the same time, entrepreneurs believe that difficult bureaucratic procedures regarding acquisitions are also an essential problem, this option being chosen by 50% of respondents. In hierarchical order, insufficient tax incentives for start-ups" is the factor that ranks fifth and was chosen by 48.2% of respondents, respectively in the same position with an equal value is the option the entrepreneurial ecosystem is not adapted to start-ups. At the same time, "the lack of an advantageous legislative framework for start-ups.

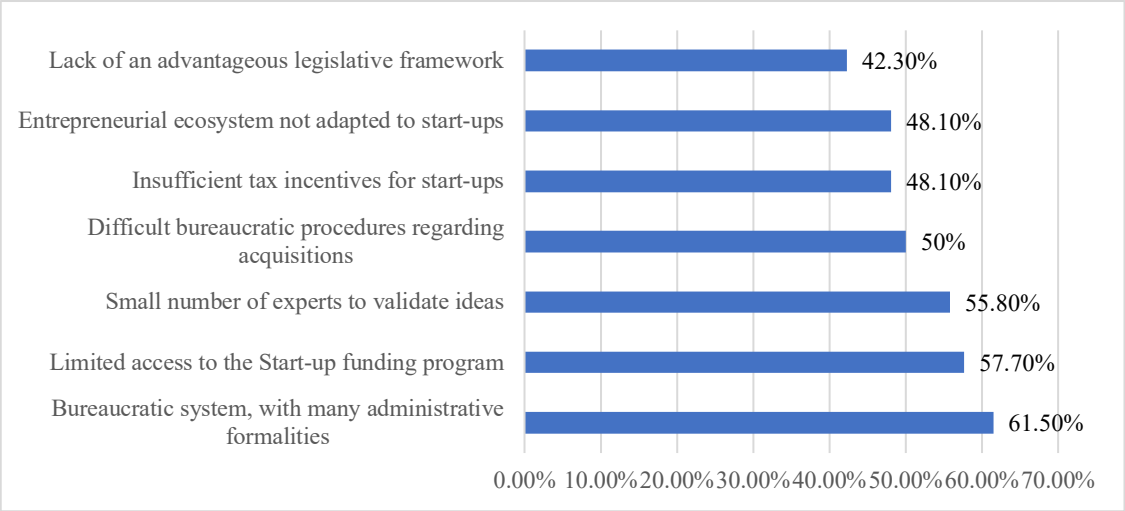

Figure no. 1. The main barriers to launching and developing a start-up in Romania

To analyze entrepreneurs' perceptions of entrepreneurship education, we used two variables: whether they had taken an entrepreneurship course and when they took it (Figure no. 2). Of the total respondents involved in this study, 78.4% had taken an accredited course. Most of the respondents who had taken an entrepreneurship course (41.4%) had done so before applying for the Start-up Nation grant program, 32.4% had taken the course during the implementation of their business idea, and 16.2% had taken the course before starting their business.

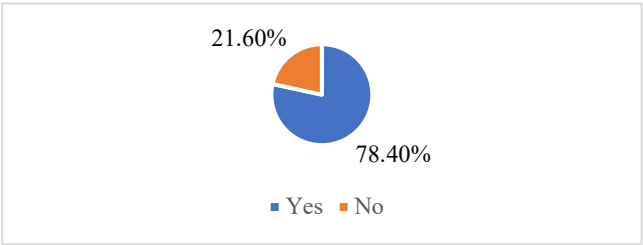

Figure no. 2. Share of people who have taken an accredited entrepreneurship course

At the same time, the perceptions of entrepreneurs related to entrepreneurial training were also analyzed and two factors were proposed for analysis, the highest average value (3.72) is obtained by the item I am willing to take specialized courses to improve my entrepreneurial knowledge in order to develop my business, where most of the entrepreneurs (40.4%) completely agree with this statement.

The second variable is entrepreneurial training was useful in starting my own business and obtained an average value of 3.59. Of the total number of respondents, 30.78% partially agree with this statement. Next, we wanted to find out what the plans are regarding the business financed through the Start-up Nation program. According to the data presented in Figure no.3, the majority of respondents (50%) intend to develop

their business in the coming period, 30.8% of respondents want to maintain the current state of the business, 11.5% intend to close the business, 5.8% intend to reduce their business, while only 1.92% of respondents plan to change their business activity field.

Table no. 2. Perceptions related to entrepreneurial training

	1	2	3	4	5	Average	Standard Deviation
I am willing to take specialized courses to develop my skills	9.61%	15.38%	9.61%	25%	40.38%	3.72	1.39
The entrepreneurial training was useful in terms of starting my own business.	7.69%	9.61%	25%	30.76%	26.92%	3.59%	1.2%

Regarding the entrepreneurs' perception of implementing a financing program for business expansion/development, the average value of the responses received is 3.80, and most of the respondents agreed with this statement (67.34% chose the options to a large and very large extent). Therefore, most of the respondents believe that implementing a financing program for the expansion/development of businesses that were established through the Start-up Nation Romania program would be useful (see table 2).

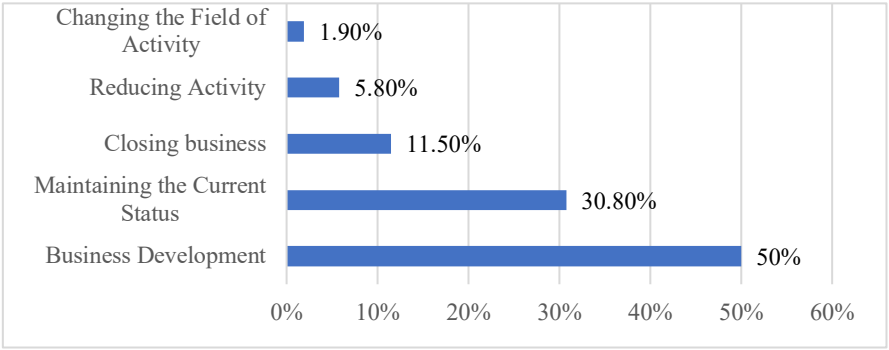

Figure no. 3. Activities proposed by entrepreneurs regarding the status of the business for the next period

Conclusions

Even though the entrepreneurial environment in Romania still has many stages to go through before reaching the level of maturity of the entrepreneurial environment in Europe, Romanian entrepreneurs and the public sector are trying to take as sure steps as possible in this direction. Certainly, most entrepreneurs want their companies to increase their performance, but, nevertheless, they omit important steps to achieve this objective. The need for entrepreneurial education is high, even if entrepreneurs believe that it is not the main factor in achieving performance. However, taking into account the results obtained from the research conducted, most entrepreneurs have taken at least one entrepreneurship course (78.4%), and of these, 41.4% took the course before applying for the Start-up Nation program. Entrepreneurs believe that at the national level there are sufficient sources of financing through loans for new and growing businesses, but, at the same time, they believe that at the national level there are not enough government subsidies available for new and growing businesses.

Most respondents believe that the Start-up Nation Romania grant program helped them develop their own business and would recommend this program to others. At the same time, the information collected showed that the main barriers to launching and developing a start-up in Romania refer to the bureaucratic system,

with many administrative formalities, limited access to start-up funding programs and the small number of experts in validating ideas and providing mentoring for start-ups.

The funding obtained through the Start-up Nation program is not the most important factor influencing the success of a business, with respondents considering that the willingness to take risks, speculation and the spirit of adventure, as well as previous experience in the business field play a more important role in ensuring the success of a business.

Entrepreneurs' choice to start a business is most influenced by the identification of an opportunity, the entrepreneurs' desire to be self-employed and their passion for the business field. Considering the information analyzed, supplementing government subsidies can help to grow the business environment.

The research on entrepreneurs' perceptions of the Start-Up Nation Romania programme provides a valuable starting point for in-depth analyses and for improving public policies to support the business environment. Among the most relevant applications and directions for extension are: the formulation of more effective public policies, the development of continuous monitoring and evaluation tools, the extension of research at regional and sectoral level.

An important extension line is to analyse differences in perceptions by geographical region, industry or business size, providing a more nuanced understanding of the needs of entrepreneurs.

The research can be extended by benchmarking with other similar national or European programmes to highlight good practices and identify alternative models for supporting entrepreneurship.

Further research could aim at tracking the evolution of the funded firms after the end of the implementation period, assessing survival rates, turnover growth and contribution to employment.

Depending on the findings of the research, adaptations of the programme for special categories such as young entrepreneurs, women entrepreneurs or people in rural areas may be proposed.

Respondents consider that a program for the expansion/development of existing businesses is useful. For example, a reassessment of the framework in which start-ups are used at the national level and the identification of key sectors that help national development are useful. Thus, the establishment of companies can be encouraged, especially in those areas, by implementing dedicated financing lines.

The government should not only consider setting up as many businesses as possible, it is also necessary to support already funded businesses, we propose implementing a financing line for the expansion of successful start-ups and those that stand out through innovative and sustainable activities, or any other criterion that represents interest at the national level.

Improving the regulatory framework that involves simplifying bureaucratic procedures, reducing barriers to implementing a business and making administrative tasks accessible can help develop the private business environment.

The main limitation of this research is the small number of completed questionnaires, which means that the results cannot be generalized to the entire population of entrepreneurs who have developed a business with the help of funding provided through the Start-up Nation program. The entrepreneurs contacted were reluctant to keep the information provided confidential.

References

Alvord, S.H., Brown, L.D. and Letts, C.W., 2004. Social Entrepreneurship and Societal Transformation. *The Journal of Applied Behavioral Science*, 40(3), pp.260-282. https://doi.org/10.1177/0021886304266847.

Asgary, A., Ozdemir, A.I. and Özyürek, H., 2020. Small and Medium Enterprises and Global Risks: Evidence from Manufacturing SMEs in Turkey. *International Journal of Disaster Risk Science*, 11, pp.59-73. https://doi.org/10.1007/s13753-020-00247-0.

Ben-Ari, G., Vonortas, N.S., 2007. Risk Financing for Knowledge-based Enterprises: Mechanisms and Policy Options. *Science and Public Policy*, 34(7), pp.475-488. https://doi.org/10.3152/030234207X244829.

Bodislav, D.A., Buzoianu, O.A.C., Burlacu, S. and Rădulescu, C.V., 2020. Analysis of companies in Romania from the perspective of risk perception and the management needs thereof. *Economic Convergence in European Union*, XXVII, pp.341-349.

Bran, F., Balu, O.F., Reynard, C., Rădulescu, C.V., Burlacu, S., Mănescu, C.O. and Gole, I., 2023. Mapping risk and performance business drivers post-pandemic. Future challenges. *Economic Computation & Economic Cybernetics Studies & Research*, *57*(4), pp.125-142. 10.24818/18423264/57.4.23.08.

Bran, F., Rădulescu, C.V., Bodislav, D.A. and Burlacu, S., 2020. Environmental risks in the context of globalization. *Economic Convergence in European Union*, XXVII, pp.350-356.

Hagedoorn, J., 1996. Innovation and Entrepreneurship: Schumpeter Revisited. *Industrial and Corporate Change*, 5(3), pp.883-896. https://doi.org/10.1093/icc/5.3.883.

Kim, Y., Vonortas, N.S., 2014. Managing Risk in the Formative Years: Evidence from Young Enterprises in Europe. *Technovation*, 34(8), pp.454-465. https://doi.org/10.1016/j.technovation.2014.05.004.

Korez-Vide, R., Tominc, P., 2016. Competitiveness, Entrepreneurship and Economic Growth. In Trąpczyński, P., Puślecki, Ł, Jarosiński, M., *Competitiveness of CEE Economies and Businesses*, Cham: Springer. https://doi.org/10.1007/978-3-319-39654-5_2.

Massa, S. and Testa, S., 2008. Innovation and SMEs: Misaligned Perspectives and Goals among Entrepreneurs, Academics, and Policy Makers. *Technovation*, 28(7), pp.393-407. https://doi.org/10.1016/j.technovation.2008.01.002.

Minniti, M. and Lévesque, M., 2008. Recent Developments in the Economics of Entrepreneurship. *Journal of Business Venturing*, 23(6), pp.603-612. https://doi.org/10.1016/j.jbusvent.2008.01.001.

Mu, J., Peng, G. and MacLachlan, D.L., 2009. Effect of Risk Management Strategy on NPD Performance. *Technovation,,* 29(3), pp.170-180. https://doi.org/10.1016/j.technovation.2008.07.006.

Neequaye, E.N., Dechun, H., Sholihah, P.I., Fynn S., (2017). The Importance of Entrepreneurship in China and Indonesia, European Journal of Business and Management, vol. 9, nr. 11, pp. 160-164.

Rahaman, M.A., Luna, K.F., Ping, Z.L., Islam, M.S. and Karim, M.M., 2021. Do Risk-Taking, Innovativeness, and Proactivity Affect Business Performance of SMEs? A Case Study in Bangladesh. *Journal of Asian Finance, Economics and Business*, 8(5), pp.689-695. https://doi.org/10.13106/jafeb.2021.vol8.no5.0689.

Rădulescu, C.V., Burlacu, S., Bodislav, D.A. and Bran, F., 2020. Entrepreneurial Education in the Context of the Imperative Development of Sustainable Business. *European Journal of Sustainable Development*, 9(4), pp.93-93. https://doi.org/10.14207/ejsd.2020.v9n4p93.

Wang, Y., 2016. What Are the Biggest Obstacles to Growth of SMEs in Developing Countries?- An Empirical Evidence from an Enterprise Survey. *Borsa Istanbul Review*, 16(3), pp.167-176. https://doi.org/10.1016/j.bir.2016.06.001.

Wonglimpiyarat, J., 2011. Government Programmes in Financing Innovations: Comparative Innovation System Cases of Malaysia and Thailand. *Technology in Society*, 33(1-2), pp.156-164. https://doi.org/10.1016/j.techsoc.2011.03.009.

Managing Local Communities for Emergency Preparedness

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Abstract

Disaster control corporations make investments differing tiers of sources into guiding groups to get equipped for a number of hazards, and are an increasing number of turning to network engagement as a manner of growing preparedness. This paper provides a scientific literature evaluate that reviews at the impact of network communique and engagement strategies which have been utilized in a risk preparedness context. The evaluate findings propose that maximum network engagement strategies are powerful in producing a few stage of extended preparedness. Face to stand strategies have been greater always a success than mass media campaigns. This article examines the role of local public administration, non-governmental organisations and citizens in strengthening the capacity to respond to natural and man-made disasters. It discusses the main planning, communication and training tools that can contribute to the development of a culture of prevention and the active involvement of communities in reducing vulnerabilities. The study emphasises the importance of inter-institutional collaboration, access to relevant information and regular simulations to increase preparedness. However, all the intervention sorts mentioned had a few degree of success, despite the fact that there have been man or woman failures. Agency efforts to interact groups in preparedness ought to encompass a extensive variety of strategies that paintings collectively to alternate behaviour, along with face-to-face network engagement that triggers and helps network-led preparedness activity. The complicated person of the subject calls for the configuration of the perfect methodology- the established order of objectives, directions, hypotheses, and techniques- critical withinside the improvement of a great studies. The originality of the article lies in the fact that the research targeted by this has an applied importance, given that it presents the necessary information related to the perception of the local community in the event of a disaster, which can lead to real help for the authorities and beyond.

Keywords

Disasters, local government public education, risk assessment, emergencies

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Introduction

Internationally, the number and intensity of crises, natural disasters, major accidents and terrorist attacks have increased in recent years (Masterson et al., 2014), which puts pressure on institutions responsible for emergency management to find solutions to prepare the population and communities for unexpected events and to intervene for their effective management (McGuire&Silvia, 2010).

This is a difficult task because many crisis situations affect large geographical areas and their resolution falls under the responsibility of several institutions at local and national levels (Burlacu, 2019).

The diversity of emergency situations and the unpredictable nature of some of them require a high degree of flexibility in their management (Beunen, Patterson and Van Assche, 2017), but public institutions operate

within a rigid legal framework that establishes clear responsibilities in the management of emergency situations (Kapucu, Arslan and Demiroz, 2010).

Therefore, crisis management requires a flexible, robust, adaptable governance style, based on collaboration and coordination, but which is based on plans that define clear responsibilities and intervention modalities (Farazmand, 2007; Ansell, Sørensen, and Torfing, 2023).

Emergency management refers to the set of measures that are adopted before, during, and after the occurrence of a major negative event (Călin et al., 2022). These measures can be grouped into four categories (Henstra, 2010): (a) anticipation and preparedness measures to increase a community's chances of responding to emergencies, (b) measures to prevent and mitigate the impact of hazards, (c) response measures during the occurrence of a hazard and to help victims, and (d) rehabilitation measures after a disaster. A very important component of this process is the set of preparedness measures that are adopted to identify, assess and understand the risks of emergency situations (Cimellaro, 2016; Christensen, Lægreid and Rykkja, 2016), prepare intervention plans, create institutional structures to manage intervention actions, as well as a well-coordinated network of structures to intervene in the event of an emergency situation and in recovery efforts (Farazmand, 2007). Authorities should organize training courses to learn how each participant should act, as well as simulation exercises of possible emergency situations to familiarize themselves with them (Henstra, 2010). It should also be planned how to provide support to people with disabilities, the elderly or those with certain special needs (Duda et al., 2020).

1. Review of the scientific literature

The emergency management literature uses the terms crises, disasters and turbulence. Crises refer to situations in which there is a threat to the core values of a social system and which impede its normal functioning and require urgent intervention (Christensen, Lægreid and Rykkja, 2016). Crises are larger in scale than more frequent emergencies, such as road accidents or fires.

Crises are unpredictable and require a rapid response (Ladaru et al., 2022). The term disaster is used to refer to those situations when an event causes significant consequences in several areas (social, economic, medical, etc.) that exceed the capacity of a community to cope with these consequences (Henstra, 2010). Disasters come in many forms, such as natural disasters (caused by hurricanes or tornadoes, earthquakes, massive floods, tropical cyclones, volcanic eruptions, wildfires, landslides, etc.) or man-made disasters (e.g. terrorist attacks, industrial accidents, fires, nuclear explosions, transportation accidents, etc.).

Chang Seng (2013).argues that some natural disasters can be seen as actually caused by humans, because they did not take the necessary measures to prevent them. The same author highlights that, in other situations, a natural disaster can cause another disaster (for example, an earthquake can cause a tsunami, which can cause flooding). Disasters capture public attention and put pressure on responsible institutions to find urgent solutions that can materialize in new policies or increased funding to prevent similar situations (Cram&Garcia-Zanor, 2016). Thus, the main distinction between the terms emergency, crisis and disaster is the scale and intensity of the events that cause these situations, as well as the severity of the consequences generated (Melo Zurita et al., 2018).

Ansell, Sorensen and Torfing (2023) use the broader term turbulence to refer to situations when unexpected and unforeseen events generate changes in different areas, and argue that the occurrence of turbulence has become a constant in the functioning of public administration. Thus, they argue that, currently, public institutions must learn to function in an environment characterized by turbulence, that is, instability (Rădulescu et al., 2023). In this article, the generic term emergency will be used predominantly, having all the meanings mentioned above (crises, disasters or turbulence) because it is consistent with the term that is used in Romania to refer to these situations.

Regardless of the intensity of unexpected events, one of the themes that is analyzed in the specialized literature is how to manage emergencies and mainly the need to adapt the way they are managed. The following section will present the main emergency management paradigms, as discussed in the specialized literature, starting from the analysis of how certain crisis situations or natural disasters have been managed in the past and how the current context has evolved (Krogh&Lo, 2023).

2. Research methodology

The purpose of the research was to analyze the management offered by the actors that help communities in Romania to be better prepared in the event of an emergency situation (such as natural disasters, major work

accidents or road accidents with multiple victims, floods, etc.). In this regard, an opinion poll was conducted among the Inspectorates for Emergency Situations, which know the characteristics of the communities that are better prepared for such situations, because they are the first to arrive at the scene of the events and are the ones that provide help in the first phase.

Thus, in the previous year, 145 questionnaires were sent by mail, of which 45 to the Inspectorates for Emergency Situations in the county capitals and 110 to the Fire Departments in cities other than the county capitals.

The questionnaire was accompanied by a letter addressed to the head of the institution informing him about the purpose of the research and asking him to complete the questionnaire. 65 completed questionnaires were returned, which represents a response rate of 48.3%. The authors decided to keep for analysis also the questionnaires that were partially completed. Responses were received from institutions in all eight development regions of the country, so the research is nationally representative.

Most of the respondents have over 20 years of experience in the workplace (62.8%) and it can be assumed that they have an informed opinion on the researched topic. Most of them work in county capital municipalities (56.1%), which means that they work within the County Inspectorates for Emergency Situations.

3. Results and discussion

Respondents were asked to rate on a scale of 1 to 5 (where 1 represents not at all and 5 represents very much) a series of statements describing the capacity of the institution they work for to intervene in emergency situations (Table no. 2). Respondents stated that their institutions collaborate well with the Mayors in their area of intervention (average score is 3.86) and that they carry out sufficient actions to train key actors on how to intervene in emergency situations (average score is 3.85). With slightly lower scores, it emerged that the institutions have the necessary equipment (3.66) and sufficient personnel (3.58) to intervene in emergency situations. The lowest score was given to the statement regarding the voluntary offering by the population to help in the event of emergency situations (2.8).

The scores awarded for these statements illustrate the creation of collaboration networks with the City Halls in the territorial area of intervention and the carrying out of training courses together with various key actors.

Table no. 1. Factors influencing the institution's ability to intervene in emergency situations

	Average	Standard deviation
Collaboration with the municipalities in your area of intervention in emergency situations is good	3,88	0,694
Sufficient actions are carried out to train the population about intervention in emergency situations	3,85	0,675
The institution has the necessary equipment for emergency situations	3,66	0,676
The institution has sufficient personnel to intervene in emergency situations	3,58	0,798
The population is interested in volunteering in emergency situations	2,8	0,812

Respondents were asked to rate on a scale of 1 to 5 (where 1 represents not at all and 5 represents very much) a series of statements characterizing the level of preparedness for emergency situations of the localities in the area of responsibility of the institution in which they work (see Table no. 1). The results show that in the vast majority of localities there is a Voluntary Emergency Service (4.28), there is a person employed to coordinate this service (4.34) and simulations have been carried out with key actors in the territory on how to intervene in the event of an emergency situation (4.15).

Community preparation also involves carrying out an analysis of the risks to which the locality is exposed (3.87), adopting emergency management plans (3.66) and keeping a record of volunteers willing to help in the event of unforeseen situations.

The level of perception regarding the implementation of infrastructure investments to prevent emergency situations is average (2.62), which illustrates that some localities have not taken the necessary measures to prevent these risks, although these localities have identified risks that could arise. There may be several causes that explain this situation. A possible reason could be that the municipalities do not have the financial resources to make the necessary investments or that making the necessary investments is not the responsibility of the municipalities. Another reason may be that they perceive that there is a low probability of the identified risks occurring or, in the event of their occurrence, the intensity of the consequences will be low, so that very expensive investments would be disproportionate compared to the anticipated consequences.

Regardless of the risks that may arise, there is a need to make more investments in infrastructure to prevent the occurrence of emergency situations

Members of emergency services are some of the actors who know such situations best and therefore have an informed opinion about the characteristics of the localities they help to better overcome such situations. In this regard, respondents were given a set of statements and were asked to evaluate them on a scale from 1 to 5 (where 1 represents not at all and 5 represents very much). The main factors that help communities cope with emergency situations can be grouped into factors related to: a) local administration and the prevention measures they adopt, and b) locality characteristics.

The majority opinion is that a mayor concerned with the good administration of the locality is the most important factor for successfully overcoming an unforeseen situation (the average score is 4.45 out of 5). Other important factors related to local government are collaboration with other institutions (4.35) and warning the population about the risks that exist in the locality and educating citizens on how to intervene in emergency situations (4.28). Equally important are making investments to prevent the occurrence of emergency situations (4.15) and educating members of the Voluntary Emergency Service on the measures to adopt (4.16).

The characteristics of a locality are also important. Respondents are of the opinion that a community located in an area accessible by road overcomes an emergency situation more easily (4.24). A possible explanation may be that such localities can receive help faster or the population can find shelter more easily. The social capital of the community is another important factor.

Thus, localities where people help each other (4.13) or where residents are involved in community life and participate in decision-making (3.95) can more easily overcome situations that disrupt the proper functioning of the community. Localities are also more resilient if they have a medical unit with permanent staff (3.98) and a diversified economic base (3.46).

Table no. 2. Characteristics of a locality that helps in an emergency situation.

	Average	Standard deviation
The locality has a mayor concerned with good administration	4,45	0,555
There is good collaboration with other institutions that intervene in emergency situations	4,35	0,565
Residents have been warned about the risks existing in the locality	4,28	0,648
The locality is located in an area easily accessible by road	4,24	0,628
Investments have been made in the locality in infrastructure to prevent emergency situations	4,13	1,008
Residents help each other	4,15	0,772
There is a medical unit with permanent staff in the locality	3,98	0,685
Residents are involved in the life of the area and actively participate in decision-making	3,95	0,813
The locality has a diversified economic base	3,46	0,838
The locality's population is relatively young	3,2	0,992

The literature highlights the importance of social capital in a community for its ability to overcome emergencies. Members of emergency response institutions observe how people behave in such situations and can provide important information about how they help each other. Thus, respondents were asked to

evaluate on a scale from 1 to 5 (where 1 represents not at all and 5 represents very much) a series of statements regarding the behavior of citizens in emergency situations.

The data collected show that most often relatives help each other (mean score is 4.15) and neighbors offer help (3.94). These results are to be expected given the closer ties that exist between family members or between people living in the vicinity. We also observe high scores for the help provided to people who cannot cope with emergencies alone (3.7).

The result obtained for the statement that people would rather wait for the authorities to help them than help each other is interesting. The average score is 3.54, but the standard deviation is 1.009, which illustrates that opinions are divided among respondents, with some agreeing with this statement to a very high extent and others to a low extent.

The result can be explained by the fact that people do not have the capacity to help others as long as they themselves need help, or solidarity between people may be lower in situations of natural disasters that have a large scope. The result that people prefer to put their lives in danger rather than leave their home is worrying (average score 3.26, but a possible explanation may be that the home is often the most valuable asset of a family, so people find it difficult to leave their home.

Table no. 3. The ways in which people help each other when an emergency occurs

	Average	Standard deviation
Relatives help each other	4,15	0,545
Neighbors help each other	3,94	0,620
People help people in need	3,7	0,772
Residents help each other when a critical situation occurs	3,61	0,778
People wait for the authorities to help them	3,54	1,009
Residents help each other after a critical situation occurs	3,46	0,842
People help to save people living in more isolated areas	3,45	0,802
People prefer to put their lives in danger than leave their homes	3,28	0,928

Respondents were asked to rate on a scale of 1 to 5 (where 1 represents not at all and 5 represents very much) the extent to which people offer each other different forms of help within the localities in the intervention area of the institution in which they work. The main ways of helping each other are announcing the imminence of a danger (average score is 3.75) and offering emotional support and encouragement to other people (3.6). Support also consists of caring for the children of families affected by a disaster (3.45) and helping to save property (3.41) and people in danger (3.39). Physical labor support in rebuilding affected households is also common (3.05), but the standard deviation is 0.984, which means that this form of support is not used in all localities (see table 3).

When a large proportion of households in a locality are affected by a disaster, it is difficult for people to help each other, given that most of them need help. Above-average scores are also obtained for providing material aid (2.9) and financial aid (2.48), but these forms of aid are probably more difficult to provide in the case of disasters of extensive proportions. The results presented above illustrate the important role that City Halls play in emergency management by identifying the risks to which a community is exposed and taking measures to prevent and prepare communities for possible types of disasters. However, the research has shown that identifying risks is not always followed by investments in infrastructure to mitigate the danger. The main results obtained will be analyzed below.

As for framework agreements, their number decreased from 6.824 in 2021 to 6.675 in 2022 and then to 5.695 in 2023. This trend may indicate a change in the priorities of contracting authorities, influenced by factors such as legislative changes or different procurement strategies. However, the total value of framework agreements increased dramatically from 79.182.130 RON in 2021 to 460.463.433 RON in 2023, suggesting a strategic use for large-scale and economically important contracts. This indicates an increased preference for public procurement contracts over framework agreements, or this preference may be influenced by other factors, such as legislative changes or public procurement priorities.

Conclusions

As previously mentioned, city halls play an important role in various stages of the emergency management process. Good collaboration between the Emergency Inspectorates and the City Halls in their intervention

area contributes to a better capacity to intervene in such situations, and localities that have created a Voluntary Emergency Service and have a person responsible for this service are better prepared to deal with unforeseen events. In addition, localities that have a mayor concerned with the good administration of the locality and that have invested in the infrastructure for the prevention of natural disasters can better deal with the consequences of emergency situations.

The research showed that collaboration with other institutions that have responsibilities in the management process of these situations is equally important, being in line with the recommendations for using collaborative management in emergency situations. However, even though respondents consider it important for City Halls to identify the risks to which a locality is exposed and to develop intervention plans for such situations, fewer City Halls invest in infrastructure to prevent these situations. Given the unpredictable nature of many events, community preparation and the adoption of prevention measures are very important to mitigate the impact of these events. Community preparation is achieved through simulations and training of the population, as well as by educating the population to react to various warnings regarding the dangers that exist.

Research on emergency preparedness of local communities provides a solid framework that can be extended and applied in many practical and academic directions. Among the most relevant applications and extensions are: the development of customised guidelines and protocols, pilot projects in vulnerable communities, digital alert and education platforms, integration into sustainable development policies. At the same time the results can contribute to the development of local and regional strategies that include the community resilience dimension as a pillar of sustainable development and climate change adaptation.

Public institutions must coordinate their actions to prevent and prepare communities for more and more unexpected events, but at the same time, they should be flexible in finding solutions to deal with these events. The intervention capacity of public institutions and their legitimacy must be strengthened. Equally important is the strengthening of citizens' trust in public institutions in the context of crisis situations (Radu, 2021; Christensen, Lægreid and Rykkja, 2016), when they have to comply with less popular decisions.

Preparing local communities for emergencies must become a strategic priority, integrated into sustainable development policies, emphasising prevention, solidarity and shared responsibility.

References

Ansell, C., Sørensen, E. and Torfing, J., 2023. Public administration and politics meet turbulence: The search for robust governance responses. *Public Administration*, [online] 101(1), pp.3–22. https://doi.org/10.1111/padm.12874.

Beunen, R., Patterson, J. and Van Assche, K., 2017. Governing for resilience: the role of institutional work. *Current Opinion in Environmental Sustainability*, [online] 28, pp.10–16. https://doi.org/10.1016/j.cosust.2017.04.010.

Burlacu, S., 2019. Transparency and Visibility in The Administrative Process at Local Level and The Decision-Making Process in Romania, 34th International-Business-Information-Management-Association (IBIMA) Conference, ISBN978-0-9998551-3-3 Page1312-1323.

Călin, A.M., Burlacu, S., Mocanu, V. and Popescu, M.L., 2022. Digital Public Management Governance. [online] https://doi.org/10.24818/BASIQ/2022/08/012.

Chang Seng, D.S., 2013. Tsunami resilience: Multi-level institutional arrangements, architectures and system of governance for disaster risk preparedness in Indonesia. *Environmental Science & Policy*, [online] 29, pp.57–70. https://doi.org/10.1016/j.envsci.2012.12.009.

Christensen, T., Lægreid, P. and Rykkja, L.H., 2016. Organizing for Crisis Management: Building Governance Capacity and Legitimacy. *Public Administration Review*, [online] 76(6), pp.887–897. https://doi.org/10.1111/puar.12558.

Cimellaro, G.P., 2016. *Urban Resilience for Emergency Response and Recovery*. Geotechnical, Geological and Earthquake Engineering. [online] Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-30656-8.

Cram, B. and Garcia-Zanor, J.C., 2016. Enhancing Community And Economic Development Postdisaster Through The Increased Resilience Of Women. In: *Cities and Disasters*. Routledge.

Duda, P.I., Kelman, I. and Glick, N., 2020. Informal Disaster Governance. *Politics and Governance*, [online] 8(4), pp.375–385. https://doi.org/10.17645/pag.v8i4.3077.

Farazmand, A., 2007. Learning from the Katrina Crisis: A Global and International Perspective with Implications for Future Crisis Management. *Public Administration Review*, [online] 67(s1), pp.149–159. https://doi.org/10.1111/j.1540-6210.2007.00824.x.

Henstra, D., 2010. Evaluating Local Government Emergency Management Programs: What Framework Should Public Managers Adopt? *Public Administration Review*, [online] 70(2), pp.236–246. https://doi.org/10.1111/j.1540-6210.2010.02130.x.

Kapucu, N., Arslan, T. and Demiroz, F., 2010. Collaborative emergency management and national emergency management network. *Disaster Prevention and Management: An International Journal*, [online] 19(4), pp.452–468. https://doi.org/10.1108/09653561011070376.

Kapucu, N., Arslan, T., Demiroz, F., 2010. Collaborative Emergency Management and National Emergency Management Network, Disaster Prevention and Management, 19(4), pp.452-468.

Krogh, A.H. and Lo, C., 2023. Robust emergency management: The role of institutional trust in organized volunteers. *Public Administration*, [online] 101(1), pp.142–157. https://doi.org/10.1111/padm.12894.

Ladaru, R.G., Burlacu, S., Guţu, C. and Platagea Gombos, S., 2022. Human resources management - labor crisis. In: *30 Years of Economic Reforms in the Republic of Moldova: Economic Progress via Innovation and Competitiveness, Vol II*. [online] Academy of Economic Studies of Moldova. pp.187–194. https://doi.org/10.53486/9789975155649.29.

Masterson, J.H., Peacock, W.G., Van Zandt, S.S., Grover, H., Schwarz, L.F. and Cooper, J.T., 2014. *Planning for Community Resilience: A Handbook for Reducing Vulnerability to Disasters*. [online] Washington, DC: Island Press/Center for Resource Economics. https://doi.org/10.5822/978-1-61091-586-1.

McGuire, M. and Silvia, C., 2010. The Effect of Problem Severity, Managerial and Organizational Capacity, and Agency Structure on Intergovernmental Collaboration: Evidence from Local Emergency Management. *Public Administration Review*, [online] 70(2), pp.279–288. https://doi.org/10.1111/j.1540-6210.2010.02134.x.

Melo Zurita, M.D.L., Cook, B., Thomsen, D.C., Munro, P.G., Smith, T.F. and Gallina, J., 2018. Living with disasters: social capital for disaster governance. *Disasters*, [online] 42(3), pp.571–589. https://doi.org/10.1111/disa.12257.

Rădulescu, C.-V., Mănescu, C.-O., Popescu, M.-L. and Burlacu, S., 2023. Sustainable Development in Public Administration: Research, Practice, and Education. *European Journal of Sustainable Development*, [online] 12(4), p.27. https://doi.org/10.14207/ejsd.2023.v12n4p27.

Make Agriculture and Energy Green Again

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Abstract

Following the initial decade of the 21st century and the onset of the financial crisis that evolved into a debt crisis, the global population is confronting another challenge, the food crisis; nevertheless, certain remedies may be anticipated as preemptive measures. This paper aims to elucidate various scenarios that could mitigate instances of exceeding limits, such as enhancing agribusiness through timely delivery solutions and reducing the carbon footprint of existing electric power-consuming units in factories, industrial sites, and food production or preparation processes, while promoting the intelligent generation of green energy. The shared factor of the innovative and sophisticated solutions arises from the engagement of the IT&C sector and its computational capabilities.

Keywords

agriculture, innovation, big data analysis, interconnectivity

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Introduction

Interdisciplinary innovation propels the future of sustainable and highly productive agriculture (Buzoianu, et al., 2024). We must incorporate the concept of interconnection propelled by the Internet of Things and acknowledge that Gordon Moore's law remains applicable and evolving as we speak. Moore observed in the early 1960s that the processing power unit's price diminishes by half every 18 months, a phenomenon that suggests that, in a few years, the costs associated with IT-driven industries will approach $0. The sole alteration in Moore's Law from the 1960s to the present is the reduction of the halving time from 18 months to 9 months. The concept of commercial tradeoff occurs among merchants, agricultural producers, and clients, centered on maximizing profits, minimizing the business turnover process for traded items (particularly perishable agricultural products), and expanding the geographical market region.

The increasing global emphasis on sustainability has exacerbated the necessity for innovative solutions in energy management and agriculture, underscoring the vital role of interconnected systems, data analytics, and technology. Big data has emerged as a transformative force, revolutionizing sustainable agriculture by improving efficiency, reducing waste, and ensuring resource optimization. For example, a systematic review of big data applications in agri-food supply chains emphasizes the substantial influence of data-driven strategies on soil management, crop monitoring, and supply chain traceability (Rejeb et al., 2021). This is consistent with the tenets of smart agriculture, which involve the utilization of digital tools and data analytics to meet the increasing demand for environmentally friendly products, minimize losses, and optimize production.

In the same way, the potential to optimize energy production has been demonstrated by the integration of big data and analytics in renewable energy, particularly in solar energy systems (Briones et al., 2017). Advanced data-driven solutions have the potential to improve the efficiency of energy grids, optimize power generation, and facilitate the transition to sustainable energy sources. Additionally, the utilization of big data has been instrumental in the enhancement of food supply chain management by guaranteeing

product traceability, reducing waste, and increasing transparency (Margaritis et al., 2022). Collectively, these studies demonstrate the potential of data-driven innovation to revolutionize the agricultural and energy sectors, thereby establishing a basis for the creation of sustainable, interconnected systems that are consistent with environmental objectives.

1. Methodological Approach on Agriculture as a Sustainable Business and Process

To build on this actual research paper we developed a 50/50 approach on what it takes to be green again, and we followed the process behind waste as one of the main issues of the agricultural supply chain and how it can be reduced through geographical targeting.

1.1. Lower Waste in the Agricultural Supply Chain

The agricultural sector, which operates on a business-to-business and business-to-consumer model, relies on economic scale processes over time (Burlacu et al., 2018). This framework encompasses three evolutionary factors: establishing work standards, large-scale implementation, and minimizing downtime (Bran, Bodislav, 2012). The harvesting process architecture must also optimize consumer engagement through a timely distribution method. To achieve a comprehensive understanding, it is essential to acknowledge the environmental and health standards that must be adhered to regarding crops, whether they are organic, ecological, or genetically modified organisms (GMOs). These standards are increasingly significant to consumers as well as regulatory agencies (Low, Vogel, 2011). When evaluating large retailers, specifically Wal-Mart, Tesco, and Carrefour in 2014, it is evident that they prioritize offering environmentally friendly products by creating customer-oriented spaces tailored to individual preferences and the geographic origin of the products. To enhance distribution efficiency to retailers and final consumers, the operational and developmental strategy was delegated to the carrier, as they can optimize downtime by calculating the intervals for production, harvesting, processing, and transportation to retailers. This enables them to provide a product life cycle sufficient to prevent losses due to expiration dates (commonly referred to as shelf life - Profiroiu et al., 2019).

The production process can also be regarded as a horizontal development component within the agriculture sector, which is integral to the vertical distribution chain leading to the end consumer, whose payments support other complimentary businesses (Prăvalie et al., 2013). Local production serves as the initial phase of agricultural recovery; however, it faces competition from global output that is excessively industrialized or chemically treated.

It may be regarded as one of the few sustainable types of outsourcing in the long term (Radulescu, Bran, and Burlacu, 2019). Outsourcing can ultimately undermine organizational culture and impede a company's progress, fostering detrimental dependency and the potential emergence of a competitor from the subcontracted entity (Bran, Bodislav, 2012). The equilibrium established through the agricultural conglomerate's production outsourcing method is distinctive as it signifies a mutually beneficial scenario in the long term (Ata et al., 2012). To outsource a local process of a global conglomerate, it must be aligned with the retailer's distribution system by restructuring the distribution network. This can be achieved by optimizing the relationship between agricultural producers/processors and the retailer's store chain or by establishing continuous flow depots to supply the retailer's stores. This approach incurs additional storage and new distribution costs between the depot and the stores, while the intense competition precludes the establishment of price disparities.

1.2. Geo-targeting for Reducing Waste

The perishability of agricultural products will restrict the feasibility of delivering to far stores, which is why producers cannot produce vast quantities, as demand is limited. If transportation costs are substantial, the retailer utilizes the deposit unit for store deliveries. Moreover, this issue is compounded by population growth, as the global development strategies of major consumer retail corporations (such as Wal-Mart, Tesco, Carrefour, etc.) are predicated on population density. In areas of population growth, there is a corresponding increase in the number and size of stores, leading to heightened consumption (Bran, Bodislav, 2012). The increase in population density enhances the economies of scale for agricultural producers, whether through extensive development (which is challenging due to the unavailability of arable land in urban areas) or through intensive development (provided that environmental and healthcare standards are maintained – Ata et al., 2012).

The solution that favors the local production model lies not in specialization but in distribution; the cost of distribution is crucial for success, provided it is managed by either the producer or the retailer, while maintaining a total cost that remains lower than that of competitors and allows for an optimal profit margin (Bran, Bodislav, 2012). Prioritizing profits entails assessing vertical differentiation, thereby enhancing the local agricultural producer by establishing new brands based on their attributes, such as organic or ecological crops in contrast to conventional agricultural products.

The innovation introduced by Big Data analysis and the Internet of Things (IT&C's physical synergy) in the merchandising sector facilitates an advanced distribution system for fresh products, adhering to stringent healthcare standards and aligning products within the bio or eco niches. A pertinent example is FarmPlate (USA), which leverages internet connectivity to engage consumers who advocate for locally sourced products from producers categorized by product type (bio, eco, or mainstream).

The clients embrace bio and eco-friendly products as primary attributes at a certain degree of professional knowledge and above-average earnings. FarmPlate leveraged their client's attributes to establish "a community for consumers of sustainable agricultural products" (with sustainability encompassing organic and ecological products), which embodies YELP, an online platform (informational marketplace) connecting those seeking sustainable agricultural products with providers, as well as facilitating reviews for each product (Bran, Bodislav, 2012). Client data constitutes a database or Big Data that embodies a model of expectations for future consumption, so transforming into an asset provided to agricultural farmers, restaurant proprietors, and health-conscious culinary enthusiasts. The legitimacy of these platforms is derived from their complete openness, which conveys professionalism to participants and demonstrates their endorsement of sustainable products and foods. In the United States, bio, eco, organic, and natural fashion has become nearly ubiquitous, trending towards mainstream acceptance. This shift validates theories related to group membership, as consumers increasingly opt for local products. Furthermore, this alternative presents a long-term business opportunity by aligning demand with supply, potentially eliminating retailers from the merchandising equation.

2. Big Data Analysis and Intelligent Interconnectivity - Reducing the Cost Disparity for Achieving Comparability Between Conventional and Renewable Energy

In the renewable energy sector, the solar energy niche achieves a yield of 75%, attributed to the physical efficiency of the silicon utilized in solar panels and the reconfiguration of the solar energy absorption system, resulting in a yield of 92% (Bodislav, 2011). The yield of 92% represents the utmost attainable efficiency after all physical components, including silicon, have attained their optimal performance, and the construction and development methodologies of the technical and managerial systems have achieved their peak efficiency (Rădulescu et al., 2023). How can we achieve a 100% yield? An integrated efficiency management system establishes a connection between Information Technology and Communication (IT&C), Gordon Moore's law of system efficiency, and the optimal yield for solar energy acquisition, which currently reaches a maximum of 98%, significantly surpassing the conventional yield of 75% achieved through traditional methods (Bodislav et al., 2025a).

A comprehensive project validating this solution has previously been executed by Silicon Valley entrepreneur Bill Gross, an expert in fossil fuels. His fervor in pursuing the concept of "green" technology has yielded results today by establishing a pioneering presence in the field. He is the principal stakeholder of eSolar, a firm that constructs solar energy facilities; Aptera, which manufactures electric vehicles; and Energy Innovations, a developer of advanced photovoltaic technology (Bodislav, 2011). The "laboratory" for this initiative is exemplified by the largest contract awarded to an independent green energy producer: providing the technology to construct a solar "farm" in China capable of generating 2000 megawatts, comparable to two high-capacity nuclear power reactors (Liu et al., 2014).

The operational and construction principles of a solar energy power plant involve positioning thousands of mirrors, known as heliostats, to concentrate sunlight onto water-filled boilers situated atop towers, which then heat the water. The heat produces steam that activates a turbine, which generates power. The prototype plant, designated Sierra, was established in 2009 in the desert outside Los Angeles and generates 5 megawatts of energy.

This innovative technique represents a technical and economic reconfiguration of power towers, utilizing advanced management and imaging software to handle 176,000 mirrors that produce 46 megawatts. Computational processing power accurately positions the focal point of each mirror that constitutes a huge parabolic mirror directed at the sun (Wood, 2010). The economic performance is characterized by: - a parabolic mirror constructed from numerous smaller mirrors, which are less expensive than a single large

mirror (the cost of mirrors increases exponentially with size); - reducing the surface area of each mirror diminishes the land requirement for construction on a level surface (the land acquisition cost is lower); - installation and manufacturing costs decrease due to simplified deployment.

Moore's Law is referenced more frequently than the rules of physics or the steel utilized in manufacturing (Anderson, 2008). New efficiency models for generating electricity using sustainable ways can be developed by forming innovative partnerships, such as one between a green energy firm and technology and innovation organizations like Google (Major and Kiss, 2013). A crucial lesson is to adopt a philosophical perspective on computer-generated green energy. According to Moore's Law, a processor that cost $5,000 a decade ago is now priced at $5, allowing for the installation of a microprocessor in each mirror. These microprocessors compute real-time statistics on their status, position, confidence coefficient of the received data, and data accuracy, with each mirror obtaining this information individually. The organizational framework of a green-tech enterprise parallels that of online-centric businesses, as both necessitate the generation of logs for each data entry, including complete rotation cycles of turbines, measurements from control towers, and video observations of the energy production grid. This establishes a comparable system of "data mining" and "data analysis" (Branson et al., 2010).

A classic software corporation is established following a transformation process that transitions from technology and management practices to system programming, enhancing all power plants that generate "green" energy (Gaillard, 2013). This is a significant distinction between old technology and future technology from a solar perspective. If a substantial area of solar panels is established, they are designed to endure 25 years of continuous operation. They exhibit same performance without any potential enhancements.

A software upgrade can be implemented at each plant, augmenting the initial yield by 3%. However, to generate renewable energy for the entire planet, there exists a significant capital deficit. Efficiency improves every six months through software upgrades designed to enhance system performance in power plants (Wood, 2010). Enhancements can be implemented in the hardware components of power plants; nevertheless, even in the absence of hardware upgrades, software modifications can generate increased power output.

A significant issue lies in the substantial capital expenditure required for the implementation and advancement of innovative methodologies in renewable energy, particularly solar energy (Angheluta et al., 2019). However, a notable distinction is that, despite renewable energy being analogous to energy derived from traditional methods, such as thermal (coal), all capital must be presented upfront to cover fixed costs and expenses for a 20-year period of utilization (Bodislav et al., 2020).

In a thermal power plant, the requisite capital constitutes 20% of the overall operational costs, whereas 80% pertains to coal consumption during a 20-year period. In renewable energy, around 80-90% of the initial expenditure is allocated to plant construction, while fuel expenses are nonexistent; the sole ongoing expense is to maintenance and operations, which remains minimal. The primary restraint is the elevated costs, which restrict the expansion and final energy output capacity of the plant (Wood, 2010).

A technique involves establishing an energetic hedge fund, compelling the client to accumulate the requisite capital for constructing the plant (Stanislaw, 2010). The transition to green energy requires substantial resources, yet the primary challenge is that this capital must be provided upfront (Diaconu et al., 2019).

In 2011, Germany is developing and executing one of these innovative energy mega-structures. Facilitated access to funding enhances the direct execution of the project in the market while simultaneously increasing its visibility and viability. Virtually Ferrostaal, a German plant developer, possesses the expertise to create traditional thermal plants enhanced by the technology created by eSolar.

This efficiency strategy for harnessing renewable energy, specifically solar energy, was deployed on a big scale in China at a power plant with an installed capacity of 2000 megawatts. The Chinese facility marked a significant achievement in worldwide business, with development progressing seamlessly due to an effective methodology and requisite capital, without the complications of securing challenging bank contracts (Pauna et al., 2022). Another advantage for China is the extensive territory available for the establishment of power plants. China is an advantageous location for the advancement of such systems. Alongside accessible capital and a substantial growth rate, there exists a significant demand for energy. These implementations are not driven by global benevolence; rather, they are motivated by necessity to ensure that the globe benefits from the innovations developed. The towns in China are recognized as filthy, and the current generation of electric energy serves as a significant and ongoing source of pollution for the country (Li-qun et al., 2014).

The market decline imposed significant financial limitations. The current global market surpasses the US market in power, as evidenced by the increasing global demand for renewable energy (Drzik, 2011). This style of power plants is also present in the US; nevertheless, they are unable to match the rapid advancement of the global energy market driven by renewable techniques. The USA aims to adopt a renewable energy model by establishing institutions for financing and securing the requisite funds to develop solar energy in innovative power plants. Another factor is the economy, which must adapt to facilitate this transformation, necessitating that bank devise methods to simplify credit offerings in these regions. Another issue is the current lack of support from the energy sector. Other green technologies, aside from those involving solar energy, are on the verge of significant enhancement.

Electric energy storage, encompassing both solar and conventional technologies, is a crucial element in enhancing the significance of renewable energy globally, more effective transportation modalities. For example, companies such as Aptera exhibit remarkable innovation in achieving optimal efficiency for both urban and extra-urban everyday transportation. One method to reduce energy consumption is to enhance aerodynamic efficiency, hence minimizing fuel combustion. The model produced by Aptera achieves a fuel efficiency of 1.2 liters per 100 km. The advancement of the technologies results in transport efficiency with zero emissions, exemplified by firms such as Tesla Motors, which offers models like the Tesla S with a range of 480 km on a full charge.

The research model represents an innovation, commencing with the establishment of the Sierra pilot power plant and culminating in the formation of the Indian subsidiary of eSolar, Distributed World Power. The advancement in research is attributed to the testing methodology: two miniature power plants were constructed to supply energy to a household and a freshly established tiny hamlet. This approach evaluates the minimum required volume for efficient manufacturing and the corresponding market to ensure affordability for a big audience (Burlacu et al., 2022).

The European Union is a leading global advocate for the development and consumption of renewable energy. The Lisbon Strategy and the Horizon 2020 structural financing program promote the advancement of producers and infrastructure.

Upon examining the proportion of renewable energy in total power generation at the EU28 level, we will assess the actual economic equilibrium between the share of renewable energy utilized in real consumption at the EU28 level. What is the rationale for implementing this measure? This perspective on final consumption reveals the negative externalities that contribute to the ongoing melting of the Arctic ice and the annual rise in global temperatures.

Norway is unequivocally Europe's leading champion in renewable energy, primarily due to its geographical attributes, with nearly two-thirds of its electricity derived from renewable sources. However, projections indicate that by 2020, Sweden will surpass Norway, currently ranked second in the utilization and implementation of renewable energy systems within the smart grid (Bodislav et al., 2025b).

The European Union's economy is increasingly adopting sustainable practices, adhering to the Agenda 2020 timeline, and assessing the overall development of the renewable energy sector in relation to the hierarchical structure of electricity production, while aligning with final consumption patterns.

In the long term, the European Union is progressing towards establishing a macro-renewable ecological and economic model, particularly by employing solutions that integrate systems through big data analysis and a novel methodology, referred to as innovative disruption within the macroeconomic supply chain.

Conclusions

This may pose a challenge. Similarly, the Americans' training was pivotal to their victory upon entering the Second World War. Following the victory in the war, the subsequent objective was to eliminate poverty, illiteracy, and curb the proliferation of diseases, including cancer and degenerative conditions. The concept posits the existence of a "Game Over," the timing of which remains unknown until it is reached. The possibility of approaching the “end of the game” serves as a compelling impetus for achieving optimal efficiency in technological advancements within the solar energy sector. Does this fact facilitate the technique for generating electric energy from fossil fuels? Negative. The path dependence is anti-cyclical; however, one must not disregard the notion that the gradual evolution of government may be influenced by affluent and powerful individuals whose primary interests lie in acquiring electric energy through conventional means, or who possess coal mines or extensive oil reserves. The "renewable" method in the energy sector faces greater political obstacles than technological challenges compared to the traditional approach.

Returning to the first scenario emphasized in this study article, we can assert that establishing an appropriate framework for process timings, harvest production, and geographical distribution, encompassing both distances and population density. Cost reduction through transportation and product differentiation enhances profit margins for agricultural producers and retailers; however, the equilibrium often favors retailers, as they can capitalize on client-targeted marketing (profit margins are greater in business-to-consumer relationships than in business-to-business interactions). Formulating distribution strategies may serve as a framework to engage a larger retail group as a prospective client for agricultural producers, particularly as circumstances adversely affect another supplier, since the transportation costs incurred by the producer influence the acquisition of a supplier contract (Georgescu, 2020).

In the long term, the impact of innovation and interconnectivity arising from synergistic interactions among the Internet of Things, Big Data analytics, and Business Intelligence will fundamentally alter traditional paradigms regarding the production, distribution, and marketing of bio, eco, organic, and natural products, as well as contribute to reducing the carbon footprint through the utilization of efficient and cost-effective green energy, grounded in the same technological IT&C principles.

References

Anderson, C., 2008. Free! Why 0.00 is the Future of Business. [online] Wired Magazine. Available at: < https://www.wired.com/2008/02/ff-free/ > [Accessed 10 March 2025].

Angheluta, S.P., Burlacu, S., Diaconu, A. and Curea, C.S., 2019. The Energy from Renewable Sources in the European Union: Achieving the Goals. *European Journal of Sustainable Development*, [online] 8(5), p.57. https://doi.org/10.14207/ejsd.2019.v8n5p57.

Ata, B., Lee, D. and Tongarlak, M.H., 2012. *Got Local Food?.* (Working Paper). Harvard Business School.

Bodislav, D.A., 2011. The internet: source for the globalization of the market of goods and services. In: *Globalization & Business Conference 2011*, Sofia, Bulgaria.

Bodislav, D.A., Moraru, L.C., Georgescu, R.I., Grigore, G.E., Vlăduț, O., Staicu, G.I. and Chenic, A. Ștefania, 2025. Recyclable Consumption and Its Implications for Sustainable Development in the EU. *Sustainability*, [online] 17(7), p.3110. https://doi.org/10.3390/su17073110.

Bodislav, D.A., Nițu, R.M., Pirosică, G.I. and Georgescu, R.I., 2025. The Opportunity Cost Between the Circular Economy and Economic Growth: Clustering the Approaches of European Union Member States. *Sustainability*, [online] 17(6), p.2525. https://doi.org/10.3390/su17062525.

Bodislav, D.A., Radulescu, C.V., Bran, F. and Burlacu, S., 2020. P Public Policy in the Areas of Environment and Energy. In: R. Pamfilie, V. Dinu, L. Tăchiciu, D. Pleșea, C. Vasiliu eds. *6th BASIQ International Conference on New Trends in Sustainable Business and Consumption.* Messina, Italy, 4-6 June 2020. Bucharest: ASE, pp. 228-235

Bran, F. and Bodislav, D.A., 2012. *Locally or Globally: Agribusiness from the Globalization Perspective, chapter in Agri-Environment: Perspectives on Sustainable Development*. Cluj Napoca: Bioflux Publishing House.

Branson, R., Bodislav, D.A. and Stoyanova, P., 2010. If I could do it all over again. *The Wall Street Journal*.

Briones, G.F.E., Jacome, N. and Arroyo-Figueroa, G., 2017. Big Data & Analytics to Support the Renewable Energy Integration of Smart Grids – Case Study: Power Solar Generation, *Conference Proceedings: 2nd International Conference on Internet of Things, Big Data and Security*, available at: https://www.researchgate.net/publication/317299122_Big_Data_Analytics_to_Support_the_Renewable_Energy_Integration_of_Smart_Grids_-_Case_Study_Power_Solar_Generation#fullTextFileContent

Burlacu, S., Bodislav, D.A. and Rădulescu, C.V., 2018. E-Commerce and Global Food Resources. *Managerial Challenges of the Contemporary Society. Proceedings*, 11(2), 48.

Burlacu, S., Georgescu, R.I., Moise, D., Cretu, R.F., Gombos, S., Buzoianu, O. and Rotaru, C. 2022. The Tension between Adjusted Net Savings, Sustainable Growth and Resource Depletion. *ECONOMIC COMPUTATION AND ECONOMIC CYBERNETICS STUDIES AND RESEARCH*, [online] 56(3/2022), pp.265–277. https://doi.org/10.24818/18423264/56.3.22.17.

Buzoianu, O.A.C., Iacob, O., Mateescu, V.M. and Burlacu, S., 2024. Balancing Economic, Environmental, and Technological Systems for Sustainable Agricultural Development in Romania. *European Journal of Sustainable Development*, [online] 13(4), p.153. https://doi.org/10.14207/ejsd.2024.v13n4p153.

Diaconu, A., Popescu, M.L., Burlacu, S. and Buzoianu, O.C.A., 2019. *Strategic options for the development of renewable energy in the context of globalization*. In: International Management Conference. Bucharest, Romania: Faculty of Management, Academy of Economic Studies. Vol. 13, No. 1, pp. 1022–1029.

Drzik, J., 2011. *The new rules of energy sustainability*. Davos-Klosters: World Economic Forum Annual Meeting 2011.

Gaillard, L., 2013. Towards a green economy: in search of sustainable energy policies for the future. *Australian Geographer*, [online] 44(2), pp.218–220. https://doi.org/10.1080/00049182.2013.789587.

Georgescu, R.I., 2020. *Strategii de valorificare a resurselor naturale în contextul globalizării*. Bucharest: Universitara Publishing.

Li-qun, L., Chun-xia, L. and Yun-guang, G., 2014. Green and sustainable City will become the development objective of China's Low Carbon City in future. *Journal of Environmental Health Science and Engineering*, [online] 12(1), p.34. https://doi.org/10.1186/2052-336X-12-34.

Low, S.A. and Vogel, S., 2011. *Direct and intermediated marketing of local foods in the United States*. Economic Research Report no. 128. Washington, D.C.: United States Department of Agriculture (USDA).

Major, I. and Kiss, K.M., 2013. Interconnection and incentive regulation in network industries. *Acta Oeconomica*, 63(1), pp.1–21.

Margaritis, I., Madas, M. and Vlachopoulou, M., 2022, Big Data Applications in Food Supply Chain Management: A Conceptual Framework, *Sustainability*, 14(7), pp. 1 – 21.

Pauna, V., Diaconu, A., Gombos, S. and Georgescu, R.I., 2022. Banking management in the prism liquidity–profitability interrelation. *Theoretical and Applied Economics*, 29(1), pp.93–100.

Prăvălie, R., Peptenatu, D. and Sirodoev, I., 2013. The impact of climate change on the dynamics of agricultural systems in south-western Romania. *Carpathian Journal of Earth and Environmental Sciences*, 8(3), pp.175–186.

Profiroiu, M.C., Rădulescu, C.V. and Burlacu, S., 2019. Aspects of quality of life in urban areas of the European Union. In: *Proceedings of the Administration and Public Management International Conference*. Bucharest, Romania: Research Centre in Public Administration and Public Services. Vol. 15, No. 1, pp.3–11.

Rădulescu, C.V., Bran, F. and Burlacu, S., 2019. Strategic options for managing sustainable business. In: *MIC 2019: Managing Geostrategic Issues; Proceedings of the Joint International Conference*.

Rădulescu, C.V., Gâf-Deac, I.I., Bran, F., Mănescu, C.O., Bodislav, D.A. and Burlacu, S., 2023. The mix of resources, security and sustainability of the energy complex in Romania in the European context. *Amfiteatru Economic*, 25(63), pp.447–447.

Rejeb, A., Rejeb, K., and Zailani, S., 2021. Big data for sustainable agri-food supply chains: a review and future research perspectives, *Journal of Data, Information and Management*, 3, pp. 167 – 182.

Stanislaw, J.A., 2010. A new green deal and future of global energy: a policy perspective. In: A. Goldthau and J.M. Witte, eds. *Global energy governance: the new rules of the game*. pp.183–192.

Vlăduț, O., Grigore, G.E., Bodislav, D.A., Staicu, G.I. and Georgescu, R.I., 2024. Analysing the connection between economic growth, conventional energy, and renewable energy: a comparative analysis of the Caspian countries. *Energies*, 17(1), pp.1–30.

Wood, T., 2010. A high-tech entrepreneur on the front lines of solar. *Yale Environment 360* [online]. Available at: https://e360.yale.edu/ [Accessed 8 April 2025].

The Sustainability Design of EU Policy – Economic Growth and Climate Change

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Abstract

This study aims to analyse the solutions developed for the long-term implementation of proactive climate change policies and the introduction of new mechanisms to modify behaviours across European Union countries, with a particular focus on Romania. Using a qualitative research methodology based on document analysis and a systematic review of legal and economic policy frameworks, the study evaluates the current instruments employed by the EU and Romania in pursuing sustainability and decarbonization goals. The analysis is grounded in publicly available legislative acts, strategy documents, and performance indicators relevant to the European Green Deal and "Fit for 55" package. The results delineate a decision-making matrix built around four primary features of the Romanian economy as an EU member state. The study contributes to the academic discourse by offering a comprehensive synthesis of EU climate governance practices contextualized for an emerging economy. From a policy-making perspective, it identifies institutional and structural alignments required for effective climate action implementation in Romania, offering guidance for adaptive national strategies aligned with EU directives.

Keywords

Climate change, clean energy, sustainability, competitiveness, economic growth.

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Introduction

Consistent with the principles of the United Nations Framework Convention on Climate Change (UNFCCC), to which Romania is a committed signatory, climate change is now broadly recognized as a critical challenge stemming from both direct and indirect human activities that alter the global atmosphere and accelerate long-term climate variability (Acocella, 2009; Angheluta et al., 2019). These changes pose escalating threats to ecosystems, public health, food security, and economic development trajectories (Burlacu et al., 2022). Despite extensive global and national mitigation efforts, the average world temperature continues to rise, driving environmental degradation and diminishing agricultural productivity (Buzoianu et al., 2024.

Romania, like other EU member states, is now compelled to manage the twin challenge of adapting to climate impacts while contributing to mitigation efforts through legislative reform, green innovation, and public awareness campaigns (Mogos et al., 2021). Recent years have seen Romania strengthen its alignment with EU environmental strategies, notably through its commitment to the European Green Deal, the “Fit for 55” package, and energy transition objectives — all of which aim to reduce greenhouse gas emissions, increase the share of renewable energy, and improve energy efficiency by 2030.

The aim of this study is to analyze and systematize the legal and economic instruments underpinning climate change policy implementation within the European Union, with a focus on their application and relevance to Romania. The paper seeks to address the following research questions:

1. What are the primary legal and policy instruments adopted by the EU to promote sustainability and decarbonization?
2. How have these instruments been transposed and operationalized in Romania?
3. What are the challenges and opportunities faced by Romania in aligning with EU sustainability goals?

The study's novelty lies in its systematic integration of economic and legal perspectives on climate policy in the EU and Romania, offering a cross-sectoral understanding that bridges academic literature and policymaking. Existing research tends to either isolate legal frameworks or economic dynamics; this study contributes by unifying them in a comparative context tailored to an emerging economy. Moreover, it addresses a critical gap in the literature related to the institutional coherence and operational capacity of member states like Romania to implement EU-mandated climate policies in real-world governance settings. In the post-pandemic and post-Ukraine-conflict context, energy security and sustainability are no longer parallel goals but converging necessities — making this analysis both timely and policy-relevant.

The structure of the paper is as follows. Section 1 explores the legal and economic frameworks that shape the implementation of climate and energy policy in Romania under the umbrella of EU directives. Section 2 examines the institutional interplay between markets and governments in driving sustainability outcomes. Section 3 discusses macroeconomic stability and output generation within the context of sustainable economic growth. The paper concludes by synthesizing the findings, outlining key policy recommendations, and suggesting directions for future research.

1. The legal and economic perspective for implementation

To foster the energy economy and increase the appeal of the energy industry to investors, the European Union must establish competitive prices to establish an internal energy market. The national objective is to satisfy immediate energy needs while simultaneously establishing a foundation for long-term energy security that is consistent with the needs of a modern market economy, thereby promoting a robust economy (Alchian, 1950). The Kyoto Protocol requires countries to reduce greenhouse gas emissions by 8% by promoting and adopting policies that address climate change and implementing sustainable development strategies (Cocean, Ilovan, 2008).

As a member of the European Union, it is crucial for Romania to align its energy sector policy framework with the EU's long-term objectives. The primary aims are enhancing security in energy distribution, fostering competition within the energy sector, mitigating environmental effect, and integrating Romania's smart grid into the regional energy market (Rojanschi et al., 2006). The primary strategic avenues in the energy sector's strategy that Romania aims to adopt in accordance with EU standards are:

1. *Energetic security.*

   Maintaining national integrity on basic resources for energy and respecting national options in:

   a) The energy industry,
   b) Growing the supply of energy and keeping a good degree of dependence in tune with the imports by hedging the import sources, their own energetic sources,
   c) The national and regional grid,
   d) International cooperation and protecting the infrastructure.

2. *Durable development.*

   Improving energetic efficiency in the supply chain (resources-production-transportation-distribution-final consumption) by:

   a) Optimizing the production and distribution processes and by lowering the end consumption of energy yielded with the real value of goods or services,
   b) By increasing the percentage of renewable energy in the total production and consumption of energy,
   c) Rational and efficient usage of not-renewable resources and progressive decreasing of its part in the final consumption,
   d) Promoting the production of electric energy at a high level of efficiency,
   e) Giving a bigger role to secondary energy resources,

f) Supporting Research, Development and Innovation divisions in the energy sector,
g) Decreasing the negative impact of the energetic sector on the environment and applying all measures on polluters.

3. *Competitiveness.*
a) Continuing development and tuning markets for energy, natural gases, oil, coal, uranium,
b) Promoting renewable resources by using green certificates in the international context,
c) Creating white certificates on yielded efficiency for energy,
d) Creating a market for green certificates,
e) Letting a free float for energy transit and assuring the access for participants to the national and international grid,
f) Developing the energy infrastructure,
g) Continuing the restructuring and privatization process in the energetic, thermal and natural gases sector,
h) Doing complete cycles on the restructuring process in the extractive sectors for growing the profitability and market access,
i) Developing a regional energy market in which Romania should play an important role.

In addition to national energy policies, there has been an increasing emphasis on regional and local execution, particularly through the energy rehabilitation of the extant building inventory and the modernization of urban heating systems. It is imperative to retrofit a minimum of 30% of older residential and public buildings to reduce energy consumption and CO_2 emissions. These initiatives are essential to Romania's comprehensive commitment to the EU Renovation Wave and the energy transition objectives of the Green Deal.

Concurrently, Romania is developing a more socially inclusive energy framework that helps vulnerable consumers by subsidizing their energy expenses and improving their access to contemporary energy services. Rural communities are the primary focus of attention, as improvements to energy infrastructure and heating systems are essential for bridging the energy access and efficiency disparity between urban and rural areas (Bodislav, 2011). Romania is promoting private-sector involvement in sustainable energy investments to expedite the green transformation. This encompasses facilitating the establishment of new renewable energy facilities that utilize eco-technologies, so aiding in emissions reduction and the decarbonization of the national energy infrastructure (Popescu et al., 2018).

Romania is susceptible to climate change and requires study and development of new solutions for biodiversity, agriculture, water resources, forestry, road infrastructure, transit, tourism, energy, industry, and healthcare (Mogos et al., 2021). Underprivileged communities rely on the direct utilization of natural resources due to their inadequate resources and limited ability to confront climate change and its consequences, such as natural catastrophes (Burlacu et al., 2018).

The legal framework established by the European Parliament and the EU Council mandates that Romania elevate the proportion of renewable energy sources (solar, wind, hydro, geothermal, biogas, etc.) in end-user energy consumption from 17.8% in 2005 to 30% by 2030, while the European average was 8.5% in 2005, with a target reached of 20% by 2020. The reference year was 2005, as the actual implementation commenced in that year for both Romania and the European Union. Moreover, Romania must achieve a renewable energy component of 55% by 2030. The Romanian energy distribution grid has integrated new production components to meet increasing demand and to proactively manage potential hazards, including two nuclear reactors at Cernavodă, the completion of hydroelectric projects, and the establishment of wind power facilities.

In Romania, each prospective sector has its adverse aspects assessed about climate change. The subsequent measures have been formulated and are progressing towards implementation:

- Implementing a proactive climate change system at both the application level and the legal framework for current and future policies.
- Budget configuration in accordance with the plans and national programs established to ensure the integration of sectoral policies.
- Establishing communication channels for the implementation of adaptation measures from the local to the international level. The initial focus is at the local level, as modifications are implemented based on solutions tailored specifically to the circumstances.
- Enhancing understanding of the impacts of climate change, as knowledge ultimately fosters behavioral modifications within societies and communities by informing them of the challenges they face.

The long-term strategy for 2030 for the European Union, including Romania, aims to comply with international and union laws to achieve climate change objectives by reducing gas emissions and establishing a proactive system to mitigate potential effects of climate change. By enhancing energy efficiency, direct energy consumption will diminish by 30%, and end-user consumption will decline by 26% relative to the current European Union average.

Clean technologies will expand in utilization, particularly in the energy sector and electric heating systems characterized by minimal carbon emissions. New power plants, particularly hydropower facilities, will be constructed to enhance the already underutilized capacity by 20%. To meet the demand for electrical energy required for economic development and consumption, two additional nuclear-powered reactors will be constructed. The thermal rehabilitation will expand to encompass 40 to 50% of the entire multi-leveled buildings as a concluding element of the proactive climate change system.

2. The purpose of markets and governments in the policy scheme for sustainability

To examine the notion of economic growth, one must begin with the complete framework (Aristotle, 2004), encompassing the market as the stage and the government as the director, to ensure the quality of the performance and its progression to new heights. The globally recognized definition of a market is a venue where commodities and services are exchanged. The market does not require a physical manifestation; it may be viewed as a worldwide telecommunications network in which economic agents, whether privately or state-owned, engage with the populace during the process of economic realization. When a model that is not associated with the market for state governance is incorporated, it is characterized by a limited degree of freedom, which typically contradicts the principles of competitiveness and capitalism; hence, this study will see the market as entirely free.

Market-based economies operate competitively, influenced by labor dynamics, where supply and demand serve as the primary factors for the medium and long-term prospects of welfare, development, and economic progress of a nation (Lipsey, Chrystal, 2002). In the contemporary economic landscape, we navigate a mixed economy wherein several factors exert influence on market operations, necessitating government involvement to restore market stability as required. While the market economy serves as the primary global economic model, there are discussions emphasizing the ideal and efficient level necessary to sustain competitiveness within the global economic framework. This paper's developed system emphasizes the correlation between the public and positive aspects of the private environment to establish a guiding framework for optimal intervention through corporate governance, implemented at the state level and tailored to the characteristics of an emerging state, such as Romania. The global notion of government and state governance denotes an entity that formulates, enacts, executes, and administers public policies (the government) while exercising executive, political, and legislative authority through mechanisms, statutes, and institutions within a specified territory (state governance).

Governance of the State

The governance process of a state is defined by the regulation and management of public policy within a political system. This governance approach is predicated on a government that operates under the principle of political unity, which ensures that its influence is felt throughout the entire apparatus and that all actions are carried out in accordance with the current political philosophy, which is determined by the situational context. In a parliamentary system, a linear process requires a coalition formed by the majority political parties. In contrast, governance in the private sector is the administration or management of a corporation, which is solely focused on achieving economic growth. The concept of corporate economic growth underscores the significance of achieving profits by satisfying the interests of shareholders and stakeholders through either comprehensive or intensive strategies, or by achieving other growth objectives in the medium to long term. All concerns must be assessed in relation to the way specific economic entities respond to laws or governmental procedures that define economic interactions among individuals. This ensures that the principles and objectives established by these laws and procedures are upheld. A precise examination of the boundaries of the economic framework and the legitimate participants involved is necessary to provide a coherent understanding of the complete economic process aimed at achieving economic growth. The market and the government are two critical components that are currently under scrutiny because of the interplay between social and economic factors. This is accomplished by focusing the conversation on the economy from a framework perspective. Certainly, there are other entities of potential greater significance, such as corporations (a concept that was initially explored by Coase in 1937 but has since failed to produce a sustained direct correlation or a lasting mathematical microeconomic model in economic research) (Coase, 1937), as well as nonprofit organizations that extend beyond households or government institutions.

Frequently, the Market and the Government produce opposing outcomes because of their divergent ideologies in the pursuit of individual or collective objectives. The contrast between democracy and oligarchy serves as a stark illustration of this (Bodislav, 2012a). Corporations and other organizations may pursue their corporate objectives by aligning with concealed group interests or other entities with social missions that may not conform to the government's social model (nonprofit organizations).

3.Macroeconomic stability and output generation

In order to promote economic development, it is necessary to harness growth in order to accomplish production that is in close proximity to the economy's potential output, or potential Gross Domestic Product. A foundation based on long-run aggregate supply is required to establish macroeconomic equilibrium, as its primary characteristics suggest that an increase in aggregate supply can increase real output and short-run employment rates, while also potentially contributing to inflation in the short term. At the convergence of short-run aggregate supply and aggregate demand, equilibrium is achieved.

The Gross Domestic Product is the primary metric used to evaluate the effectiveness of government actions and state governance and to measure economic growth. Nevertheless, it is essential to implement an optimal strategy that operates within the potential output range, thereby preventing both economic excess and underperformance (Pareto, 1906). This involves maintaining a GDP that is below its potential, a situation that is frequently observed in unstable economic conditions or under a government that fails to coordinate market activities. Consequently, the development and competitiveness of the nation or its economic agents are impeded. The output gap is represented by the positive gap (which exceeds the potential point) or the negative gap (which falls short of the potential). Short-term equilibrium is achieved by the intersection of aggregate demand and short-run aggregate supply, which determines the actual GDP level. A negative output gap is indicated when the actual GDP is less than the prospective GDP. This outcome is the result of the optimal utilization of production factors in conjunction with elevated unemployment. It can be rectified by diminishing real wages or aligning real GDP with its potential. This is in stark contrast to the situation in which the economy overheats, resulting in an excess of actual GDP over potential GDP.

The paradigm of economic growth and its associated policies underwent transformation following the conclusion of World War II, driven by the aspiration for economic recovery and the attainment of economic and social prosperity. The primary illustration of advantages derived from the pursuit of economic growth is provided by Far Eastern countries that, post-World War II, successfully established an environment conducive to social welfare enhancement while aligning national interests with those of the populace. The procedures for enhancing living standards in the Far East were protracted endeavors. The favorable view of economic growth is evident and accurate, provided that certain mechanisms conducive to economic growth are comprehended.

The conventional framework — the classical economic growth model

Wall Street's derivability (the economic valuation of certain components lacking tangible foundations, such as tertiary services, services derived from services, which in turn are based on other services) and the network economy, which achieved global productivity, transcended geographical limitations, and operated within a continuous 24-hour work cycle, were components that the traditional model of economic growth was unable to handle due to their complexity (the Internet emerged as a remedy for various issues that were not legally or commercially delineated). The local transaction model was transformed into a global operations framework with a 24-hour work cycle when NASDAQ New York staged its initial public offering in 2005 after merging with the well-known international electronic platform, Archipelago Exchange Chicago. The current economic growth model is under pressure from the new approaches based on modern norms and principles and in line with technological, economic, social, and environmental changes.

Since the third century has created a "global village" built on a network of global expansion that serves individual or collective interests (national, union, or global), the geographic component is another element that is not fully assessed. Engaging with changes in socio-economic life is necessary since the idea of globalization has led to changes in the concept of economic growth (Leibstein, 1966). Although the concepts of economic growth and economic policy to attain it were developed after World War II, they are constantly being altered by the economic changes that occurred at the beginning of this millennium, such as the dot-com crisis and the economic-financial-social crisis that began in 2007. The new problems lead to a new idea for a sustainable way to carry out economic expansion.

The phrase "economic growth" may appear generic, especially in times of recession, but it is not synonymous with the concepts of healthy or sustainable economic growth. This concept was initially

formulated in an economic setting over two centuries ago and was designed as a strategy for enhancing productivity at the firm level (microeconomic rationale). The trajectory of economic growth commenced with the formulation of economic growth theory in the 1940s, prompted by the Great Depression of 1929–1933, therefore illustrating the limitations of a microeconomic perspective on macroeconomic phenomena. What constitutes economic growth? This can be characterized as a favorable trend in certain global economic indicators (such as GDP growth or income growth) over an extended timeframe, as economic growth cannot be accurately assessed through short-term projections; it requires several annual cycles to manifest, and annual fluctuations should not be regarded as economic growth. To enhance economic growth, the upward trajectory must be sustained over the long term rather than being influenced by exogenous forces. While grounded in GDP growth, the methodology must incorporate a social perspective in relation to GDP per capita and its upward trajectory. Academic standards advocate for positive economic growth in every society due to the aspiration to enhance individual wellbeing; yet, scenarios such as stagnation, characterized by "zero economic growth," and decline, referred to as "negative economic growth," may arise (Georgescu, 2020).

One qualitative measure of economic growth is the expansion of welfare, which is based on structural and quantitative changes that take place over the medium to long term (Bodislav et al., 2025a). The roll-over phenomenon is an irreversible event that is independently brought about by the effectiveness of the production forces that support development (Smith, 1998). There is a conventional understanding of changes in the economic environment brought about by economic growth from a quantitative standpoint. This includes the measurement of the macroeconomic outcome and the idea of the amount of economic activity that produces a validated result as economic growth. As disparities between production growth and the availability of natural resources, between the well-being of the present generation and the capacity of future generations to meet their needs, and between economic performance and environmental preservation began to appear in the 1970s, the conventional model started to show its limitations.

Economic expansion was disrupted by the limitations of classical vision and post-1970s economic fluctuations, especially when the Bretton Woods agreement (fiat currency) ended and the standard parity between the US dollar and gold was terminated. The stress caused by this circumstance led to a reconsideration of the traditional view of the economic, social, and environmental landscape by embracing new, flexible concepts that arose at the beginning of the third millennium: sustainable growth.

The sustainable economic growth paradigm used today

In what ways did it result in long-term economic expansion? The need for these plans to create the new economy, known as "the information economy," which depends on information technology not included in the classical paradigm, was made clear by the reinterpretation of the theoretical framework, which was brought about by the demands of the crisis of the 1980s. The new economy fundamentally relies on the notion of unconventional, non-depleting resources, specifically know-how and the innovative capacity of human capital.

The primary asset affected by the accelerated effects of extensive and intensive development is nature, which possesses finite resources. This has resulted in an exacerbation of resource scarcity due to exponential consumption growth and excessive exploitation, leading to environmental degradation (Beckett, Hencke, 2009). Consequently, this ongoing issue threatens long-term economic growth and hinders societal development. This challenge is compounded by inequalities in educational levels, which generate instability both domestically and internationally, so complicating or even rendering impossible the process of convergence between emerging and developed economies.

Durable economic growth relies on its three-dimensional development (Angelescu, Stanescu, 2004):

- Economic: predicated on investments in scientific research and information technology, enhancing the innovative capacity of human capital.
- Social: aimed at diminishing disparities among various social groups, ensuring equal opportunities and access to education, culture, information, and the means to generate tangible welfare.
- Ecological: Rational exploitation, consumption, and efficient utilization of resources yield long-term effects that foster sustainable economic growth, hence providing replenishment time for utilized resources and extending their life cycle.

Over the medium and long term, sustainable economic growth ensures and promotes the development of human society in balance with the environment. It maximizes the use of resources in relation to the given goods. The business services sector, which produces scientific and informational services with less of an environmental impact than the sectors that produce tangible goods, is the engine of sustainable economic growth. Its primary resource is human intelligence (innovation, execution, and analytical capability).

Reevaluating hard skills (the technical aspect) while placing less emphasis on soft skills (the interpersonal aspect) is a fresh development in human capital management. The main drivers of advancement are not the factors of production; rather, it is the individual who must be managed with social fairness and equity as both the executor and the beneficiary of sustainable economic growth. Strong economic growth depends on the elements identified at the beginning of this study, namely the market or the government, since they provide the framework required for efficient operation and progress. The GDP per capita is a key metric for tracking the upward trend of a state's development and is also a good example of how economic potential and social welfare are maintained and improved, which helps to fight poverty.

The sustainable economic growth model as the new paradigm

According to Simon Kuznets, economic growth is the expansion of a country's capacity to produce a growing range of economic goods by sophisticated production technologies and institutional and ideological adaptability (Muler, 2008), which exemplifies the macroeconomic nature of the concept in terms of social, economic, and ecological aspects (Ruttan, Hayami, 2011).

Both GDP output and the direct relationship between resource input and production are necessary for economic growth. The disparity measures the efficiency of the growth process, the judicious consumption of allocated resources across industrial sectors, and the effectiveness of qualitative distribution and redistribution in areas that excel and provide a competitive or comparative advantage over other nations.

Sustainable economic growth is a reform of durable economic growth, selected as a response to the current context established by the Great Recession, which is based on the durable economic growth concept. Sustainable economic growth relies on achieving economic advancement by applying the same mechanisms and levers utilized in a firm but adapted to the context of a national or union economic system (Bodislav et al., 2025b). This method facilitates an ultra-efficient strategy for addressing pollution and social security concerns, with the primary innovation being the attainment of long-term economic stability and the advancement of social welfare, ensuring a harmonious balance among the economy, society, nature, and technology.

Sustainable economic growth, influenced by globalization, has fostered the concept of the network economy, which yields positive externalities such as access to new markets and an expanded client base (resulting in increased demand and production). This also facilitates occupational restructuring, reducing unemployment in nations with a labor force willing to accept wages below the sector's average in the host country, or through the outsourcing of services to countries where labor costs are lower than those in the home country of the outsourced service or product. A checkpoint for the imported flow from the corporate framework is established by maintaining standard restrictions that do not adversely affect workforce migration, economic, social, and educational gaps, as well as the equitable and efficient distribution of resources (Sen, 1970).

4. Research methodology

This research aims to investigate the way the European Union's climate policies, particularly those enshrined in the European Green Deal and "Fit for 55" framework, are implemented within the Romanian economic and legislative context. The objective of the investigation is to pinpoint the gaps, structural modifications, and national opportunities for convergence between the sustainability objectives of the European Union and Romania's development agenda.

To achieve this objective, a qualitative research design was implemented, which involved the critical comparative review of pertinent institutional strategies and policy frameworks, as well as descriptive analysis and documentary analysis. This method is suitable considering the investigation's emphasis on the interpretation of strategic documents, legal texts, and socio-economic contexts. It enables a comprehensive comprehension of nation-wide policy responses, regulatory frameworks, and institutional processes, as opposed to causal inference or numerical measurement.

The methodological framework is based on the established literature in qualitative research and policy analysis. Qualitative methods are particularly effective in investigating contemporary phenomena within real-world policy environments, particularly when the boundaries between phenomena and context are not clearly defined, as Yin (2014) argued in his foundational work on case study research. Additionally, Creswell (2013) endorses the necessity of qualitative inquiry in the examination of the operation and evolution of policies within intricate institutional frameworks, a topic that is fundamental to the objectives of this paper.

5. Results and discussion

The analysis of the implementation of EU climate and sustainability policies in Romania reveals four critical findings that support the development of policy and academic understanding: (1) Partial institutional alignment with EU frameworks, (2) structural gaps in energy and environmental governance, (3) a bias toward public investment over private innovation, and (4) obstacles to regional and social equity in the decarbonization process.

Initially, Romania has formally synchronized its legal and strategic documents with critical EU directives, such as the Renewable Energy Directive (RED II), the Energy Efficiency Directive, and the climate frameworks incorporated into the European Green Deal. Nevertheless, effective implementation is significantly impeded by institutional fragmentation and inconsistent coordination among ministries, agencies, and subnational authorities. This discovery aligns with Giddens (2009), who underscored that the success of climate governance in the EU is contingent upon institutional coherence and administrative capability at the national level, in addition to target-setting. In the same vein, Diaconu et al. (2019) observed that sustainable development necessitates proactive integration across government levels and policy sectors, in addition to the transposition of EU norms.

Secondly, Romania's energy transition is still heavily reliant on centralized, top-down mechanisms. Community-led initiatives, decentralized renewable energy sources, and green technology innovation are not widely adopted, despite substantial EU funding and regulatory support. The paper's findings are consistent with the concerns of Ruttan and Hayami (2011), who contend that institutional innovation is necessary for sustained economic growth in the presence of environmental constraints, particularly in emerging economies. Although the construction of new nuclear reactors and hydropower plants contributes to the reduction of emissions, these infrastructure-heavy responses have the potential to reinforce legacy energy models rather than enabling distributed and resilient systems, as the European Commission has envisioned.

Third, Romania has made progress in reducing greenhouse gas emissions and increasing the proportion of renewables; however, this progress has been primarily driven by public-sector financing and compliance-driven investments. Scalable private-sector involvement in energy startups, eco-innovation, or green R&D is scarcely documented. This supports the findings of prior research conducted by Popescu et al. (2018) and Angheluta et al. (2019), which identified the absence of long-term investment frameworks, policy stability, and fiscal incentives as significant obstacles to green entrepreneurship in Romania. Although the green certificate mechanism is in place, it has not achieved the desired level of market dynamism, particularly in terms of attracting foreign investment and promoting local industrial transformation.

Fourth, the paper identifies regional disparities and social vulnerabilities as unresolved dimensions of Romania's climate policy implementation. Despite being the most vulnerable to climate risks, rural areas are particularly underserved in terms of access to modern energy services, heating infrastructure, and energy-efficient housing. This is in accordance with the findings of Burlacu et al. (2022), who documented the varying effects of climate-related economic shocks on marginalized communities in Central and Eastern Europe. Additionally, the prioritization of infrastructure modernization in urban areas may serve to exacerbate existing disparities unless it is accompanied by targeted initiatives, including energy subsidies, housing rehabilitation programs, and capacity-building initiatives in underdeveloped regions.

In general, this study serves to substantiate the notion that sustainable economic growth in an EU context must be multifaceted, encompassing not only environmental objectives but also economic competitiveness, institutional quality, and social inclusion. It is based on Kuznets' (as cited in Muler, 2008) concept of adaptive institutional capacity as a critical component of long-term growth, demonstrating that Romania's present trajectory is partially successful but also demonstrates a policy gap between transposition and transformation.

The results also verify that Romania is not the only country facing these obstacles. Throughout the EU, member states with transitional economies encounter comparable challenges in reconciling rapid decarbonization with energy security and economic stability. Nevertheless, Romania's experience demonstrates that the EU's climate objectives may be pursued in a form rather than substance in the absence of a more cohesive legal-economic framework and stronger incentives for innovation and equity.

Conclusions

The institutional, legal, and economic aspects of Romania's endeavours to implement European Union sustainability and climate change policies have been examined in this study, which has also explored the

broader context of the European Green Deal and the "Fit for 55" initiative. The analysis has shown that Romania has made substantial formal progress in aligning its policy frameworks with EU directives. However, practical challenges regarding governance, equity, innovation, and systemic transformation remain intractable.

Strengthening cross-sectoral coordination mechanisms, particularly between environmental, energy, and economic institutions, is the subsequent step for policymakers. It is imperative to develop policies that transcend formal compliance and promote the genuine integration of sustainability principles into public investment, fiscal policy, and industrial strategy. Furthermore, policymakers should prioritize inclusive transition strategies that mitigate rural-urban disparities and guarantee that vulnerable populations are not neglected. By conducting policy benchmarking across EU member states, producing impact evaluations of green policies, and developing models to evaluate the long-term socio-economic benefits of sustainable transitions, researchers have a clear opportunity to support evidence-based policymaking.

This investigation is not without its constraints. Initially, the analysis is predicated on secondary data and policy documents, which may be indicative of strategic intent rather than actual implementation or outcomes. Secondly, the analysis is restricted to the Romanian context within the EU and does not include comparative fieldwork or interviews with institutional actors, which would have enhanced its depth. Third, the findings may not be fully generalizable to countries with different political economies or institutional capacities, even though the focus on Romania is relevant for understanding the dynamics of a transitional EU economy.

Mixed-method approaches, such as interviews with policy stakeholders, implementation agencies, and community representatives, should be integrated into future research to address these limitations. A comparative analysis of the drivers and constraints of policy effectiveness between Eastern and Western European member states could provide valuable insights. Furthermore, future research could concentrate on the micro-level effects of climate policy, including household adaptation behaviours, SME participation in green innovation, or regional decarbonization trajectories, thereby enriching the macro-institutional focus of this paper. To facilitate a fair and efficient climate transition throughout the European Union, it will be imperative to advance interdisciplinary research that unites law, economics, public administration, and environmental science.

References

Acocella, N., 2009. *Economic Policy in the Age of Globalization*. New-York: Cambridge University Press.

Alchian, A., 1950. Uncertainty, Evolution and Economic Theory. *Journal of Political Economy*, 68, pp. 211 – 221.

Angelescu, C. and Stanescu, I., 2004. *Politica de Crestere Economica (translation: The Policy for Economic Growth).* Bucharest: Economica Publishing.

Angheluta, S.P., Burlacu, S., Diaconu, A. and Curea, C.S., 2019. The Energy from Renewable Sources in the European Union: Achieving the Goals. *European Journal of Sustainable Development*, [online] 8(5), p.57. https://doi.org/10.14207/ejsd.2019.v8n5p57.

Angheluță, S.P., Mitriță, M., Burlacu, S., Gole, I. and Badea, C.G., 2019. Climate change and renewable resources in the European Union. In: *Proceedings of the 34th International Business Information Management Association (IBIMA) Conference*. pp.1324–1336. ISBN 978-0-9998551-3-3.

Aristotle. 2004. *Politics: A Treatise on Government*. Madrid: Public Domain Books.

Beckett F. and Hencke, D., 2009. *Marching the Fault Line*. London: Constable & Robinson.

Bodislav, D.A., 2011. The eco-innovational approach for the energy of the future. *Quality - Access to Success*, 12(121).

Bodislav, D.A., 2012a. Oligarchy versus democracy and regulation versus deregulation. *Theoretical and Applied Economics*, 29(5), pp.33–46.

Bodislav, D.A., 2012b. How did we get to the deficit crisis? *Romanian Journal of Fiscal Policy*, 3(1).

Bodislav, D.A., Moraru, L.C., Georgescu, R.I., Grigore, G.E., Vlăduț, O., Staicu, G.I. and Chenic, A. Ștefania, 2025. Recyclable Consumption and Its Implications for Sustainable Development in the EU. *Sustainability*, [online] 17(7), p.3110. https://doi.org/10.3390/su17073110.

Bodislav, D.A., Nițu, R.M., Piroșcă, G.I. and Georgescu, R.I., 2025. The Opportunity Cost Between the Circular Economy and Economic Growth: Clustering the Approaches of European Union Member States. *Sustainability*, [online] 17(6), p.2525. https://doi.org/10.3390/su17062525.

Bodislav, D.A., Radulescu, C.V., Bran, F. and Burlacu, S., 2020. P Public Policy in the Areas of Environment and Energy. In: R. Pamfilie, V. Dinu, L. Tăchiciu, D. Pleșea, C. Vasiliu eds. *6th BASIQ*

International Conference on New Trends in Sustainable Business and Consumption. Messina, Italy, 4-6 June 2020. Bucharest: ASE, pp. 228-235

Burlacu, O., Crețu, C.R., Crețu, R.F., Spiridon, C.E. and Gombos, S.P., 2022. Lack of economic and food security on a global scale. *Revista de Management Comparat Internațional*, 23(5), pp.686–693.

Burlacu, S., Alpopi, C. and Popescu, M.L., 2018. Omul și degradarea mediului natural. Efecte distructive. In: *Competitivitatea şi Inovarea în Economia Cunoaşterii*, Vol. 1, 28–29 September 2018, Chișinău, Republic of Moldova. Chișinău: Departamentul Editorial-Poligrafic al ASEM, pp.159–165. ISBN 978-9975-75-932-8.

Burlacu, S., Georgescu, R.I., Moise, D., Crețu, R.F., Gombos, S., Buzoianu, O. and Rotaru, C., 2022. The tension between adjusted net savings, sustainable growth and resource depletion. *Economic Computation and Economic Cybernetics Studies and Research*, 56(3), pp.265–277.

Buzoianu, O.A.C., Iacob, O., Mateescu, V.M. and Burlacu, S., 2024. Balancing economic, environmental, and technological systems for sustainable agricultural development in Romania. *European Journal of Sustainable Development* [online], 13(4), p.153. https://doi.org/10.14207/ejsd.2024.v13n4p153.

Coase, R., 1937. The nature of the firm. *Economica*, 1(4), pp.386–405.

Cocean, P. and Ilovan, O.R., 2008. Elemente ale managementului dezvoltării durabile. *Geographia Napocensis*, 2, pp.5–17.

Creswell, J.W. 2013. *Qualitative Inquiry and Research Design: Chosing Among Five Appraches*, Thousands Oaks: SAGE Publications.

Diaconu, A., Popescu, M.L., Burlacu, S. and Buzoianu, O.C.A., 2019. Strategic options for the development of renewable energy in the context of globalization. In: *Proceedings of the International Management Conference*. Bucharest, Romania: Faculty of Management, Academy of Economic Studies. 13(1), pp.1022–1029.

Georgescu, R.I., 2020. *Strategii de valorificare a resurselor naturale in contextual globalizarii*, Bucharest: Universitara Publishing.

Giddens, A., 2009. The politics of climate change. *Public Policy Research*, 16, pp.64–67.

Leibenstein, H., 1966. Allocative efficiency versus X-efficiency. *American Economic Review*, 56, pp.392–415.

Lipsey, R.G. and Chrystal, K.A., 2002. *Principiile economiei* [Economic principles]. Bucharest: Economica Publishing.

Mogos, R.I., Negescu–Oancea, M.D., Burlacu, S. and Troaca, V.A., 2021. Climate change and health protection in European Union. *European Journal of Sustainable Development* [online], 10(3), p.97. https://doi.org/10.14207/ejsd.2021.v10n3p97.

Muler, K., 2008. *Modern economic growth: rate, structure and spread (Simon Kuznets)*. Munich: Ludwig Maximilians Universität.

Pareto, V., 1906. *Manuale di Economia Politica*. Milano: Societe Editrice.

Popescu, M.L., Dobrea, C.R. and Burlacu, S., 2018. Inconsistency in natural resources management and managerial dimension in economic management. In: *Proceedings of the 14th Administration and Public Management International Conference: Human Resources Management and Public Organizational Performance*.

Rădulescu, C.V., Gâf-Deac, I.I., Bran, F., Mănescu, C.O., Bodislav, D.A. and Burlacu, S., 2023. The Mix of Resources, Security and Sustainability of the Energy Complex in Romania in the European Context. *Amfiteatru Economic*, 25(63), pp. 447-462.

Rojanschi, V. and Bran, F., 2002. *Politici si strategii de mediu*. Bucharest: Economica Publishing.

Rojanschi, V., Bran, F. and Ioan, I., 2006. *Cuantificarea dezvoltarii durabile*. Bucharest: Economica Publishing.

Ruttan, V. and Hayami, Y., 2011. *Can Economic Growth Be Sustained?,* New York: Oxford University Press.

Sen, A.K., 1970. *Collective Choice and Social Welfare*. Edinburgh: Oliver & Boyd Publishing.

Smith, A.M, 1998. *Wealth of Nations*. Oxford: Oxford Press.

Vlăduț, O., Grigore, G.E., Bodislav, D.A., Staicu, G.I. and Georgescu, R.I., 2024. Analysing the Connection between Economic Growth, Conventional Energy, and Renewable Energy: A Comparative Analysis of the Caspian Countries. *Energies*, [online] 17(1), p.253. https://doi.org/10.3390/en17010253.

Yin, R.K. 2014. *Case Study Research: Design and Methods*, Thousand Oaks: SAGE Publications.

Emerging Trends Regarding the Digitalization of Public Administration in the Context of Business and Sustainable Consumption: Bibliometric and Empirical Study

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Abstract

This study aims to investigate how the digitalization of public administration, through the implementation of electronic service delivery platforms, the adoption of digital public policy frameworks and the use of citizen engagement tools, intersects with the development of sustainable businesses and the promotion of responsible consumption models. The bibliometric analysis was carried out on a sample of 642 specialized articles, published between January 2010 and December 2024, selected from the Web of Science and Scopus databases and processed using the VOSviewer application. By mapping keyword co-occurrence networks, keyword burst phenomena and citation clusters, thematic developments and key concepts in the international literature on the subject could be identified. The results highlight a growing interest in integrating digital solutions into sustainability-oriented public policies, highlighting the emergence of the concepts of "sustainable digital governance" (e.g., policy interoperability and transparency), "smart cities with an ecological and social dimension" (e.g., low-carbon infrastructure coordinated through the Internet of Things), and "green e-governance" (such as digital platforms for environmental monitoring and public participation). The study reveals a growing convergence between the digital transformation agenda of public administration and the United Nations Sustainable Development Goals, in particular Goal 9 (Industry, Innovation and Infrastructure) and Goal 12 (Responsible Consumption and Production). The analysis of research cluster developments shows a transition from a focus on infrastructure and access in 2010–2015, to service integration and citizen engagement in 2016–2020, and in recent years (2021–2024) holistic e-governance models aligned with sustainability objectives are emerging.

By empirically clarifying the digitalization strategies frequently associated with sustainable outcomes in the business sector—such as open data portals, AI-based decision support systems, and integrated services—the study provides a direction for potential research aimed at exploring the causal relationships between the adoption of digital policies and measurable sustainability indicators, such as reduced resource consumption and increased adoption of circular economy practices among local businesses. In addition, the results suggest policy implications for prioritizing interoperable digital platforms and cross-sector partnerships to accelerate the SDGs. This bibliometric mapping also highlights some areas that are still insufficiently researched, such as the use of blockchain technology for green public procurement, and provides an information basis for designing digital governance interventions aimed at effectively supporting sustainable business ecosystems and responsible consumption models.

Keywords

Digitalization of public administration, sustainable business, responsible consumption, bibliometric analysis, VOSViewer.

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Introduction

The introduction of digitalization of public administration has become, in the last decade, a strategic priority for governments around the world, with the potential to improve the efficiency, transparency and sustainability of administrative processes (Dunleavy, 2015; Janssen and Helbig, 2018). This digital transformation is starting to be associated with the concept of sustainable development that promotes sustainable businesses and encourages responsible consumption models (Gil-Garcia, Gasco-Hernandez and Pardo, 2023). In this context, the specialized literature emphasizes the role that digital technologies can have in facilitating the transition to more sustainable economic and social models, but, despite the progress made, the integration of digitalization into public policies oriented towards sustainable development and sustainable consumption continues to face a series of challenges related to institutional adaptability, digital skills and citizens' perception.

Although numerous studies have separately analyzed the impact of digitalization on public administration efficiency or the link between emerging technologies and responsible consumption practices, there is still a gap in the specialized literature regarding the integrated assessment, on the one hand, of how the digitalization of public administration can support the development of sustainable businesses and, on the other hand, of the perception of future public administration specialists on these interdependencies. Therefore, the identified knowledge gap consists in the lack of a bibliometric approach that identifies emerging trends in the international literature and examines, at the same time, the perspective of students or young professionals in the field. The present study aims to fill this gap through a bibliometric analysis of relevant publications and, in parallel, by investigating the attitudes and future perceptions of public administration specialists regarding the role of digitalization in promoting sustainable businesses and responsible consumption. This methodological combination offers a new perspective on how the academic literature evolves and on the expectations of those who will work in public administration, thus contributing to a new paradigm of the subject.

1. Review of scientific literature

The digitalization of public administration has become a central topic in academic literature, being recognized as a key factor for efficiency, transparency and sustainability (Janssen et al., 2020). This transformation facilitates citizens' access to services and improves the capacity of governments to respond to social and economic challenges. Alcaide Muñoz and Rodríguez Bolívar (2021) highlighted the potential of digitalization to support the Sustainable Development Goals (SDGs) by integrating technologies into administrative processes, reducing the carbon footprint and promoting transparency. The concept of smart cities is also relevant in the context of sustainable urban governance and in this context Yigitcanlar et al. (2019) define smart cities as systems that use digital technologies to optimize resources and improve the quality of life, while reducing the impact on the environment. As such, public administrations have the role of coordinating digital strategies that support sustainable businesses. From this perspective, sustainable digital governance has gained importance in recent years and Estevez and Janowski (2019) define digital governance as a framework that integrates information technologies to support data-based decision-making, with a focus on sustainability because it is considered that digitalization can reduce bureaucracy and promote public policies that encourage responsible consumption. These ideas are also supported by Medaglia, Misuraca and Aquaro (2021) who also highlight the contribution of green e-government but also to the reduction of resource consumption by digitalizing administrative processes as argued by Zampou and Pramatari (2011).

The impact of digitalization of public administration on sustainable business can be significant according to Bocken et al. (2014) who note that digital public policies can stimulate companies to adopt circular business models, which reduce waste and promote recycling. In addition, government digital platforms would facilitate collaboration between the public and private sectors, stimulating innovation in the field of sustainability, argue Turok et al. (2020).

The perceptions of young public administration professionals can be essential for the future of digitalization and Pereira et al. (2020) found a positive attitude of students towards digitalization, considering it crucial for promoting sustainability. Thus, adapting educational programs to include digital skills and knowledge about sustainability becomes a necessity to prepare future generations of leaders (Holland et al., 2021). In 2020, important theoretical foundations were outlined regarding the link between digital governance and

sustainability, as Erkut (2020) emphasized the need to move from "digital government" to "digital governance", highlighting that the sustainable transition involves expanding from a purely technical structure to multiple and participatory governance processes. This challenge is not only technological, but also the creation of governance structures that include citizens in the decision-making process, avoiding information overload and unilateral decisions. This situation was also demonstrated by the COVID-19 pandemic, which in 2020 acted as a strong catalyst for the digitalization of administration (Negescu et al., 2021; Popescu et al., 2021), so that governments were forced to move their services online to ensure the continuity of public functions under conditions of social distancing. This led to a significant increase in academic interest in e-government and the SDGs (Figure no. 1), with an exponential increase in the number of scientific publications after 2019. The rapid implementation of digital solutions has demonstrated the potential of these tools to maintain essential public services in crisis situations. If 2020 marked a conceptual maturation and practical impetus for the agenda of sustainable digitalization of governance, in 2021, as the health crisis continued, the focus shifted to integrating digital transformation into sustainable development strategies. Burlacu et al. (2021a, 2021b) highlighted that the digitalization of public administration can promote sustainable development and a more inclusive society because the proliferation of information technologies offers the hope of making administration more efficient and improving the relationship with citizens, strengthening social inclusion. In addition, e-government has been recognized as a path to tangible benefits for the state and society, including increased service efficiency, expanded access to information and decision-making processes, augmented civic participation, and reduced operational costs (Burlacu et al., 2021b).

Another important aspect of 2021 was the link between good governance and digitalization, with studies confirming the contribution of digital governance to achieving good governance principles, including creating public value, administrative modernization, increasing transparency, reducing administrative burdens, and combating corruption (Călin et al., 2022). Our analysis highlighted that, at least in theory, digital changes in the public sector can reduce corruption, stimulate economic growth, and strengthen democratic processes (Haug et al., 2024). However, there are researchers who have drawn attention to potential risks, such as excessive surveillance or deepening inequalities of access, emphasizing the need to address these challenges (Durkiewicz and Janowski, 2021).

In 2022, the topic of environmental sustainability in the context of e-governance was increasingly present in the mainstream of scientific work, with the concept of green e-governance starting to be articulated as an important research and policy direction. Digital government initiatives have proven essential in the transition to a circular economy, facilitating practices of product reuse, repair and recycling (Burlacu et al., 2022b). It is thus argued that the digitalization of supply chains and open data platforms allow for better monitoring of material flows and the involvement of non-governmental actors in circular economy solutions, supporting SDG 12 (Responsible Consumption and Production).

The concept of smart cities has evolved towards a sustainability-focused approach, transforming into smart sustainable cities. Studies have shown that such approaches are increasingly needed to achieve urban sustainability, by strengthening disaster resilience and combating climate change (Kuzior et al., 2023). The stated goal of such cities is to improve the quality of life of citizens and address social and environmental issues in a holistic manner.

Research has also highlighted the need to overcome structural challenges to ensure the long-term sustainability of digital government institutions, including data security, digital skills of the population and unequal access to technology (Burlacu et al., 2022a). In 2022, a consensus emerged on the need for inclusive digital transformation strategies that involve all actors and ensure that no one is left behind, and in 2023, previous trends were consolidated, with the literature providing stronger empirical evidence and new perspectives, with a notable focus on smart governance. A global study on smart cities revealed the expansion of digitalization strategies at the local level, recognizing cities as laboratories for sustainable innovation (Kuzior et al., 2023). The development of urban e-government would thus depend on national policies, although visionary municipalities can outpace the national pace in adopting green and participatory technologies and the key factors for effective urban e-government would include both the level of human development and IT infrastructure, underlining the importance of investments in education and technology. In fact, smart cities have begun to be seen as a means of achieving integrated urban sustainability, combining economic development with social inclusion and environmental protection.

Another important direction in 2023 was the attention paid to the perception and involvement of young people in the process of digitalization and sustainable transition, where it was found that the younger generation has high expectations regarding the digitalization of public services (Méndez-Rivera et al., 2023). Studies have highlighted that the digitalization of public services meets the expectations of young people, accustomed to the widespread use of ICT and they appreciate the transparency, speed and efficiency offered

by e-services, strengthening their trust in digital public institutions. They have proven to be important ambassadors of e-government tools in their communities, promoting the adoption of new technologies. The involvement of the younger generation becomes a pillar of the sustainability of digital transformation, both as demanding users and as agents of change. In 2023, the concept of the "twin transition" was deepened - the interconnection of the digital and green transitions, which makes digitalization and sustainability viewed as complementary, so that digital technologies can optimize resource management and support green initiatives, and the digital transformation itself can be governed sustainably, minimizing negative effects (high energy consumption, e-waste, etc.). Recent literature speaks of green IT and green e-governance as necessities to mitigate the climate impact of digital infrastructures and to ensure that the benefits of digitalization are not canceled by its environmental externalities.

The 2024 literature indicates a stage of reflection and synthesis on the progress made and the existing gaps and a bibliometric analysis (Lubis et al., 2024) revealed that, although the discourse on the link between digital governance and the SDGs has become increasingly present, explicit research at this intersection is still limited, especially in public administration journals. There is a gap in the specialized literature, with the connections between the digitalization of government and the sustainability agenda requiring more in-depth investigation (Lubis et al., 2024).

On the other hand, 2024 brings concrete empirical evidence of the benefits of the interconnection between e-government and sustainability. The study by Zhao et al. (2025) on digital environmental governance in China shows that the use of digital tools in monitoring and enforcing environmental regulations has become a driver of the green transition of the economy, which may lead us to the idea that digital environmental governance can contribute to improving environmental performance, the effect being more pronounced in regions with high levels of pollution and the mechanism identified would be the strengthening of regulatory enforcement through digital technology. The spatial propagation effect is also interesting, noting that digital innovations in a region also help neighboring regions to progress towards sustainability.

On the other hand, the study of current scientific literature has also highlighted a direct correspondence between e-government themes and certain SDGs, such as reducing inequalities (SDG 10), promoting innovation and resilient infrastructure (SDG 9) and strong and accountable institutions (SDG 16) (Adams and Paul, 2023; Marcovecchio et al., 2019) so that designing digital public policies to target these targets could generate strong synergies. An expansion of the research area towards citizens' perceptions and behaviors in relation to these changes is also noted. In fact, we were drawn to the fact that in 2024, International Youth Day had the theme "From clicks to progress: Youth digital paths for sustainable development", highlighting the trust that society places in young people in using digital technologies for a sustainable future, as it has been found that young people actively campaign for open government solutions, greener cities and responsible consumption, using the online environment for collaboration and innovation, and young people's perception of the digitalization of government is generally positive, considering it a way to promote transparency and government accountability, but expecting it to serve the purpose of protecting the environment and ensuring a fair future (Van Ryzin, 2021).

2. Research Methodology

The main purpose of this study is to identify and analyze emerging trends regarding the digitalization of public administration in relation to the development of sustainable businesses and the promotion of responsible consumption, while monitoring the perception of future public administration specialists on these aspects. To achieve this objective, an extensive bibliometric analysis of the international scientific literature was used, a quantitative method established for examining the structure and evolution of a research field by studying publication data (articles, authors, journals, citations, keywords).

Bibliometric analysis is approached in the specialized literature as a robust tool for mapping the evolution of a scientific field. Van Eck and Waltman (2010) highlight that the VOSviewer software allows the construction and visualization of co-occurrence networks of terms and citation clusters, thus facilitating the identification of thematic clusters and research trends. Zupic and Čater (2015) emphasize the importance of bibliometrics for quantifying scientific impact and for highlighting the relational dynamics between concepts or authors. In the context of the current research, this method proves to be appropriate because it allows, on the one hand, to identify the chronological evolution of academic interest in the digitalization of public administration and sustainability and, on the other hand, to discover conceptual relationships between topics such as digital governance and responsible consumption models.

Bibliographic data were extracted from the Web of Science database, internationally recognized for its exhaustive coverage of academic publications. The data collection process was carried out on March 15,

2025 and involved the formulation of logical combinations of search terms: "public administration digitalization" OR "e-government" OR "digital governance" AND "sustainability" OR "sustainable development" OR "sustainable business" OR "responsible consumption" OR "circular economy" OR "green e-government" OR "smart cities". In order to capture recent trends, filters were applied that included research articles, reviews and book chapters published between January 2010 and December 2024, with increased attention paid to the "post-2019" interval (i.e. the years 2020–2024), this threshold being chosen against the backdrop of the disruptions generated by the COVID-19 pandemic and the strategic acceleration of digital transformation projects in administration. Following the initial query, 820 bibliographic records were identified. By applying the inclusion criteria, which targeted only publications in English reviewed by the academic community, and by excluding duplicate articles, those irrelevant to the topic of interest after analyzing the titles and abstracts, as well as materials that did not fit into the specified chronological interval, a final batch of 642 papers was reached. The main inclusion criteria were: the central theme addressed (the intersection between the digitalization of public administration and elements of sustainability or responsible consumption), the type of publication (research articles, reviews, book chapters), the interval 2010–2024 and the English language. Conference papers and publications in other languages were excluded in order to preserve a homogeneous and comparable sample.

For data analysis, the VOSviewer application (version 1.6.19) was used, which allowed the following procedures to be carried out: analysis of keyword co-occurrence networks to identify key themes and their evolution over time, analysis of citation clusters to delimit relevant scientific communities, and analysis of keyword bursts to detect the sudden emergence of new concepts. Bibliographic data were imported in .txt format, normalized to avoid synonyms and terminological variations, then processed to generate the co-occurrence matrix and thematic maps. The “post-2019” period was justified by the need to assess how the pandemic influenced the prioritization of digitalization with an impact on sustainable development and responsible consumption, a scenario in which e-governance projects and smart cities initiatives experienced significant accelerations.

3. Results and discussion

The results of the bibliometric analysis carried out with VOSviewer highlighted an exponential increase in the number of publications on digitalization in public administration in relation to sustainability, especially observable after 2019–2020. This phenomenon confirms the earlier findings of Gil-Garcia, Gasco-Hernandez and Pardo (2023), who had already signaled an upward trend in academic interest in integrating digital solutions into sustainable development strategies. The sharp increase in publications after 2019 can be interpreted in the context of global agendas (such as the UN 2030 Agenda) and the crisis generated by the COVID-19 pandemic, which accelerated the adoption of digital platforms in administration (McKinsey Global Institute, 2021). In this sense, our data support the conclusions of Janssen and Helbig (2018), who argued that force majeure events (such as a pandemic) favor the rapid transition to digital infrastructures designed to ensure the continuity of public services with a reduced impact on the environment.

Figure no. 1 (network map) illustrates the thematic structure of the analyzed scientific literature, based on the co-occurrence of keywords extracted from the titles, abstracts and keywords of the publications. The visualization, generated with the VOSviewer software, includes a significant number of terms (represented as nodes), the size of which is proportional to their frequency in the data set. The lines between the nodes indicate the frequency with which two terms appear together in the same document, the thickness of the line reflecting the strength of the link. The color of the nodes denotes the membership in a particular thematic cluster, identified by the VOSviewer clustering algorithm based on co-occurrence links.

The map reveals the existence of several distinct but interconnected thematic clusters that define the research landscape at the intersection of public administration digitalization and sustainability in the urban and business context: Red Cluster: Central and dense, groups terms related to smart city technology and infrastructure, including "smart city", "Internet of Things", "big data", "artificial intelligence". This forms the technological core of the field. Green Cluster: Groups fundamental concepts related to sustainability and the environment, such as "sustainable development", "sustainable cities", "circular economy", "energy efficiency", "climate change". The strong connection with the red cluster emphasizes the study of technology in order to achieve environmental and sustainability objectives. Blue Cluster: Concentrates terms associated with governance, politics and urban development processes, including "governance", "policy", "urban development", "citizen participation", "smart city development". This represents the decision-making and socio-political dimension. Yellow Cluster: Delimits the area of e-government and public services, with terms such as "e-government", "government", "stakeholders", "social sustainability".

This cluster is closely related to digital governance and the interaction between the administration and citizens/actors.

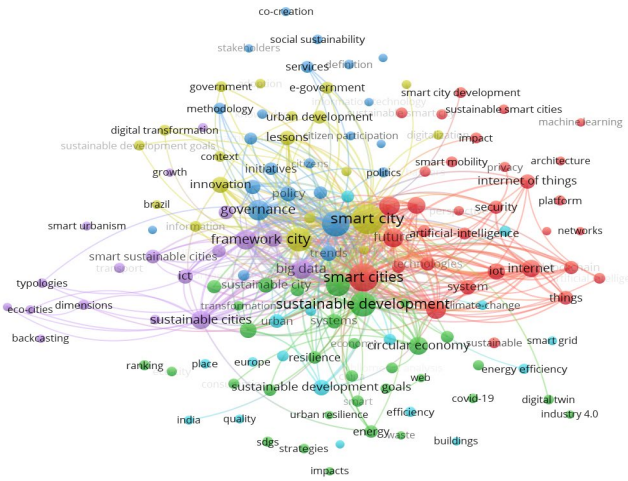

Figure no. 1. Network map of keyword co-occurrence on public sector digitalization and sustainability (Generated with VOSviewer)

The analysis of connections highlights a significant interconnection between these clusters, suggesting a multidisciplinary approach to the topic. Terms such as "smart city", "sustainable development" and "digital transformation" occupy central positions and have large dimensions, confirming their role as conceptual pillars in the analyzed literature. The map visually illustrates how research explores the interdependencies between the digitalization of the public sector (represented by the Blue and Yellow clusters, connected to technology in the Red cluster) and sustainability objectives (represented by the Green cluster), often through the lens of the concept of "smart city". The presence of terms related to "sustainable business" and "responsible consumption" (although perhaps with a lower frequency than other central terms) in connection with these main clusters indicates their integration into the broader discussion on digitalization, sustainability and governance.

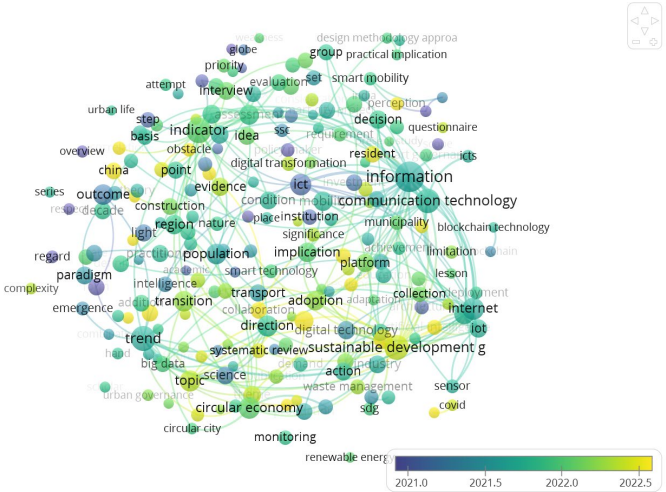

Figure no. 2. Thematic evolution of the domain: Overlay map of co-occurrence of colored keywords by average year of publication (Generated with VOSviewer)

The conceptual map presented in Figure 2 shows the co-occurrence of key terms and their temporal evolution. It is thus found that academic interest in this field has increased significantly, as evidenced by the growing number of publications linking digitalization to public sustainability, which indicates a growing recognition of the synergy between the two terms. The analysis identified a central core of concepts related to information technology (ICT, information, internet, platform) around which thematic groups gravitate, including urban governance and mobility (smart city, smart mobility), connected both to technology (iot, sensor, big data), as well as social actors (resident, population) or administrative structures (municipality, policy, decision).

An evolution of concepts is also observed, so that the discourse on the "smart city" goes beyond the purely technological perspective, explicitly integrating the sustainability dimension and stronger links appear between smart city and sustainable development, circular economy, waste management, renewable energy, reflecting a deeper understanding of the role of technology in achieving ecological and social goals and this dynamic favors the emergence of new integrative concepts, such as "sustainable digital governance" and "ecological e-governance", signaling the alignment of digital solutions with the principles of sustainable development. The temporal analysis (indicated by the colors of the nodes in Figure 2) confirms the recency of terms such as digital transformation, IoT and Covid and the convergence of digital and sustainability agendas in public administration represents a paradigm shift in research and practice that implies the need for digitalization policies to be correlated with environmental and social objectives (SDGs), and sustainability strategies to use digital tools.

Conclusions

The results of the bibliometric analysis confirm the existence of an exponential increase in academic interest in the intersection between the digitalization of public administration and sustainability, especially since 2020, when the pandemic context accelerated the rapid adoption of digital solutions in the public sector. Mapping of keyword co-occurrence networks identified three dominant thematic clusters: “sustainable digital governance”, in which terms such as interoperability, transparency and digital public policies are closely connected; “smart cities with an ecological and social dimension”, where the concepts of the Internet of Things, low-carbon infrastructures and integrated waste management appear in interdependence; and “ecological e-governance”, characterized by the concern for digital environmental monitoring, online public participation and green e-government initiatives. Among the limitations of this approach are, first, the dependence on a single database (Web of Science) and the search terms used, which may exclude relevant studies published in other platforms or under other equivalent keywords. Also, the bibliometric analysis reflects only the published literature and does not include technical reports or informal practices in public administration, which may provide a partial picture of the real dynamics of implementation of digital initiatives. Regarding future research directions, the development of empirical case studies that investigate the concrete way in which local or central administrations implement green e-government digital solutions and measure the impact on sustainability indicators, such as greenhouse gas emissions, natural resource consumption or the degree of civic participation would be welcome.

References

Adams, S.O. and Paul, C., 2023. E-government development indices and the attainment of United Nations sustainable development goals in Africa: A cross-sectional data analysis. *European Journal of Sustainable Development Research*, [online] 7(4), p.em0234. https://doi.org/10.29333/ejosdr/13576.

Burlacu, S., Creţu, R.C., Potcovaru, A.M.B. and Călin, A.M., 2024. Integrative Digital Governance: The Role of Public Administration in Promoting Sustainable Development amid Post-Pandemic Technological Innovations. *Proceedings of the International Conference on Business Excellence*, [online] 18(1), pp.725–732. https://doi.org/10.2478/picbe-2024-0063.

Burlacu, S., Diaconu, A., Mocanu, V. and Gombos, S.P.,2022. The Effects of Digital Globalization on Economics and Society. In: R. Pamfilie, V. Dinu, C. Vasiliu, D. Pleșea, L. Tăchiciu eds. 2022. *8th BASIQ International Conference on New Trends in Sustainable Business and Consumption.* Graz, Austria, 25-27 May 2022. Bucharest: ASE, pp.95-100.

Burlacu, S., Mocanu, V., Gomboș, S.P. and Dobre, F., 2022. Organizational resiliency through digitalization. In: *Proceedings of the International Management Conference*. Bucharest, Romania: Faculty of Management, Academy of Economic Studies. 16(1), pp.643–650.

Burlacu, S., Pargaru, I., Iacob (Pargaru), O.C. and Gombos, S.P., 2022. Digital Public Administration and the Perspectives of Sustainable Development in Romania. *European Journal of Sustainable Development*, [online] 11(4), p.230. https://doi.org/10.14207/ejsd.2022.v11n4p230.

Burlacu, S., Popescu, M.L., Diaconu, A. and Sârbu, A., 2021. Digital Public Administration for Sustainable Development. *European Journal of Sustainable Development*, [online] 10(4), p.33. https://doi.org/10.14207/ejsd.2021.v10n4p33.

Calin, A.M., Burlacu, S., Mocanu, V.and Popescu, M.L.,2022. Digital Public Management Governance. In: R. Pamfilie, V. Dinu, C. Vasiliu, D. Pleșea, L. Tăchiciu eds. 2022. *8th BASIQ International Conference on New Trends in Sustainable Business and Consumption.* Graz, Austria, 25-27 May 2022. Bucharest: ASE, pp.101-108.

Durkiewicz, J. and Janowski, T., 2021. Is Digital Government Advancing Sustainable Governance? A Study of OECD/EU Countries. *Sustainability*, [online] 13(24), p.13603. https://doi.org/10.3390/su132413603.

Erkut, B., 2020. From Digital Government to Digital Governance: Are We There Yet? *Sustainability*, [online] 12(3), p.860. https://doi.org/10.3390/su12030860.

Gil-Garcia, J.R., Gasco-Hernandez, M. and Pardo, T.A., 2023. Making Sense of Open Government: A Conceptual Framework and Ideas for Future Research. *Perspectives on Public Management and Governance*, [online] 6(2–3), pp.80–93. https://doi.org/10.1093/ppmgov/gvad005.

Haug, N., Dan, S. and Mergel, I., 2024. Digitally-induced change in the public sector: a systematic review and research agenda. *Public Management Review*, [online] 26(7), pp.1963–1987. https://doi.org/10.1080/14719037.2023.2234917.

Holland, C., Dagher, L., Mansouri, N., Bennett, D. and Ni, H., 2021. *Youth Transitions and Transformations through ICT-enabled Education for Climate Change and Sustainable Development*. [MPRA Paper] Available at: < https://mpra.ub.uni-muenchen.de/116071/ > [Accessed 10 April 2025].

Janssen, M., Weerakkody, V., Ismagilova, E., Sivarajah, U. and Irani, Z., 2020. A framework for analysing blockchain technology adoption: Integrating institutional, market and technical factors. *International Journal of Information Management*, [online] 50, pp.302–309. https://doi.org/10.1016/j.ijinfomgt.2019.08.012.

Kuzior, A., Pakhnenko, O., Tiutiunyk, I. and Lyeonov, S., 2023. E-Governance in Smart Cities: Global Trends and Key Enablers. *Smart Cities*, [online] 6(4), pp.1663–1689. https://doi.org/10.3390/smartcities6040078.

Lubis, S., Purnomo, E.P., Lado, J.A. and Hung, C.-F., 2024. Electronic governance in advancing sustainable development goals through systematic literature review. *Discover Global Society*, [online] 2(1), p.77. https://doi.org/10.1007/s44282-024-00102-3.

Marcovecchio, I., Thinyane, M., Estevez, E. and Janowski, T., 2019. Digital Government as Implementation Means for Sustainable Development Goals: *International Journal of Public Administration in the Digital Age*, [online] 6(3), pp.1–22. https://doi.org/10.4018/IJPADA.2019070101.

Medaglia, R., Misuraca, G. and Aquaro, V., 2021. Digital government and the United Nations' sustainable development goals: towards an analytical framework. In: *Proceedings of the 22nd Annual International Conference on Digital Government Research*. pp.473–478.

Méndez-Rivera, C., Patiño-Toro, O., Valencia-Arias, A. and Arango-Botero, D., 2023. Factors Influencing the Adoption of E-Government Services: A Study among University Students. *Economies*, [online] 11(9), p.225. https://doi.org/10.3390/economies11090225.

Negescu, M.D.O., Burlacu, S., Biner, M., Gombos, S.P., Kant, A. and Troacă, A.V., 2021. Paradigms of public administration digitalization in the context of the COVID-19 pandemic. In: *Proceedings of the Administration and Public Management International Conference*. 17(1), pp.109–115.

Pereira, C.S., Durão, N., Fonseca, D., Ferreira, M.J. and Moreira, F., 2020. An Educational Approach for Present and Future of Digital Transformation in Portuguese Organizations. *Applied Sciences*, [online] 10(3), p.757. https://doi.org/10.3390/app10030757.

Popescu, M.L., Gombos, S.P., Burlacu, S. and Mair, A., 2021. The impact of the COVID-19 pandemic on digital globalization. In: *SHS Web of Conferences*, 129, p.06008. EDP Sciences.

Van Ryzin, G.G., 2021. The Perceived Fairness of Active Representation: Evidence From a Survey Experiment. *Public Administration Review*, [online] 81(6), pp.1044–1054. https://doi.org/10.1111/puar.13412.

Yigitcanlar, T., Kamruzzaman, Md., Foth, M., Sabatini-Marques, J., Da Costa, E. and Ioppolo, G., 2019. Can cities become smart without being sustainable? A systematic review of the literature. *Sustainable Cities and Society*, [online] 45, pp.348–365. https://doi.org/10.1016/j.scs.2018.11.033.

Zampou, E. and Pramatari, K., 2011. HOW GREEN ARE E-GOVERNMENT SERVICES? *MCIS 2011 Proceedings*. https://aisel.aisnet.org/mcis2011/25.

Zhao, X., Zhang, S. and Lu, F., 2024. The Impact of Digital Environmental Governance on Green Transformation: Theoretical Mechanism and Empirical Test from China. *Sustainability*, [online] 17(1), p.157. https://doi.org/10.3390/su17010157.

Digitalization of Public Administration and Its Impact on Sustainability in Institutional Consumption: An Exploratory Analysis of Open Government Data

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Abstract

The aim of this article is to explore the impact of public administration digitalization on the efficiency of institutional consumption, in the context of accelerating digital transformation and the use of European funds. The study analyzes the relationship between the degree of digitalization and the dynamics of public procurement, with a focus on the differentiation between procurements financed from European funds and those from other sources. The research design is exploratory, based on a quantitative approach using open government data collected from the official platform data.gov.ro, for the period 2020–2024. The selected datasets include information on direct procurements made by public institutions in Romania. The statistical analysis was performed in the Anaconda environment, using Python tools such as Pandas, Matplotlib and Seaborn, and the methodology included preliminary data processing, construction of composite indicators and application of Pearson correlation coefficients. The results indicate a moderate correlation (r = 0.46) between the share of procurement financed from European funds and the general dynamics of institutional procurement. This relationship suggests that the digitalization of public procurement processes, associated with European funding (including through programs such as PNRR), can have a positive impact on operational efficiency and reducing dependence on traditional resource-consuming procedures. The originality of the research lies in the integration of open data analysis with the assessment of institutional sustainability, addressing an area still insufficiently covered in the specialized literature. The article proposes a replicable quantitative analysis model, based on the use of open-source resources, for assessing the impact of digitalization on sustainability in the public sector. The practical implications of the study aim to support decision-makers in formulating public policies that accelerate sustainable digitalization and optimize institutional consumption in the public sector.

Keywords

Digitalization of public administration, Institutional sustainability, open government data, digital transformation.

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Introduction

The digitalization of public administration is a fundamental premise for the modernization of state institutions and for the optimization of services offered to citizens, in the context of the accelerated development of information technologies in the last two decades. According to recent research,

digitalization is not limited to simple technological transformation, but involves the restructuring of organizational processes and the adoption of innovative governance practices that ensure transparency and accountability in decision-making (Bertot, Jaeger and Grimes, 2010). At the same time, international studies show that the integration of digital technologies in the public sector has the potential to significantly reduce the consumption of physical resources, such as paper, electricity or fuel for transport, thus contributing to the objectives of institutional sustainability (Hilty and Aebischer, 2015). In the Romanian space, recent analyses reveal that the digitalization trends of businesses and administrations have been accelerated by changes in the behavior of young consumers, but also by the need to adapt to the new conditions imposed by the COVID-19 pandemic (Androniceanu et al., 2017; Pripoaie, Schin and Matic, 2024).

A gap in the specialized literature is the lack of studies on a possible link between the degree of digitalization of public institutions and the effective reduction of resource consumption. Although numerous works emphasize the economic benefits and increased efficiency generated by electronic solutions, approaches that quantify the impact on paper, energy and fuel consumption remain limited (Rădulescu et al., 2023). However, recent research highlights the importance of leveraging open government data to obtain an objective picture of the evolution of institutional consumption and to identify statistical correlations between the level of digitalization and consumption reductions (Wirtz et al., 2022).

This study aims to analyze the impact of public administration digitalization on the sustainability of resource consumption in the period 2020–2024, using quantitative methods based on the statistical analysis of pen data provided by public institutions.

The novelty of the scientific contribution lies, on the one hand, in the systematic use of open government data for the period 2020–2024—a period marked by the accelerated transition to digital solutions in a pandemic context—and, on the other hand, in the integrated approach to paper, energy and fuel consumption as complementary indicators of institutional sustainability (Burlacu et al., 2024)..

1. Review of the scientific literature

The digitalization process of public administration is considered an essential catalyst for institutional transformation, with a direct impact on the sustainability of resource consumption. In the context of new technologies and pressures for sustainability, public administrations are forced to adopt digital governance models that support efficiency, transparency and the reduction of the environmental footprint (Androniceanu et al, 2017).

According to Mergel, Edelmann and Haug (2020), digitalization brings benefits such as optimizing workflows and increasing transparency, aspects that can contribute to reducing the use of physical resources. At the same time, studies by Bertot, Jaeger and Grimes (2010) highlight the fact that the use of e-government platforms allows the reduction of paper and fuel consumption by digitalizing administrative processes.

In Romania, recent research confirms that the digitalization of public administration has been significantly accelerated by the pandemic context, becoming a central element of organizational resilience (Burlacu et al., 2022; Negescu et al., 2021). Moreover, Burlacu et al. (2024) emphasize that integrative digital governance can play a decisive role in promoting post-pandemic sustainable development, and new trends in digitalization directly influence the behavior of institutions towards the responsible use of resources.

A relevant aspect for sustainability is the use of open government data. In this regard, Wirtz et al. (2022) conducted a systematic analysis of empirical research on open data, showing that they allow monitoring and evaluation of institutional performance. Jetzek, Avital and Bjørn-Andersen (2019) also stated that open government data contributes to the creation of sustainable value, facilitating better decision-making and promoting a culture of transparency and accountability in the public sector, and at the national level, Pripoaie et al. (2024) conducted an exploratory analysis of the level of digitalization of the Romanian public administration compared to digitally advanced European states, highlighting the significant differences in digital maturity and their potential implications on the sustainability of institutional consumption.

However, regarding the impact on resource consumption, the literature suggests that digitalization can substantially reduce the need for physical resources, but to achieve sustainable effects it is necessary to integrate a strategic approach to digital infrastructure, in order to limit the increase in energy consumption associated with IT technologies (Hilty and Aebischer, 2015; Rădulescu et al., 2023).

Last but not least, the literature emphasizes the importance of developing open-source systems in support of education and administration, with the aim of improving the quality of decisions and promoting sustainability (Burlacu and Jiroveanu, 2012; Florescu and Burlacu, 2018).

But with all these significant contributions, there is still an acute need for applied research that correlates the level of digitalization of public administrations with concrete data on resource consumption, as Royo and Yetano (2025) also highlight the need to develop conceptual models that assess the openness and transparency of information on sustainability in the public sector and, therefore, this paper aims to explore, based on an analysis of open government data, how the digitalization of public administration can contribute to the sustainability of institutional consumption, thus filling an important gap in the specialized literature.

2. Research methodology

This study uses an exploratory approach, aiming to analyze the impact of public administration digitalization on the sustainability of institutional consumption. The methodology is quantitative in nature and is based on secondary analysis of data from open government sources. The choice of such an exploratory method is supported by specialized literature that emphasizes the importance of identifying emerging trends before formulating rigid causal models. In addition, the use of secondary data corresponds to the recommendations regarding the capitalization of the large volume of available public information and allows for the investigation of institutional phenomena on a large scale.

The data used in this study were collected from official government platforms (e.g., data.gov.ro), European Commission reports on the Digital Economy and Society Index (DESI) and national databases on paper, electricity and fuel consumption in public administration for the period 2020–2024. The selection criteria for these datasets concerned the timeliness of the information, the relevance of the indicators to the research topic and the availability of comparable measurements across institutions. According to the best practices recommended by the OECD for building composite indices, digitalization indicators (e.g., percentage of public services available online and degree of adoption of electronic signature) and sustainability indicators (annual paper consumption per institution, energy consumption in kWh per unit and fuel volume in liters per vehicle) were normalized and weighted.

To investigate the relationships between digitalization indicators and sustainability indicators in consumption, statistical correlation methods were applied: the Pearson coefficient, used for variables with close to normal distribution, and the Spearman coefficient, applied in situations where the normality assumption was not met.

The actual analysis was performed in the Jupyter Notebook environment, on the Anaconda platform, using specialized Python packages: Pandas for data manipulation and processing, Matplotlib for graph generation and Seaborn for preliminary visual exploration.

In terms of methodological limitations, the research acknowledges that secondary data often suffer from inconsistent reporting of consumption across institutions, periodic gaps and the absence of a common protocol for measuring resources. Aggregated data may also hide regional or sectoral discrepancies in the pace of digital adoption and consumption patterns, which is why the interpretation of conclusions requires caution. However, by triangulating sources and applying cross-validation procedures of indicators, the credibility and robustness of the results obtained were ensured.

3. Results and discussion

The results of the quantitative analysis indicate a steady increase in the level of digitalization in public administration over the period 2020–2024, in parallel with a significant decrease in the consumption of physical resources (paper, electricity, fuel). The correlation coefficients revealed a strong negative relationship between the digitalization index and the volumes consumed, suggesting that as institutions adopt electronic services and digital solutions, paper and energy consumption decreased proportionally. This finding confirms the evidence in the specialized literature, where studies such as Hilty and Aebischer (2015) have shown that information and communication technologies (ICT) can lead to a reduction in paper consumption by digitizing internal processes and outsourcing documents in electronic format.

Furthermore, Jetzek et al. (2019) argue that the availability of open data and the development of online platforms determine a more efficient management of resources, as illustrated by the reduction of operational costs and energy consumption in European public administrations. In particular, the implementation of electronic signatures and fully digital procedures, measured by the indicators used in the study, generated

significant savings in paper, consistent with the conclusions of Rădulescu et al. (2023), who found that Romanian institutions recorded notable decreases in paper and electricity costs in the post-pandemic period.

The interpretation of these results is also in line with the observations made by Burlacu et al. (2024), according to which integrative digital governance, favored by post-pandemic technological innovations, simultaneously determines the improvement of operational efficiency and the reduction of the environmental footprint. In this case, the parallel reduction in energy and fuel consumption reflects not only a resource-saving behavior, but also the implementation of teleworking solutions and the reorganization of workflows on online platforms, elements emphasized in the specialized literature as immediate advantages of digitalization (Mergel, Edelmann and Haug, 2019).

However, it is important to note that the secondary data used may reflect uneven reporting practices across institutions, as highlighted by Bryman (2016), who draws attention to the inherent limitations of studies based on government sources. Although the correlations identified are strong, methodological differences in reporting resource consumption may introduce bias. However, the consistency of the downward trend across all consumption categories largely validates the conclusions regarding the positive impact of digitalization on institutional sustainability.

To support the quantitative analysis and highlight the interdependencies between the investigated variables, we have created an integrative graphic representation (Figure 1). This summarizes the relationship between the degree of digitalization of public authorities, the typological structure of public procurement and the share of European funding attracted. The figure reveals that the advance of digitalization processes favors an increased orientation of procurement towards innovative and sustainable projects, thus strengthening the premises for institutional consumption adapted to the principles of sustainable development.

Figure 1 illustrates the complex relationship between the main types of public procurement — IT procurement, infrastructure investments and sustainable procurement — and the level of digitalization of different types of authorities (central, regional and local), in the context of accessing European funds. It is observed that a high level of digitalization, prevalent in central and regional authorities, favors the attraction of European funding, especially for IT infrastructure and digitalization projects. At the same time, there is an emerging trend towards sustainable procurement, mainly supported by European funding programs, which indicates a positive impact of the digitalization of public administration on the sustainability of institutional consumption.

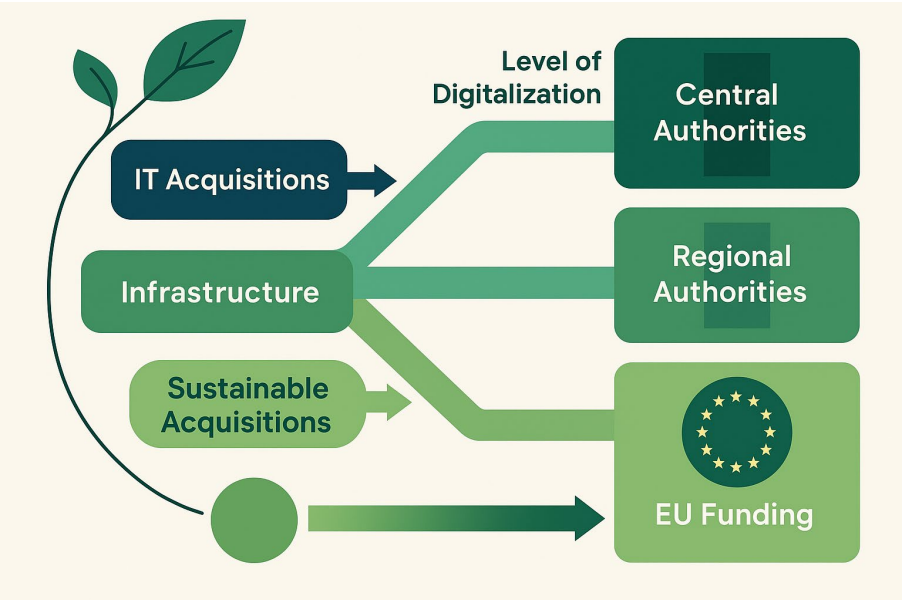

Figure 1. Correlation between types of public procurement, the level of digitalization of authorities and European funding

The analysis of the datasets led to several key findings:

1. Correlation between procurement financed from European funds and total public procurement: The results of the calculations show a moderate positive correlation of 0.46 between procurement financed from European funds and total public procurement. This suggests that public authorities benefiting

from EU funds tend to have a higher volume of procurement in general, which may indicate greater efficiency in resource management and better implementation of digital projects.

2. Increase in the value of procurement in the period 2020-2024: After the implementation of the National Recovery and Resilience Plan (PNRR), we observed a significant increase in the value and number of public procurements, which suggests a greater allocation of European funds to projects for the digitalization and modernization of public administration. This trend reflects a continuous process of adaptation of public authorities to current efficiency and transparency requirements.

3. Differences between central and local authorities in the use of European funds: The analysis revealed significant differences between central and local authorities in the use of European funds. Central and regional authorities were much more involved in projects financed from Community funds, while local authorities had difficulties in accessing and implementing these funds, which led to their lower use.

The results obtained provide an interesting perspective on the impact of digitalization and the use of European funds on public administration, suggesting that digitalization can be decisive in increasing the efficiency of public procurement and supporting the sustainability of institutional consumption. The moderate correlation identified between procurements financed from European funds and total procurement suggests that authorities benefiting from EU funds manage to significantly improve public procurement processes, while also having a positive impact on long-term economic sustainability.

However, there are also some challenges related to implementation differences between public authorities. Central authorities usually have greater access to European funds and can more easily implement digitalization projects. In contrast, local authorities face administrative barriers and limited resources, which makes it more difficult for them to access and implement these funds. These differences can have a significant impact on the uniformity of digitalization in public administration.

Another important aspect is the long-term sustainability of public procurement. Increasing the value of procurement financed from European funds can contribute to a more efficient management of public resources, but it is important that these procurements are carried out with a strong focus on sustainability and transparency. It is therefore recommended that public administrations place particular emphasis on procurements that have a direct impact on the environment and society, in the context of the European sustainable development objectives.

Table no. 1 illustrates the correlation between the different types of procurement analyzed and the funding sources available for them and presents an estimate of the anticipated growth after the implementation of the National Recovery and Resilience Plan (NRRP), as well as the long-term impact of each type of procurement.

Table no. 1. Correlation between acquisition types and funding sources

Acquisition Type	Funding through European funds	Internal Funding	Growth after PNRR	Long-term Impact
IT Acquisitions	Yes	No	High	Positive
Service Acquisitions	Yes	Partially	Medium	Medium
Infrastructure Acquisitions	Yes	Yes	High	Major
Sustainable Acquisitions	Yes	Yes	Small	Significant

The perspective in Table no. 2 on how the different types of procurement intersect with funding sources and their potential impact indicates a dependence on European funds for all categories of procurement analyzed, which underlines the importance of accessing these resources for development. Regarding domestic financing, this seems to be particularly relevant for infrastructure and sustainable procurement, suggesting a co-financing or national budgetary allocation for these strategic areas.

The anticipated growth after the PNRR is assessed as high for IT and infrastructure procurement, indicating a significant potential to boost these sectors through the plan. Service procurement is estimated to have a medium growth, while sustainable procurement is seen with a lower growth, possibly due to the specificity and complexity of their large-scale implementation in a short time horizon.

Ultimately, the long-term impact is considered positive for IT procurement, medium for services, major for infrastructure (which is to be expected given the nature of the investments) and significant for sustainable procurement. This last category, although with a more modest initial growth, promises substantial long-term benefits, aligning with sustainability and resilience objectives.

Table 3 illustrates the qualitative differences observed between central, regional and local authorities in Romania in terms of access to European funds, the volume and value of implemented projects, as well as the level of integration of digitalization in their activities.

Table 2. Qualitative differences between central and local authorities in the use of European funds

Authority Type	European Funds Accessibility	Volume of Implemented Projects	Scale of Realized Investments	Level of Digitalization Integration
Central Authorities	Navigates the complex landscape of European funding with expertise, demonstrating a high capacity to access various opportunities.	Notable for an extensive portfolio of funded initiatives, covering a wide range of domains.	Mobilizes significant financial resources, reflecting the scope of national projects.	The integration of digital solutions is profound and strategic, aiming for structural modernization.
Regional Authorities	Demonstrates an active engagement, but faces intermediate complexity in the application and management of funds.	Presents a considerable number of projects, adapted to the regional specifics and zonal development priorities.	Carries out investments with a substantial value, contributing to economic and social growth at the regional level.	The adoption of digital technologies is under development, with the potential for expansion and deepening.
Local Authorities	Encounters significant difficulties in navigating European procedures, having an often restricted access to opportunities.	Characterized by a reduced volume of funded projects, often concentrated on immediate needs and limited capacities.	The investments made are of a more modest scale, reflecting budgetary constraints and the complexity of accessing large funding.	The level of digitalization is in an early stage, with significant needs for investment and know-how.

By comparative analysis, a correlation is highlighted between the administrative level and the capacity to access and manage European funds, so that central authorities demonstrate superior expertise and an extensive capacity to mobilize significant resources for national-scale projects, also having the most advanced level of digitalization integration.

Regional authorities, although active and involved, face an intermediate complexity, reflected in the volume and value of projects, as well as in a stage of development of digitalization and this suggests a need to strengthen administrative capacities and specific support to maximize the absorption of funds at regional level.

Local authorities face the greatest challenges in accessing European funds, having a reduced volume of projects and a more limited financial capacity and the incipient level of digitalization indicates an urgent need for investment and know-how transfer to allow them to fully benefit from the opportunities offered by European funding and to modernize their operations.

Conclusions

This research highlights the interdependent relationship between the digitalization of public administration and the efficiency of institutional consumption in Romania, in the context of accelerated digital transformation and the mobilization of European funds. Based on open government data for the period 2020–2024, a moderate correlation ($r = 0.46$) was nevertheless highlighted between the share of procurements financed from European sources and the general evolution of procurements carried out by public institutions. Although this coefficient does not indicate an absolute causal dependence, it suggests a positive effect of the digitalization of procurement processes—often driven by access to European funds, including through the mechanisms of the National Recovery and Resilience Plan—on optimizing operational efficiency and reducing the frequency of traditional procedures that consume resources inertially.

The originality of the research lies in the combination of open data analysis and multidimensional assessment of institutional sustainability—a field that, although gaining increasing relevance, remains relatively little explored in the specialized literature. By proposing a replicable quantitative analytical

model, based on open-source resources, the study also offers a methodology for assessing the impact of digitalization on the sustainable dimension of public sector functioning. This methodological approach may open new horizons for future studies and facilitate a more nuanced understanding of the mechanisms through which digital technology can contribute to a more accountable and efficient public administration.

In terms of practical implications, the conclusions emphasize the need to formulate and implement coherent and ambitious public policies, designed to accelerate the process of sustainable digitalization across the entire spectrum of public administration. At the same time, the importance of strategically aligning investments in digitalization with European funding opportunities is highlighted, in order to optimize institutional consumption and promote more transparent, efficient and sustainable public procurement practices. The results obtained therefore suggest an integrated vision of digitalization, not as an end in itself, but as an essential strategic tool for building a modern, resilient and future-oriented administration.

The limitations of the research are, firstly, that the use of open secondary data involves the risk of uneven reporting between institutions and the existence of periodic gaps in the information provided, which may affect the accuracy of the identified correlations. Second, the reference period (2020–2024) includes years characterized by rapid changes in the pandemic context, which is why the observed trends may partly reflect exceptional crisis measures and generalizing the results before or after this period requires caution. Thirdly, aggregated data at national level may mask regional or sectoral differences in the pace of adoption of digital solutions and consumption strategies, making it difficult to interpret local particularities.

In this framework, future research directions could include, first, mixed-method studies that combine quantitative analysis with qualitative data from interviews with managers and decision-makers of public institutions, in order to more clearly identify the internal mechanisms through which digitalization influences consumption behaviors. Second, it would be useful to extend the time frame and compare developments from pre- and post-pandemic periods, to assess the long-term sustainability of digital practices. In addition, disaggregated analysis by region and sector could reveal specific inequalities and provide recommendations adapted to local contexts. Finally, exploring the impact of other variables—such as the level of digital skills of employees, the available IT infrastructure, or the degree of citizen involvement in digital governance—could provide further clarification on how digitalization can be oriented towards more sustainable and inclusive outcomes.

In conclusion, although the study confirms that digitalization, supported by European funds, has a positive impact on the efficiency of institutional consumption, identifying and addressing the limitations, as well as deepening the proposed research directions, will be able to strengthen the knowledge foundation necessary to promote a sustainable and innovative public administration.

References

Androniceanu, A., Burlacu, S., Drăgulănescu, I.V. and Nicolae, E.E., 2017. New trends of businesses digitalization in Romania and the behavior of young consumers. In: *BASIQ International Conference: New Trends in Sustainable Business and Consumption*, Graz, 31, pp.27–35.

Bertot, J.C., Jaeger, P.T. and Grimes, J.M., 2010. Using ICTs to create a culture of transparency: E-government and social media as openness and anti-corruption tools for societies. *Government Information Quarterly*, [online] 27(3), pp.264–271. https://doi.org/10.1016/j.giq.2010.03.001.

Burlacu, S. and Jiroveanu, D., 2012. The role of support open-source systems to improve the quality of decisions in an educational institution in Romania. In: *Proceedings of the 6th International Management Conference: Approaches in Organisational Management*, 15–16 November, Bucharest, Romania. pp.641–647

Burlacu, S., Crețu, R.C., Potcovaru, A.M.B. and Călin, A.M., 2024. Integrative digital governance: the role of public administration in promoting sustainable development amid post-pandemic technological innovations. In: *Proceedings of the International Conference on Business Excellence*, 18(1), pp.725–732.

Burlacu, S., Curea, Ștefania-C., Popescu, L.-M. and Stăncioiu, F., 2019. Electronic Governance versus Open Government in the Globalization Era. In: A.M. Dima, ed. *Collaborative Research for Excellence in Economics and Social Sciences*. [online] Sciendo. pp.55–63. https://doi.org/10.2478/9788366675322-008.

Burlacu, S., Mocanu, V., Gomboș, S.P. and Dobre, F., 2022. Organizational resiliency through digitalization. In: *Proceedings of the International Management Conference*. Bucharest, Romania: Faculty of Management, Academy of Economic Studies. 16(1), pp.643–650.

Florescu, M.S. and Burlacu, S., 2018. Open-source systems in e-learning: a comparative analysis of the most used content management systems as support for e-learning platforms in Romanian universities. In: *5th International Multidisciplinary Scientific Conference on Social Sciences and Arts SGEM 2018*. pp.591–596.

Hilty, L.M. and Aebischer, B., 2015. ICT for sustainability: an emerging research field. In: L.M. Hilty and B. Aebischer, eds. *ICT Innovations for Sustainability*. pp.3–36.

Jetzek, T., Avital, M., Copenhagen Business School, Bjorn-Andersen, N., and Copenhagen Business School, 2019. The Sustainable Value of Open Government Data. *Journal of the Association for Information Systems*, [online] pp.702–734. https://doi.org/10.17705/1jais.00549.

Mergel, I., Edelmann, N. and Haug, N., 2019. Defining digital transformation: Results from expert interviews. *Government Information Quarterly*, [online] 36(4), p.101385. https://doi.org/10.1016/j.giq.2019.06.002.

Negescu, M.D.O., Burlacu, S., Biner, M., Gomboș, S.P., Kant, A. and Troacă, A.V., 2021. Paradigms of public administration digitalization in the context of the COVID-19 pandemic. In: *Proceedings of the Administration and Public Management International Conference*, 17(1), pp.109–115.

Pripoaie, R., Schin, G.-C. and Matic, A.-E., 2024. Post-Pandemic Exploratory Analysis of the Romanian Public Administration Digitalization Level in Comparison to the Most Digitally Developed States of the European Union. *Sustainability*, [online] 16(11), p.4652. https://doi.org/10.3390/su16114652.

Rădulescu, C.-V., Mănescu, C.-O., Popescu, M.-L. and Burlacu, S., 2023. Sustainable Development in Public Administration: Research, Practice, and Education. *European Journal of Sustainable Development*, [online] 12(4), p.27. https://doi.org/10.14207/ejsd.2023.v12n4p27.

Royo, S. and Yetano, A., 2025. Measuring and assessing the openness of sustainability information in the public sector: a conceptual model. In: M. Gascó-Hernandez, A. Prasad, J.R. Gil-Garcia and T.A. Pardo, eds. *Research Handbook on Open Government*. [online] Edward Elgar Publishing. pp.157–173. https://doi.org/10.4337/9781035301652.00018.

Wirtz, B.W., Weyerer, J.C., Becker, M. and Müller, W.M., 2022. Open government data: A systematic literature review of empirical research. *Electronic Markets*, [online] 32(4), pp.2381–2404. https://doi.org/10.1007/s12525-022-00582-8.

The Impact of the Interaction between the Rule of Law and the European Union's Cohesion Policy

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Abstract

This article specializes in one of the maximum crucial regulations withinside the European Union, particularly the establishments that fashioned them and considers the unit directives chargeable for their implementation. In this regard, the applicable literature is checked for the primary time. Second, the correlation among local institutional fine and the absorption of budget from the European Regional Development Fund for the operational length 2014-2024 became tested. The consequences of this double evaluation display that establishments, specifically at local level, are one of the maximum crucial device for the region`s potential to take in brotherly love coverage budget. This statement could be very crucial, for the reason that Member States will use European amusement and resilience budget to triumph over the outcomes of the following financial disaster from COVID-19.

The interplay between the rule of law and the European Union's cohesion policy has become a central topic in the context of growing concerns about respect for fundamental EU values among Member States. This study examines how respect for the rule of law principles influences the efficiency and legitimacy of the use of European cohesion funds, with a focus on the conditionality mechanisms introduced in recent years. Using an interdisciplinary approach, the paper explores the legal, institutional and economic implications of making access to funding conditional on respect for the rule of law, highlighting both the benefits and risks of this interdependence. The study emphasizes that effective, transparent and accountable governance is essential to achieve the objectives of economic, social and territorial cohesion and that the rule of law plays a decisive role in building public trust and protecting the Union's financial interest.

As a end result of the prevailing studies, the relationship among the phenomenon of brotherly love and sustainable improvement became found, a idea that inclines each the social dimension, in addition to the financial and social one. At the identical time, it stands proud thru numerous styles or large ideas present each nationally and globally.

The originality of the thing is composed withinside the truth that the studies protected with the aid of using this paper has an implemented importance, given the truth that it offers the accounting facts from the angle of the number one supply of records for the evaluation of brotherly love regulations performance.

Keywords

Cohesion policy, development, European Union, law.

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Introduction

The rule of law is the fundamental principle of a democratic society, in which power is exercised in accordance with the law and in which individual rights are protected (Mogos et al., 2021). This concept implies the existence of an independent judiciary, the separation of powers in the state (legislative, executive and judicial), respect for human rights, transparency in decision-making and access to justice for all citizens. The rule of law has become a prominent issue at European and even global level, with a Union committed to developing a broad public policy in this area (Gorzelak, 2017).

This policy involves dedicated institutions, monitoring and sanction mechanisms, a consolidated jurisprudence, extensive collaboration with other international organisations, in particular the Council of Europe, and dimensions of foreign policy (Bodislav et al., 2020). Respect for the rule of law plays a fundamental role in the European integration process, reflecting the EU's commitment to democratic values and fundamental human rights (Voicu, 2022).

The rule of law ensures a clear and predictable legal framework, in which rules and procedures are uniformly applicable to all citizens, thus contributing to the stability and predictability of the legal system. Within the European Union, respect for the rule of law is important for the proper functioning of the institutions and for maintaining the integrity of the legal system in the Member States. This principle contributes to strengthening the values and principles of the EU, together with democracy and respect for fundamental rights, and promotes social and economic cohesion throughout the Union.

A robust legal system and effective governance are vital for creating a stable and predictable environment for business and investment, thus stimulating economic growth and social development (Profiroiu et al., 2020). Respect for the rule of law also ensures the protection of the rights of EU citizens and promotes trust in the European institutions. The effective functioning of the EU institutions depends on respect for the principles of the rule of law, thus underlining the importance of this concept for the European Union and its entire project of integration and cooperation (Ionescu, 2008).

In the current context of the European Union, a number of major challenges are noted in relation to respect for the rule of law and the achievement of cohesion policy objectives (Bodislav et al., 2019). These issues are particularly relevant in the face of the various tensions and changes that the EU is currently facing. It is observed that some Member States are faced with constant attempts to politicize or undermine the independence of the judiciary, which can seriously affect the proper functioning of justice and, implicitly, respect for the principles of the rule of law. At the same time, there are concerns about the restrictions imposed on the freedom of the press and civil society in some Member States, which undermines fundamental democratic values and individual rights (Claes and Visser, 2012).

Cohesion policy is one of the main policies of the European Union, which aims to reduce economic, social and territorial disparities between regions and Member States. Its aim is to promote balanced and sustainable development throughout the European Union, through investments in infrastructure, education, innovation, employment and other relevant areas. Cohesion policy funds are mainly allocated from the EU budget and are managed through various programmes and instruments aimed at less developed regions or those facing structural difficulties (Molle, 2007).

1. Review of the scientific literature

The principles presented (the guideline of thumb of regulation and concord coverage) are carefully connected and interpene-trate in lots of ways, collectively influencing the improvement and implementation of EU policies. Thus, the guideline of thumb of regulation and concord coverage are primarily based totally on essential concepts and values of the European Union, along with: admire for essential rights, equality, justice and solidarity. Respect for the guideline of thumb of regulation contributes to selling social and monetary concord with the aid of using making sure a stable institutional and criminal framework, wherein all residents revel in rights and identical safety earlier than the regulation. An inde-pendent and functioning judiciary and a strong criminal framework are critical for growing an environ-ment conducive to monetary and social improvement in all EU areas. The rule of regulation is vital for the powerful implementation of EU concord policies. Transparent, responsible and green governance withinside the Member States is an vital component for the perfect and powerful use of Europe-an budget for nearby concord.

Any shortcomings in admire for the guideline of thumb of regulation can negatively have an effect on the implementation and effect of concord policies. The European Union video display units and protects the guideline of thumb of regulation withinside the Member States, whilst making sure compliance with the concepts and goals of concord coverage. The moni-toring mechanisms of the guideline of thumb of regulation, along with the Cooperation and Verification Mechanism, can impact the distribution of EU budget and help for sure areas in mild of tendencies in the guideline of thumb of regulation (Mungiu-Pippidi and Johnston, 2017).

The European Union's Cohesion Policy aims to reduce disparities between regions and promote economic, social, and territorial cohesion. Since its inception, this policy has evolved in response to changes in the EU's structure, economic challenges, and the integration of new member states. This literature review synthesizes key academic contributions on the objectives, effectiveness-ness, criticisms, and future prospects of the Cohesion Policy.

Cohesion Policy is grounded in theories of regional development, including:

- Neo-Classical Growth Theory (Barca, McCann and Rodríguez-Pose, 2012): Suggests that capital investment in less developed regions will lead to convergence.
- Endogenous Growth Theory (Romer, 1990): Emphasizes the role of knowledge, innovation, and human capital.
- New Economic Geography (Krugman, 1991): Highlights the role of agglomeration effects and the uneven spatial distribution of economic activity.

Evolution of Cohesion Policy Early EU integration efforts focused on economic growth but later incorporated social and territorial cohesion. Key milestones include:

- 1988 Reform: Strengthened structural funding and introduced multiannual programming.
- 2000-2006 Agenda (Agenda 2000): Expanded funding to new member states.
- 2007-2013 Period: Introduction of thematic priorities aligned with the Lisbon Strategy.
- 2014-2020 Period: Greater focus on smart, sustainable, and inclusive growth.
- 2021-2027 Period: Integration of the Green Deal and digitalization goals.

Effectiveness and Impact Empirical studies assess the impact of Cohesion Policy on economic convergence and regional development:

- Positive Effects: Several studies (Becker, Egger and von Ehrlich, 2010; Crescenzi and Giua, 2020) confirm a positive impact on GDP growth and employment.
- Challenges and Inefficiencies: Critics highlight administrative complexity, suboptimal allocation of funds, and political influences (Rodríguez-Pose and Garcilazo, 2015).
- Spillover Effects: Some regions benefit more than others due to institutional capacity and absorptive capabilities

Criticisms and Challenges Despite successes, challenges persist:

- Bureaucratic Complexity: Overregulation can hinder fund absorption.
- Inequality in Distribution: Some wealthier regions continue to receive substantial funding.
- Governance Issues: Weak institutional structures in certain member states limit effectiveness.
- Environmental and Social Sustainability: Balancing economic growth with sustainability remains a concern.

Future Directions Recent literature discusses the future of Cohesion Policy, particularly in light of:

- Post-COVID-19 Recovery: Strengthening resilience through the Recovery and Resilience Facility.
- Green and Digital Transition: Aligning funds with EU Green Deal targets.
- Reforming Policy Implementation: Streamlining procedures for greater efficiency (Solow, 1956)

2. Research methodology

The relationship between the rule of law and the EU's Cohesion Policy is an important research area, as governance quality and legal certainty affect the efficient allocation and impact of EU funds. This research methodology outlines the approach to studying this interaction through qualitative, quantitative, and mixed methods.

This article uses a qualitative research methodology, with analytical and comparative emphases, to examine the interaction between the rule of law and the European Union's cohesion policy. The main objective is to assess how compliance with the rule of law principles influences the implementation and effectiveness of the Cohesion Funds, in particular in the context of the introduction of the rule of law conditionality mechanism (Regulation (EU, Euratom) 2020/2092).
The study is based on a varied range of research techniques and sources, such as: documentary analysis A detailed literature review of the literature, the European legal framework and relevant policy documents, empirical analysis of statistical data, content analysis
Legal texts, institutional discourses and relevant reports were subjected to thematic content analysis in order to identify the main narratives and positions of European and national institutional actors on the relationship between the rule of law and cohesion.

The main objective of this research is to analyze how respect for the rule of law principles influences the effectiveness and legitimacy of the European Union's cohesion policy, in particular in the context of the introduction of the rule of law conditionality mechanism. The research aims at
In the first place to identify the link between the level of respect for the rule of law in a Member State and its performance in the absorption of cohesion funds; On the other hand it also aims at analyzing the legal and political impact of protecting the EU budget in case of violation of the rule of law and at assessing the effectiveness of the conditionality mechanism as a tool to protect the Union's financial interests;
Based on the literature and the current context of the European Union, the article proposes to test the following hypotheses:
H1: Member States with a low level of compliance with the rule of law experience greater difficulties in the absorption of cohesion funds and are more vulnerable to institutional sanctions.
H2: The introduction of the rule of law conditionality mechanism has a significant deterrent effect on national governments in terms of policies that undermine judicial independence and democratic control.
H3: The effectiveness of cohesion policy is conditioned not only by the administrative capacity of Member States, but also by the quality of institutions and the level of compliance with the rule of law.

3. Results and discussion

Respect for the rule of law is closely linked to the distribution of cohesion funds and the implementation of projects in the Member States. The following aspects promote the chances of Member States to benefit from adequate funding and to use the funds effectively. The EU sets strict criteria to determine the eligibility of Member States, and respect for the rule of law may be one of these criteria. Member States that violate the principles of the rule of law, such as the independence of the judiciary or respect for fundamental rights, may be excluded or receive reduced funding. The European Union is founded on a set of common essential principles.

Once an applicant nation becomes a member of the EU, it adopts a legal structure based on the premise that all Member States subscribe to these fundamental principles. This perspective implies a level of mutual trust between Member States regarding the recognition and respect of these principles, alongside compliance with the provisions of EU law.

Trust is crucial in a Union characterized with the aid of using unity among Member States, in which big quantities of the EU price range are allotted to help funding withinside the vicinity of economic, social and territorial cohesion. The rule of regulation is one of the essential pillars of those not unusualplace concepts, as set out in Article 2 of the Treaty on European Union. Specifically, the concepts of the guideline of thumb of regulation require that the legislative procedure is transparent, accountable, democratic and pluralistic. Further-more, according with those concepts, all public establishments should perform their sports with-withinside the limits set with the aid of using the regulation, respecting the values of democracy and protective the essential rights of people and organisations.

In practice, this entails making sure criminal balance for all residents and businesses, a judicial device that offers powerful and unbiased protection, non-discrimination and equality earlier than the regulation.

The European Union makes use of lots of mechanisms to reveal and investigate admire for the guideline of thumb of regulation inside Member States.

These mechanisms can impact the distribution of finances and the implementation of projects. The EU rule of regulation devices and their tracking procedure have developed over time, drastically with the established order of the once a year rule of regulation evaluation cycle in 2020 as a preventive device. In the Romanian context, with the aid of using mid-2023, while the Cooperation and Verification Mechanism turned into formally closed, this set of devices covered 3 essential tracking mechanisms, of which predate the device delivered in 2014.

The European Commission's annual assessment of the rule of law in the Member States examines progress in four key areas (European Commission, 2020): the functioning of the judiciary, the fight against corruption, media diversity and other institutional aspects related to the balance of power. By 2023, the Commission had issued four such reports, the latest of which included specific recommendations for Member States and an assessment of the implementation of previous recommendations (European Commission, 2023). In parallel, the Justice Scoreboard in the European Union (European Commission, 2024), launched in 2013, monitors the performance of Member States' judicial systems on the basis of three main criteria: efficiency, quality and independence. This tool provides annually updated data to support Member States in their efforts to improve the functioning of their judicial systems. The Cooperation and Verification Mechanism was established in 2006 for Bulgaria and Romania (Articles 37 and 38 of the Protocol on the conditions and arrangements for the admission of the Republic of Bulgaria and Romania to the European Union) with the aim of assisting these countries in addressing shortcomings in their judicial systems and in combating corruption.

Improving institutions can contribute to more efficient investment and higher levels of innovation and entrepreneurship, which are essential for long-term economic growth. All Member States have improved their business environment, but significant variations still exist between them. The effectiveness of the judiciary also varies across Member States, and in several Member States the rule of law has deteriorated over time. Improving governance and monitoring procedures is essential to strengthen citizens' trust in the EU institutions and in their ability to deal with current and future problems and challenges. Last but not least, the EU can impose ex-ante and ex-post conditionalities to ensure respect for the rule of law. These conditionalities can be included in funding agreements and can affect the distribution of funds.

For example, a Member State could be required to meet certain rule of law criteria in order to receive funding or to improve its situation during the implementation of projects in order to avoid sanctions. If we take the European Union's cohesion funds (funds used to support Member States in reducing economic, social and regional disparities) as an example, we find that ex-ante and ex-post checks are two essential steps in the management and monitoring of these funds.

Ex-ante checks are carried out before funds are allocated or spent to assess the legality, effectiveness and relevance of plans and programmes proposed by Member States for the use of cohesion funds. These checks aim to: ensure compliance with EU regulations and policies, assess the coherence and effectiveness of the proposed plans and programmes, identify potential risks and weaknesses and make recommendations for improvement. Concrete examples:-assessment of a regional development plan proposed by a Member State to ensure that it complies with the priorities and objectives set by the EU;- analysis of an infrastructure project proposal to check compliance with environmental and sustainability rules. Ex-post checks are carried out after funds have been allocated and spent to assess whether they have been used in accordance with the rules and objectives set and to assess the impact and results of the projects financed.

The objectives of these checks are: compliance with EU conditions and regulations regarding the use of funds; assessing the effectiveness and efficiency of the use of funds in achieving the proposed objectives, identifying lessons learned and good practices for future projects and programs.

Monitoring and protecting the rule of law in EU Member States

Improving the mechanisms for monitoring and protecting the rule of law in the Member States is perhaps the most important aspect in order to strengthen democratic values and institutional integrity. The following proposals concern a series of initiatives aimed at strengthening and streamlining EU action in this area. The first aspect, which we would like to highlight, is the need to increase transparency and accessibility regarding the mechanisms for monitoring the rule of law. Regular and accessible publication of monitoring reports would allow citizens to follow developments in their countries and to react appropriately to deficiencies identified. Secondly, we suggest introducing a comprehensive and objective assess-

ment system of the rule of law in the Member States, based on clear and objective criteria, and involving independent legal and human rights experts.

Strengthening dialogue and cooperation between the EU institutions and national authorities is another essential aspect. This could involve supporting the capacities of national authorities and providing technical and financial assistance to ensure better implementation of European rule of law standards. In addition, we also recall the introduction of more effective sanctioning mechanisms for Member States that violate the rule of law principles, sanctions that should be proportionate and applied fairly.

Promoting civic engagement and responsibility should be a key pillar of these proposals, through initiatives to educate citizens about the importance of the rule of law and to support non-governmental organisations and academia in monitoring and reporting on breaches of the rule of law. The implementation of these proposals would strengthen the mechanisms for monitoring and protecting the rule of law in EU Member States, thus contributing to a more democratic, transparent and accountable European Union.

In order to optimise cohesion policy in order to strengthen social and economic cohesion throughout the European Union, we must refer to the fact that cohesion policy focuses on regions facing real difficulties in social and economic development, such as peripheral regions, rural regions or those affected by industrial transitions or demographic change. It is also important to promote partnership and coordination between the different levels of government in the implementation of cohesion policy. This would ensure an integrated and coherent approach, adapted to the specific needs of each region and would increase the effectiveness of the use of available resources.

Cohesion policy should support innovation and sustainable development in regions, investing in sectors such as green technologies, sustainable tourism and the digital economy, to diversify regional economies and reduce dependence on traditional or polluting industries, while paying particular attention to access to quality education and vocational training to increase the qualifications and skills of the local workforce, promoting social inclusion and combating poverty by supporting access to basic social services and the development of social and community infrastructure, with constant evaluation and monitoring to ensure the effectiveness and efficiency of the use of EU funds and to adjust policies according to changes in the needs and priorities of the regions.

Like the anti-corruption indicators, the World Bank's Rule of Law Indicators are part of the World Bank's Governance Indicators, which measure the performance of governments in various ways. This index contains several indicators that measure and monitor social rules. These include perceptions of crime rates, the effectiveness and predictability of the judicial system, and contract enforcement characteristics.

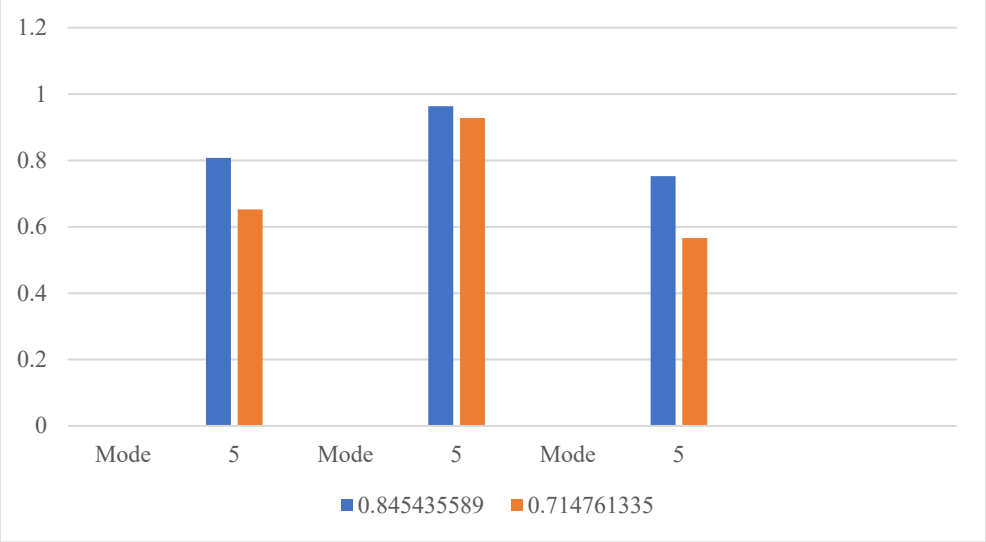

Figure no. 1. WGI Rule of Law Index
Source: Worldbank Data, 2023

Conclusions

The main findings and conclusions highlight the fundamental importance of respecting the rule of law in the process of distributing EU cohesion funds and implementing projects. This has a significant impact on eligibility criteria, monitoring and evaluation mechanisms, ex-ante and ex-post conditionalities, as well as on the long-term impact on regional development.

Failure to respect the rule of law in the affected Member States can affect the effectiveness of cohesion policy and social and economic cohesion, by reducing trust in institutions, redirecting funds towards narrow political or economic interests and impacting on regional development.

The relationship between the rule of law and the cohesion policy of the European Union has become an essential topic in the context of the strengthening of the Union's fundamental values and the need to protect its financial interests.

The importance of this research derives from its interdisciplinary nature, at the intersection of European law, political science and public policy, as well as from its direct relevance to the Union's current political and institutional situation.

The research contributes to a better understanding of how rule of law conditionality mechanisms can function as instruments of European governance, with a direct impact on cohesion policy and the relationship between the Union and the Member States. In a political climate where departures from democratic norms are increasingly frequent, this paper provides a rigorous analysis of the effectiveness and legitimacy of these mechanisms.

The research results can support the process of formulating and strengthening EU policies to condition funding on respect for the rule of law. They can be used by the European Commission, the European Parliament and the Court of Auditors to improve monitoring and sanctioning tools.

The study provides recommendations on the institutional reforms needed to strengthen the rule of law and ensure stable and efficient access to cohesion funding. In particular, it can guide policies on administrative transparency, control of public spending and the independence of the judiciary.
It provides a valuable analytical framework for studying the interdependence between the EU's constitutional values and its structural policies. It opens new research perspectives on indirect Europeanization through financial conditionality.
In the context of an increasing involvement of citizens in monitoring the use of public funds, the research provides a factual basis for public discourse and for monitoring governance through civic instruments.

References

***Agenda, 2020)

Barca, F., McCann, P. and Rodríguez-Pose, A., 2012. The Case for Regional Development Intervention: Place-based versus Place-Neutral Approaches, Journal of Regional Science, vol. 52, nr. 1, pp.134–152. https://doi.org/10.1111/j.1467-9787.2011.00756.x.

Becker, S.O., Egger, P.H. and von Ehrlich, M., 2010. Going NUTS: The effect of EU Structural Funds on regional performance. *Journal of Public Economics,* 94(9-10), pp.578-590. https://doi.org/10.1016/j.jpubeco.2010.06.006

Bodislav, D.A., Radulescu, C.V., Bran, F. and Burlacu, S., 2020. Public Policy in the Areas of Environment and Energy. In: R. Pamfilie, V. Dinu, L. Tăchiciu, D. Pleșea, C. Vasiliu eds. 6th *BASIQ International Conference on New Trends in Sustainable Business and Consumption*. Messina, Italy, 4-6 June 2020. Bucharest: ASE, pp. 228-235

Bodislav, D.A., Rădulescu, C.V., Moise, D. and Burlacu, S., 2019. Environmental Policy in the Romanian Public Sector. *The Bucharest University of Economic Studies Publishing House,* p.312.

Claes, M. and Visser, M.D., 2012. Reflections on comparative method in European constitutional law. In: M. Adams and J. Bomhoff, eds. *Practice and Theory in Comparative Law*, 1st ed. Cambridge University Press. pp.143–169. https://doi.org/10.1017/CBO9780511863301.007.

***Comisia Europeană, 2020

***Comisia Europeană, 2023

***Comisia Europeană, 2024

Crescenzi, R. and Giua, M., 2020. One or many cohesion policies of the European Union? *Journal of Economic Geography,* 20(2), pp.349-373. https://doi.org/10.1080/00343404.2019.1665174.

Gorzelak, G., 2017. Cohesion Policy and Regional Development. In: Bachtler, J., Berkowitz, P., *EU Cohesion Policy: Reassessing Performance and Direction*, New York: Routledge, pp.58-79.

Ionescu, S., 2008. Justiția şi marile doctrine privind statul de drept, *Studii de Drept Românesc*, 20(53), pp.107-126.

Krugman, P., 1991. Increasing returns and economic geography. *Journal of Political Economy,* 99(3), pp.483-499.

Mogos, R. I., Negescu–Oancea, M. D., Burlacu, S., and Troaca, V. A., 2021. Climate Change and Health Protection in European Union. *European Journal of Sustainable Development*, 10(3), pp.97-108, https://doi.org/10.14207/ejsd.2021.v10n3p97.

Molle, W., 2007. *European Cohesion Policy*, Londra: Routledge. https://doi.org/10.4324/9780203945278.

Mungiu-Pippidi, A. and Johnston, M., 2017. *Transitions to Good Governance. Creating Virtuous Circles of Anti-corruption.* Cheltenham: Edward Elgar Publishing,

Profiroiu, M.C., Radulescu, C.V., Burlacu, S. and Guţu, C., 2020. Changes and trends in the development of the world economy. In*: Ediţia a 22-a Conferinţa Competitivitatea şi inovarea în economia cunoaşterii.* Chişinău, Moldova, 25-26 septembrie 2020, pp.324-330.

Rodríguez-Pose, A. and Garcilazo, E., 2015. Quality of government and the returns of investment: Examining the impact of cohesion expenditure in European regions. *Regional Studies,* 49(8), pp.1274-1290. https://doi.org/10.1080/00343404.2015.1007933.

Romer, P.M., 1990. Endogenous technological change. *Journal of Political Economy,* 98(5), pp.71-102.

Solow, R.M., 1956. A contribution to the theory of economic growth. *Quarterly Journal of Economics,* 70(1), pp.65-94. https://doi.org/10.2307/1884513.

Voicu, M., 2022. *Criteriile de definire a statului de drept vs. statul de drept în UE și în statele membre. Evoluțiile statului de drept. Statul constituțional contemporan* [online]. Available at: <https://www.juridice.ro/essentials/6117/criteriile-de-definire-a-statului-de-drept-vs-statul-de-drept-in-ue-si-in-statele-membre-evolutiile-statului-de-drept-statul-constitutional-contemporan> [Accessed: 2 May 2025].

***WorldBank Data

Study on the Evolution of Public Procurement Contract Award Procedures in Romania in the Period 2021-2023

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Abstract

Key statistical indicators (years and the like) are highlighted especially in public ones. After pointing out the causes of these abnormalities, this analysis can also provide evidence for the shortcomings of the ways in which the procedures of good public services processes are conducted, control rights to public services, achieve additional savings and identify policy measures to enhance effectiveness in the use of public funds. The analysis of public development is not possible relative to the growth of spending budgets, most of all in the case of reduction of budget powers (budget sequester) or at the start of an economic crises. This paper addresses the fundamental aspects of public development in România by 2021-2024 and reveals life-threatening gaps in the public use.

The methodological technique is mainly based on a solid set of methodological tools, which combine essential studies with quantitative studies and current strategies with classical strategies. The complexity of the subject requires the configuration of the ideal methodology - the status quo of objectives, directions, hypotheses and strategies - crucial in the development of enjoyable studies.

Through the literature systematic inquiry, it was feasible to identify a niche gap in the area- the void in Information on scientific information resources for commercial performance and the requirement to develop some research that captures the essence for the indicator of how performance occur in the field. In an extensive literature on commercial performance, it is located in theoretical and applied research that gives hints at what is the relationship between factoring and the gestation of modern promotion of trade techniques.

The innovativeness of the item is determined with the aid of using the truth that studies targeted through this has a implemented significance, on the grounds that it affords the data required for a extra whole evaluation of the statistical degree withinside the context of sustainable financial increase.

Keywords: contract, expenditure, public procurement, Romania

DOI: 10.24818/BASIQ/2025/11/015

Introduction

The methods of awarding public contracts constitute a fundamental component of the national economy, significantly influencing the efficiency of the use of public funds and the development of the business environment (Bran et al., 2023). In the Romanian context, this area has experienced a series of major transformations in the period 2021-2023, influenced by factors such as the adoption of European legislation, the digitalization of administrative processes and the need to adapt to the challenges generated by the COVID-19 pandemic (Negescu et al., 2021). These changes aimed to increase transparency, efficiency and competitiveness in the public procurement process (Ameyaw, Mensah and Osei-Tutu, 2012).

Public procurement is an essential aspect of public investment: it stimulates economic development and is an important element for the dynamo. Public procurement also offers opportunities for businesses, thus encouraging private investment and contributing concretely to economic growth and job creation (Walker and Brammer, 2009).

The purpose of this article is to analyze the evolution of public procurement procedures in Romania during the mentioned period, focusing on legislative transformations, the use of digital tools and the impact of these changes on practices in the field. The present study contributes to the specialized literature through a comprehensive and current approach to public procurement issues, providing a useful analytical framework for both researchers and practitioners in the field.

1. Review of the scientific literature

The study of public procurement procedures involves a multidisciplinary approach, including elements from fields such as law, economics and public management. Public procurement is widely recognized as a crucial element of public sector management, responsible for the acquisition of goods, services and infrastructure necessary for government operations (Calin et al., 2022). According to Thai (2001), public procurement includes processes such as identifying needs, developing specifications, selecting suppliers and managing contracts.

These processes are governed by fundamental principles such as transparency, competition and value for money (Behl et al., 2023). The integration of historical data into public procurement is a topic of interest, with significant implications for improving budget planning and procurement outcomes. According to a study by Bosio et al. (2022) the analysis of historical data allows public entities to better understand market dynamics and supplier performance, thus contributing to more accurate budget estimates and optimal resource allocation.

The use of historical data aligns with the principles of evidence-based policymaking, favoring decisions based on empirical data rather than intuition or tradition. This data-driven approach is essential for reducing risks and ensuring the efficient use of public funds (Caldwell et al., 2005). A structured procurement process facilitates competition, which, according to Porter's theory (1980), stimulates innovation and reduces costs (Paraskeva and Tsoulfas, 2025).

In the context of public procurement, 218 structured processes ensure a level playing field for all potential suppliers, which contributes to achieving better value for money and improving services (Prier, Schwerin and McCue, 2016). Also, the integration of historical data in procurement planning aligns with the dynamic capabilities' theory, emphasizing the adaptability of public entities to rapidly changing environments (Glas and Eßig, 2018). The ability to analyze and use historical data provides increased flexibility and efficiency in the public procurement process (Gaf-Deac et al., 2024).

The institutional system of public procurement in Romania is built on a set of main actors, each with a specific role. The National Agency for Public Procurement (ANAP) coordinates the national public procurement strategy, having as main responsibilities the monitoring, supervision and promotion of policies in the field. ANAP also ensures compliance with European legislation and the implementation of effective control mechanisms. CNSC is the institution responsible for resolving complaints filed within public procurement procedures. CNSC contributes to maintaining a fair competitive environment through its administrative decisions (Teece, Pisano and Shuen, 1997).

The Romanian Digital Agenda Agency is responsible for managing the Electronic Public Procurement System (SEAP), an essential tool for the digitalization of procurement processes (Burlacu et al., 2021). Courts, including tribunals and courts of appeal, play a key role in resolving complex disputes that may arise in the field. Another important actor is the National Integrity Agency (ANI), which uses the PREVENT system to identify and prevent conflicts of interest. The Audit Authority ensures the systemic verification of procedures, while the Managing Authority manages European funds for public projects, verifying the technical and financial compliance of procurements (Patrucco et al., 2017).

2. Research methodology

The generic purpose of the study is to examine trends in public services in Romania, applicable to the success rate of contract award procedures in the period 2021-2023. This will be carried out to detect and systematize trends, legislative developments, efficiency and transparency of the contract award process.

The main aspects analyzed in the study were the following:
- Analysis of the applicable regulatory framework (Law no. 98/2016, subsequent amendments, Government Emergency Ordinances, decisions of the National Council for the Resolution of Complaints (CNSC), etc.
- Investigation of how the legal requirements were respected, emphasizing automation, transparency and compliance with deadlines;

- Collection and interpretation of information regarding the number of procedures, type of procedure, total value of the contract, award duration, number of participation in the procedure, etc.;

- Analysis of particular cases, audit reports, complaints/appeals to identify the best and worst practices.

In order to support the objectives, this study uses both qualitative and quantitative methodologies. In this first category we can include as documentary analysis:

- Consultation of legislation, best practice guides, reports issued by ANAP, Court of Auditors, CNSC, etc., and as

- Analysis of processes in the areas of their, significant procedures for different nomenclatures (e.g. infrastructure, health, education).

This qualitative approach thus remains far from ideal (largely for reasons of corporate confidentiality and external transparency).

As for the identification of the quantitative methodology, the only statistics and to which credibility can be given are those based on data from SEAP (SICAP), Eurostat TED data (Tenders Electronic Daily) and cover analyses of volume, value and types of procedures. All of this can also include comparisons of annual data between years, to find key trends, relationships and tendencies.

3. Results and discussion

The award of public contracts through the Electronic Public Procurement System (SEAP) involves the observance of well-defined stages. The process is regulated by the legislation in force, aiming to ensure transparency, fair competition and efficient use of public resources. The main stages include: – Publication of the tender notice: the procedure is initiated by publishing a notice in the SEAP, which details the specific requirements of the contract, the award criteria and the deadlines. – Submission of tenders: economic operators submit tenders according to the specified documentation, such as the specifications and the procurement data sheet. – Evaluation of tenders and award: tenders are evaluated based on the award criteria, and the contract is awarded to the tenderer presenting the most advantageous proposal. According to the data processed from the SEAP, the evolution of the number of contracts awarded in the period 2021-2023 indicates significant fluctuations. The total number of contracts awarded increased in 2022, followed by a slight decrease in 2023. The most relevant contract types include the supply of goods, construction works and services (Table no. 1).

Table no. 1. Evolution by contract type in the period 2021–2023

Contract type	2021	2022	2023
Supply	15.557	16.420	13.370
Works	6.550	8.085	10.286
Services	7.240	7.660	6.065
Total	29.347	32.165	29.721

Source: *Electronic Public Procurement System*

The majority of contracts awarded in 2021 were for the supply of goods, a trend that continued in the following years, although with a notable decrease in 2023. In 2021, the most significant category was represented by supply contracts, with a total of 15.547 units, followed by works contracts, which reached 6.550 units, and service contracts, with a number of 7.240 units, leading to a total of 29.347 contracts. In 2022, the total value of contracts increased significantly, reaching 319.487.335 RON.

Works contracts continue to dominate in terms of awarded value, but notable increases are also observed in the case of supply contracts. The value of service contracts increased, but at a slower pace compared to the other categories. In 2023, the total value of contracts reached a record level of RON 668.708.361.

The spectacular increase is mainly due to supply contracts, which become the dominant category in terms of awarded value, exceeding works contracts. Service contracts continued to grow moderately. Analyzing these data, year-on-year fluctuations can be observed, with a significant increase in 2022, followed by a large decrease in 2023.

Public procurement contracts and framework agreements are the main instruments used by contracting authorities and entities. Public procurement contracts are legal agreements between contracting authorities and suppliers, which establish the conditions for the delivery of goods, the provision of services or the execution of works. These contracts are usually used for purchases completed through a single procedure, in accordance with the value limits established by the legislation in force. Framework agreements, on the other hand, are concluded between contracting authorities and one or more suppliers, establishing the general conditions for future purchases. They are used in particular for repeated or periodic purchases, providing flexibility and efficiency in the management of procurement processes (Thai, 2001).

The documentation and associated procedures are strictly regulated in order to comply with the fundamental principles of public procurement, such as transparency, competition and non-discrimination. The Dynamic Purchasing System is a fully electronic procurement method, open for the entire duration of the process. It is mainly intended for the procurement of products of current use, with standardized characteristics available on the market. Under this system, economic operators that meet the qualification and selection criteria can participate throughout its duration. Analysis of data for the period 2021-2023 reveals significant changes in the number and value of contracts awarded depending on the method used (Table no. 2).

This evolution reflects a constant preference for the use of this type of contracts. The value attributed to these contracts has registered a substantial increase, from 80.550.400 RON in 2021 to 207.588.404 RON in 2023, indicating an increase in large-scale projects managed through this method.

Table no. 2. Evolution by award method in the period 2021-2023

Assignment method	2021	2022	2023
Public procurement contract	22.500	25.400	23.880
Framework agreement	6.830	6.680	5.700
Dynamic purchasing system	8	25	32
Total	29.338	32.105	29.612

Source: *Electronic Public Procurement System*

The main objective of this study is to provide a detailed analysis of public procurement and related complaints in Romania for the period 2021-2023. The data were collected from various sources, including the Romanian public procurement platform (SEAP, ANAP), public reports and documents, official databases such as ANAF and GOV.ro, specialized articles and analyses published on relevant platforms.

The methods used for data collection and analysis included automated data extraction from the SEAP and ANAP platforms, analysis of government documents and reports to identify specific trends and issues, statistical analysis for the quantitative assessment of data on public procurement procedures, comparative analysis, used to identify differences between the analyzed periods and the applied strategies, and content analysis, for the interpretation of qualitative data from relevant documents and media sources. The value of the award of framework agreements increased from 79.182.229 RON in 2021 to 127.243.851 RON in 2022 and then to 460.483.433 RON in 2023. This significant increase may indicate a change in procurement strategy or a preference for this modality. The dynamic purchasing system has seen a remarkable increase, from only 8 contracts in 2021, to 25 in 2022 and 32 in 2023, reflecting an increase in trust in this electronic mechanism. Although the total value remains modest (from 680.433 RON in 2021 to 656.522 RON in 2023), its use demonstrates potential for expanding the application of this system within the framework of the digitalization of public procurement.

Table no. 2 highlights the evolution of the way contracts are awarded during this period. Also, the analysis of the value of contracts (Figure no. 1) shows a substantial increase in the total value, from RON 160.412.982 in 2021 to RON 319.487.536 in 2022 and to RON 668.718.359 in 2023. The significant increase in the award value in the case of framework agreements suggests a strategic adaptation towards this method for managing large-scale public procurement. The dynamic procurement system, although slowly growing, demonstrates that digital technologies have an important impact in modernizing the public procurement process, offering new opportunities for efficiency and increased transparency.

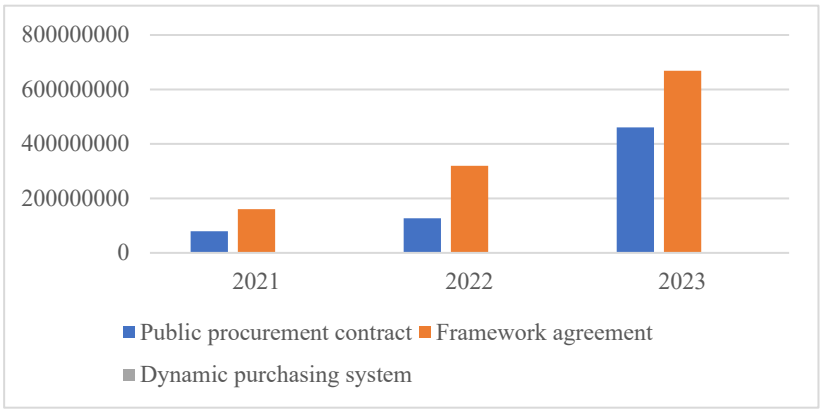

Figure no. 1. Contract value in the period 2021-2023 in Romania

In 2022, the PNRR generated initiated procedures worth 6,829.95 million euros, reflecting a significant involvement in the initiation of projects financed through this mechanism. Of this value, 1,837.9 million euros were attributed to procedures completed in the same year. This trend continued in 2023, when the value of initiated procedures increased substantially, reaching 24.142,78 million euros.

This significant increase demonstrates Romania's continued commitment to implementing projects financed by the PNRR. The impact of the PNRR program on public procurement has been considerable, supporting massive investments in infrastructure, energy, environment and digitalization.

It has also contributed to the modernization of existing infrastructure and increasing the country's economic capacity. Overall, the total value of procedures initiated and completed has increased significantly, from EUR 9,789.58 million in 2021 to EUR 16,314.6 million in 2022, reaching a new record level of EUR 24.142,74 million in 2023. This trend highlights the importance of European funds in supporting the Romanian economy and creating a stable framework for development

Conclusions

This study provides a detailed analysis of the evolution of public procurement in Romania in the period 2021-2023, focusing on the legal, procedural and financial dimensions of this process. The legislative framework and the national strategy on public procurement were built in accordance with national and European standards, based on Law No. 98 of 2016 on public procurement and Law No. 99/2016 on sectoral procurement, which transpose European legislation in this area.

The analysis was based on publicly available data, exploring various types of contracts, such as those for supplies, works and services. The objective was to highlight the distribution of public procurement activities across distinct sectors and to examine the award methods, including public contracts, framework agreements and dynamic purchasing systems. The study highlighted the preferences and strategies of contracting authorities in using the various available instruments and procedures. An essential aspect of the analysis was the assessment of funding sources, which include both the national budget and European funds. These financial resources were fundamental for the implementation of development and modernization projects, reflecting the significant impact of EU funds on public procurement in Romania.

The results of this study contribute to the identification of trends and problems specific to the sector, providing a basis for formulating recommendations aimed at improving the efficiency and transparency of the public procurement system.

The proposals that emerge from this study are: 1. Digitalization of the public procurement process. It is recommended to develop and implement a complete digital solution that would reduce bureaucracy, increase transparency and allow real-time monitoring of procurement processes. The SEAP platform requires a significant revision to become more intuitive and fully functional. 2. Promoting competition and diversity. It is essential to implement measures to encourage the participation of a larger number of bidders. Simplifying procedures, particularly with regard to uploading documents to the SEAP, can contribute to expanding participation. 3. Transparency and accessibility.

The study of the evolution of public procurement award mechanisms in Romania from the perspective of the years 2021-2023 proves to be of essential interest from at least three points of view: administrative-institutional, legal-normative and economic applicability, with direct implications in the field of government transparency, digitalization of public administration and absorption of European funds.

The relevance of the work lies in the fact that it provides a structured overview of how Romania is facing the challenges of convergence with EU legislation in the field of public procurement. Comparing the years 2021 and 2023, the differences in legislation are highlighted (and the transposition of EU directives and new trends such as the use of quantum or AI in the analysis of offers or the consolidation of mechanisms to avoid conflicts of interest).

The research results can be used in various ways as follows: the data and conclusions can provide the Ministry of Finance, ANAP and other contracting authorities with the basis to determine policies that increase the efficiency and transparency of public procurement. On the other hand, there are concrete implications for the development of the platform, targeting user experience, interoperability and predictive analysis that can be deduced from the SICAP analysis and related processes. Last but not least, the research provides relevant information for shaping tools to support the participation of small and medium-sized enterprises in public procurement tenders and the competitiveness of the offer.

It is important to strengthen monitoring and control mechanisms to detect and correct possible irregularities or abuses in the public procurement process. Repetitive procedures or non-conformities should be addressed as a priority to increase the efficiency and integrity of the system. For example, some contracting authorities include requirements that are considered abusive, which generates numerous appeals and delays. The implementation of these proposals has the potential to contribute to the modernization and improvement of the efficiency of the Romanian public procurement system, ensuring a more responsible use of resources and increasing public trust in this process.

References

Ameyaw, C., Mensah, S. and Osei-Tutu, E., 2012. Public Procurement in Ghana: The Implementation Challenges to the Public Procurement Law. *International Journal of Construction Supply Chain Management*, 2(2), pp.55-65.

Behl, A., Sampat, B., Pereira, V. and Chiappetta Jabbour, C.J., 2023. The Role Played by Responsible Artificial Intelligence (RAI) in Improving Supply Chain Performance in the MSME Sector: An Empirical Inquiry. *Annals of Operations Research*, pp.1-30. https://doi.org/10.1007/s10479-023-05624-8.

Bosio, E., Djankov, S., Glaeser, E. and Shleifer, A., 2022. Public Procurement in Law and Practice. *American Economic Review*, 112(4), pp.1091-1117.

Bran, F., Balu, O.F., Reynard, C., Rădulescu, C.V., Burlacu, S., Mănescu, C.O. and Gole, I., 2023. Mapping risk and performance business drivers post-pandemic. Future challenges. *Economic Computation & Economic Cybernetics Studies & Research*, 57(4), pp.125-142.

Burlacu, S., Ciobanu, G., Troaca,V. and Gombos, C., 2021. The Digital Finance – opportunity of development in the new economy. Proceedings of the International Conference on Business Excellence,15(1) 392-405. https://doi.org/10.2478/picbe-2021-0036.

Caldwell, N.D., Walker, H., Harland, C., Knight, L., Zheng, J. and Wakeley, T., 2005. Promoting Competitive Markets: The Role of Public Procurement. *Journal of Purchasing and Supply Management,* 11(5-6), pp.242-251. https://doi.org/10.1016/j.pursup.2005.12.002.

Calin, A.M., Burlacu, S., Mocanu, V. and Popescu, M.L., 2022. Digital Public Management Governance. *8th BASIQ International Conference on New Trends in Sustainable Business and Consumption. Graz, Austria*, 25-27 May 2022. Bucharest: ASE, pp.101-108. DOI: 10.24818/BASIQ/2022/08/012.

***Electronic Public Procurement System, 2021-2023

Gaf-Deac, I., Radulescu, C.V., Burlacu, S. and Dima, C., 2024. Professional Training in Public Administration in Romania during the COVID-19 Pandemic. In *Proceedings of the International Conference on Business Excellence* (Vol. 18, No. 1, pp. 819-828). 10.2478/picbe-2024-0072.

Glas, A.H. and Eßig, M., 2018. Factors that influence the success of small and medium-sized suppliers in public procurement: evidence from a centralized agency in Germany. *Supply Chain Management: An International Journal*, 23(1), pp.65-78. https://doi.org/10.1108/SCM-09-2016-0334.

Negescu, M.D.O., Burlacu, S., Biner, M., Gombos, S.P., Kant, A. and Troacă, A.V., 2021. Paradigms Of Public Administration Digitalization in The Context Of The Covid-19 Pandemic. *In Proceedings of Administration and Public Management International Conference* (Vol. 17, No. 1, pp.109-115).

Paraskeva, S. and Tsoulfas, G.T., 2025. Mitigating risks in public procurement. *Journal of Public Procurement*, 25(1), pp.140-176. https://doi.org/10.1108/JOPP-07-2024-0074.

Patrucco, A.S., Luzzini, D., Ronchi, S., Essig, M., Amann, M. and Glas, A.H., 2017. Designing a public procurement strategy: lessons from local governments. *Public Money and Management*, 37(4), pp.269-276. https://doi.org/10.1080/09540962.2017.1295727.

Prier, E., Schwerin, E. and McCue, C.P., 2016. Implementation of sustainable public procurement practices and policies: a sorting framework. *Journal of Public Procurement*, 16(3), pp.312-346. https://doi.org/10.1108/JOPP-16-03-2016-B004.

Teece, D.J., Pisano, G. and Shuen, A., 1997. Dynamic Capabilities and Strategic Management, *Strategic Management Journal*, 18(7), pp.509-533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7%3C509::AID-SMJ882%3E3.0.CO;2-Z.

Thai, K.V., 2001. Public Procurement Reexamined, *Journal of Public Procurement*, 1(1), pp.9-50. https://doi.org/10.1108/JOPP-01-01-2001-B001.

Walker, H. and Brammer, S., 2009. Sustainable Procurement in the United Kingdom Public Sector. *Supply Chain Management: An International Journal*, 14(2), pp.128-137. https://doi.org/10.1108/13598540910941993.

The Current State of Entrepreneurship Programs in Romania

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Abstract

Is the improvement of entrepreneurship one of the answers to the monetary and improvement troubles dealing with Romania? The solution is associated with the identity of answers to guide its improvement. Romania is an Eastern European usa that faces many troubles, now no longer most effective monetary ones, however additionally social and political ones, and which does now no longer choose a coherent and predictable entrepreneurial environment, which poses each possibilities and demanding situations for people who need to begin or broaden a business. Today there are numerous marketers in Romania who've created a hit organizations in numerous fields, contributing to monetary increase and new jobs.

In the context of economic and social transformations in recent years, entrepreneurship programs in Romania have experienced significant development, both through public initiatives and through interventions by the private sector and non-governmental organizations. The study analyzes the current status of these programs, highlighting the main sources of financing, types of support offered (training, mentoring, incubation, access to financing), as well as the degree of accessibility for different categories of entrepreneurs (young people, women, people from rural areas or vulnerable groups). It also identifies the major challenges that limit the efficiency of these programs, such as bureaucracy, lack of coherence in public policies and regional disparities. Through a comparative analysis of Start-Up Nation, Diaspora Start-Up programs, as well as initiatives supported by European funds, the paper provides an overview of the current Romanian entrepreneurial climate and proposes directions for strengthening the national entrepreneurial ecosystem.The originality of the paper is given with the aid of using the identity of the entrepreneurs` traits and competencies tightly correlated with the idiosyncrasies of Romanian enterprise environment.

Drections for destiny studies encompass integrating the perspectives (e.g. throughout the cognitive and affective domain), checking out the temporal balance of influences, and growing and checking out cross-stage fashions that include contextual influences. The paper enhances earlier opinions and meta-analyses with the aid of using picturing the breadth of the sector and including vital factors to the studies agenda.

Keywords: economic policies, entrepreneurship, COVID-19, Romania, Start-Up.

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Introduction

Entrepreneurship support programs are an important aspect of Romania's economic and social development (Radulescu et al., 2020). Managed and implemented by grant-granting authorities, these programs have had and continue to have a great impact in supporting entrepreneurs in various fields. One of the most important and beneficial consequences of entrepreneurship support programs in Romania is stimulating the economy and increasing the number of businesses (Bran et al., 2023). These programs provide non-reimbursable

financial support and access to specialized consulting services for entrepreneurs, which helps them develop their ideas and transform them into successful businesses (Alakaleek et al., 2023).

By facilitating access to the necessary funds and resources, such programs encourage innovation, creativity, and the entrepreneurial spirit of Romanians (Burlacu, Bălu, Bălu and Sabie, 2019). In addition, by promoting and supporting entrepreneurs, jobs are generated, including for young people and disadvantaged people, which contributes to reducing unemployment in the country (Arentz et al., 2013). Romanian entrepreneurs have the potential to create new jobs and improve social and economic conditions for entire communities (Ciobanu et al., 2019).

Supporting them opens up new opportunities for young people and encourages the spirit of initiative among the population (Androniceanu et al., 2017). Following the COVID-19 pandemic, the entrepreneurial landscape in Romania has faced significant changes. The impact on businesses has been profound, and entrepreneurs have had to adapt quickly to the new realities (Gaf-Deac et al., 2024). They have faced a number of challenges, but at the same time new opportunities have emerged, and now, in the post-pandemic period, they are in the midst of a continuous transformation (Burlacu, et al., 2024).

Despite the challenges, the pandemic has also been a stimulus for innovation among entrepreneurs. The knowledge and skills of individuals can be important factors in their behavior and play an important role in the initiation and development of economic activities (Radulescu et al, 2021). Knowledge provides individuals with cognitive skills and leads to greater productivity and efficiency (Aria and Cuccurullo, 2017). Thus, new business ideas have been created and innovative solutions have been developed to meet emerging market needs. Sectors such as medical technology, e-commerce, and delivery services have seen significant growth, offering new investment and development opportunities (Åstebro et al., 2012).

1. Review of the scientific literature

Currently, the situation of entrepreneurship in Romania is dynamic and constantly evolving. Romanians' appetite for business is related both to the identification of market opportunities and to individual choices, and these choices are influenced by a series of factors related to attitudes and perceptions regarding entrepreneurship, which sometimes oscillate between the fear of failure and the enthusiasm for success (Bischoff et al., 2018).

According to Bauman and Lucy (2021) initiating and starting a business is unequivocally accompanied by the fear of failure, as a factor that naturally belongs to the entrepreneurial experience. In their efforts to initiate and develop businesses, entrepreneurs simultaneously feel fear and enthusiasm in the face of various activities that can lead to both success and failure. These activities include launching new products and services, obtaining financing, forming a suitable team, as well as finding and retaining customers.

Moreover, entrepreneurs in Romania face challenges specific to the current economic context. These challenges include lack of economic predictability, excessive bureaucracy, restricted access to grants, high taxes, lack of resources and adequate infrastructure. In addition, negative public attitudes towards entrepreneurs, coupled with the absence of good practice models, can discourage individuals from starting a business (Petrolo et al., 2023).

Increasing competition, volatile and unstable markets, fluctuating demand, and unpredictable risks complete the picture of challenges faced by Romanian entrepreneurs (Bran et al., 2023). In order to ensure the success and growth of entrepreneurs in Romania, it is necessary to provide adequate solutions and support to these challenges (Radulescu et al., 2021). Despite these challenges, there are sustained efforts to improve the entrepreneurial environment in Romania through initiatives and programs to support entrepreneurs.

The writing on business enterprise has developed quickly over the final few decades and proceeds to pick up consideration in driving administration diaries. Most of this writing conceptualizes business enterprise as wander creation exercises essentially persuaded by aspirations for riches (Blankesteijn et al., 2021) or the creation of social esteem (Clark, 2021). Be that as it may, a awesome bargain of wander creation action isn't driven by any of these inspirations (Cui and Bell, 2022). Or maybe, a few business people make wanders in arrange to capture benefits they infer from locks in in exercises they discover fulfilling, and/or from living in specific areas. In spite of the fact that this shape of wandering is commonplace, the business enterprise writing has to a great extent neglected it (Lindner, 2018).

More basically, the existing writing approximately such wanders has centered on fulfillment and prosperity as the results of the entrepreneurial handle, summons expansive, as restricted to the affect of such inspirations on the particular practices of these business visionaries. In this way, whereas inquire about around artisan, create, imaginative, wellness, and specialist business enterprise (Entrialgo and Iglesias, 2016) has

picked up cash and pertinence, the system required to coordinated this work inside the business writing is missing. We utilize way of life business enterprise (LE) as an umbrella term for these shapes of business enterprise (Lim et al., 2022).

2. Research methodology

Because the area is fragmented and varied, we take an inclusive approach to capture contributions spread across a spectrum of domains, disciplines, and journals (Rajpal and Singh, 2024). Consequently, we surveyed all academic journals with pertinent articles on the subject (Saeed et al., 2018).). We adhered to an established systematic review methodology (Samuel and Rahman, 2018). to carry out our study.

The specific steps undertaken include: (1) defining the scope of the review (temporal boundaries and sources); (2) choosing keywords and conducting literature search; (3) screening identified studies for inclusion in the review; (4) evaluating and coding studies; and (5) synthesizing findings and documenting the analysis. Appendix S1 (online) includes a summary of the academic articles on LE we assessed.

In order to assess the current state of entrepreneurship programs in Romania, the research was conducted through a mixed approach, combining quantitative and qualitative methods. The main objective of the methodology is to provide a comprehensive analysis of the efficiency, accessibility and impact of these programs on the development of entrepreneurship at the national level.

To this end, a systematic review of the specialized literature, government reports, national strategies on entrepreneurship, as well as programmatic documents related to European funding was carried out. At the same time, the most relevant entrepreneurship support programs in Romania were analyzed, such as Start-Up Nation, Start-Up Plus, Diaspora Start-Up. The analysis included criteria such as: objective, target group, types of support offered, budget, number of beneficiaries, project success rate and sustainability of the businesses created.

Last but not least, interviews were conducted with 15 experts in the field of entrepreneurship (representatives of public institutions, consultants, mentors, NGOs and experienced entrepreneurs). The interviews aimed to delve deeper into qualitative aspects such as systemic barriers, gaps in program design, and good practices identified in implementation.

This integrated methodology allows for a critical and balanced evaluation of entrepreneurship programs in Romania and provides a framework for formulating relevant recommendations for decision-makers and stakeholders involved in the development of the entrepreneurial ecosystem.

The initial search resulted in 934 outcomes. Our initial sample encompassed a variety of articles that referenced entrepreneurship and included both empirical and conceptual studies related to the creation or management of ventures that emphasize personal expression through craft and artisanship, activities such as sports, or location and lifestyle. We examined the identified articles, eliminating those that briefly mentioned entrepreneurship or concentrated on individuals other than founders, such as employees (remote-working employees). We sought articles specifically targeting the relationship between entrepreneurship and the preoccupation with specific activities or lifestyles. To further hone our search, we excluded articles that addressed hobbies or activities irrelevant to entrepreneurship or those that occurred outside the realm of entrepreneurship. We also excluded articles that discussed lifestyle issues broadly, as opposed to those that engaged with the integration of lifestyle considerations into the founding and management of a venture.

3.Results and discussion

In Romania, there are a variety of entrepreneurship support programs targeting different stages of the business life cycle, as well as various industries and sectors. From financing programs and grants to business incubators and mentoring programs, these initiatives provide vital support for entrepreneurs at various stages of their business development. Among the existing non-reimbursable financing opportunities for entrepreneurs, two multi-annual programs with funding from the state budget (Start-up Nation and Femeia Antreprenor), run by the Ministry of Economy, Entrepreneurship and Tourism (MEAT), in collaboration with the Territorial Agencies for Small and Medium-sized Enterprises, stand out, due to their notoriety and objectives.

The Ministry of Economy, Entrepreneurship and Tourism plays a crucial role in developing and supporting the business environment in Romania. At the heart of the ministry's activities is the coordination of policies related to entrepreneurship and the business environment, along with the management of state aid and de

minimis schemes for the development of the enterprise sector. The main goal of these initiatives is to capitalize on the potential of the entrepreneurial sector, contribute to sustainable economic growth, and create a favorable environment for business development. To achieve these objectives, the ministry focuses on several key directions. These include creating new jobs, facilitating the insertion of the unemployed and graduates into the labor market, supporting innovation and technical and technological progress, and increasing the competitiveness of enterprises in accordance with European standards.

All these efforts aim to stimulate the country's economic development and ensure better integration of entrepreneurs into international markets. The Start-up Nation and Femeia Entreprenor programs are considered among the most successful and representative support measures implemented by the ministry. These programs are not only known in the local business environment, but have also gained recognition at the European Union level, being models for other countries to follow. Through these initiatives, the ministry reaffirms its commitment to supporting entrepreneurs, providing them with the resources and support necessary to transform their ideas into successful businesses.

The Women Antreprenor Programme is one of the most effective European initiatives in support of female entrepreneurship. This programme, recognised as a good practice within the DEBUTING: Developing Businesses Through Inclusiveness and Gender Awareness– New Cluster Competencies project (North-West Regional Development Agency, undated), aims to promote gender equality by identifying, promoting and inspiring good practices in the business environment.

Over the next four years, a European consortium of organisations from 10 countries will be tasked with supporting an inclusive and gender-sensitive entrepreneurial ecosystem, thus contributing to increasing the competitiveness of SMEs. The main objective of the de minimis scheme is to stimulate and support the establishment and development of private economic structures led by women (Ministry of Economy, Entrepreneurship and Tourism (a), undated).

It aims to improve the economic performance of these structures, facilitating smart, sustainable and inclusive economic growth, based on digitalisation, sustainable development, innovation and entrepreneurial training. The programme aims to address issues relating to the balance between family and professional responsibilities, as well as the prejudices that persist at local level regarding gender equality.

For the period 2024-2027, the estimated budget of the programme for women entrepreneurs is 800 million lei, with a budget of 200 million lei. lei allocated for the 2024 budget year, according to the State Budget Law for 2024 no. 421/2023.

Beneficiaries may be companies (microenterprises, small and medium-sized enterprises) in which at least one associate is a woman and holds at least 50% of the shares or shares of the applicant company. In the case of companies established under Law no. 1/2015 on cooperation, this condition is considered met if the majority of the members of the board of directors are women. Financing is granted based on the scores obtained after completing the application forms.

The Non-Reimbursable Financial Allowance (AFN) can reach up to 200,000 lei per beneficiary, representing a maximum of 95% of the value of eligible expenses (including VAT for non-paying companies). Eligible expenses include technological equipment, the purchase of work or production spaces, specific means of transport, furniture, office equipment, salaries, utilities, accounting services and rent. It also covers the costs of developing a presentation website, promotional expenses, necessary software, electronic signatures, and relevant licenses.

For applicants who use loans to implement projects, the program also covers the financial expenses related to them. In addition, consultancy for the preparation of documentation and project implementation can be financed within the limit of 10.000 RON. The Woman Entrepreneur program has a long tradition in MEAT, having been running for over two decades in various forms. Initially, the program offered an information and training system to facilitate women's mobility on the labor market and the development of entrepreneurial skills. Since 2013, the program has been providing non-reimbursable financial allocations, supporting the implementation of the best business plans of women entrepreneurs, with a maximum allocation value of 90% of eligible expenses and no more than 50.000 lei per beneficiary.

In the 2023 edition of the program, the first to offer a non-reimbursable financial allocation of 200,000 RON/beneficiary, over 9,500 companies registered, given that a maximum of 1.000 companies could be financed from the allocated budget (Table no.1), which shows the increased interest of women entrepreneurs in this program.

Table no.1. Financing contracts situation, 2023 edition, Female Entrepreneur, Start-up Nation

SME Programs		Financing contract situation	
2023	**Registered companies**	**Contracts signed**	**Amount**
Female Entrepreneur	9.525	975	193.703.150
Start-up Nation	15.322	9.480	1.843.027.268
Diaspora	1.652	965	18.534.925
Subtotal	26.499	11.420	2.055.265.343

Source: Agency for Small and Medium Enterprises Cluj-Napoca, 2023

The Start-up Nation program is probably the most ambitious government program in Europe, which aims to support the development and consolidation of small and medium-sized enterprises, especially start-ups and young entrepreneurs. It was initiated in 2017 and was launched to support approximately 10,000 entrepreneurs in starting and developing their businesses, in each edition. The main objective of the Start-up Nation Romania program is to stimulate the development of small and medium-sized enterprises (SMEs) in order to improve their economic performance. By supporting start-ups, the program aims to facilitate smart, sustainable and inclusive economic growth.

This approach is based on promoting digitalization, sustainable development, innovation and entrepreneurial training, essential elements for creating new jobs and strengthening the competitiveness of the Romanian economy. During the period 2022-2027, the program aimed, in the version offered to the general public in 2023, to provide de minimis aid to a number of 56.000 beneficiaries.

Of this total, it was intended that 55.000 beneficiaries would be part of the program's pillar I, dedicated to Start-up Nation Romania, while 6.000 beneficiaries would be included in pillar II, called Start-up Nation Diaspora.

The budget allocated to the de minimis scheme for the 2022 edition was 520.035.000 lei, of which 500 million lei for pillar I and 20.062.000 lei for pillar II (Ministry of Economy, Entrepreneurship and Tourism (b), undated). A significant innovation brought to the 2022 edition was the introduction of Pillar II - Start-up Nation Diaspora. It is designed for Romanians born in the country, who live or have resided abroad for at least 12 months by the date of publication of the ministerial order in the Official Gazette.

This component of the program reflects the commitment to involve the Romanian diaspora in the economic development of the country, offering concrete support to those who want to bring their expertise and financial resources home.

The program aims to support through grants the applications for funding in descending order of the scores obtained, within the limit of 100,000 lei for beneficiaries who create and maintain one job and 200.000 RON for those who create and maintain two jobs. These amounts represent up to 95% of the value of the eligible expenses of the project, including VAT for non-paying companies. The eligible expenses under the Start-up Nation program are similar to those under the Femeia Antreprenor program, thus ensuring coherence and continuity in the policies supporting entrepreneurship in Romania. Start-up Nation Romania represents an essential initiative for stimulating the entrepreneurial spirit, supporting the development of a robust and innovative business environment. The program has the potential to generate positive changes in the economy, by increasing the number of SMEs and improving their performance, thus contributing to the general well-being of society.

This measure to support entrepreneurship is a traditional one in the portfolio of financing schemes implemented by the relevant ministry from government funds. Dating back over twenty years, until 2016, this financing measure was known to the entrepreneurial environment under the name of the Start Program, which offered a grant of approximately 25.000 euros with an aid intensity of 90%, for an average number of 150 beneficiaries at national level. Starting with 2017, the program became much better budgeted and extremely ambitious due to the large number of entrepreneurs it aims to finance to start or develop their business ideas, namely 10.000 beneficiaries in each edition. For the 2024 edition of the Start-up Nation

Program, the Romanian authorities have secured an important source of financing from European funds, obtained through the Education and Employment Operational Program (POEO). With an impressive budget of 446.185.296 euros, this year's edition promises to be a landmark in the Romanian entrepreneurial landscape, with the main objective of boosting entrepreneurial initiatives and supporting various categories of entrepreneurs.

The 2024 edition of the Start up Nation program is structured on two main pillars: Pillar I. Activating the entrepreneurial potential of young people: With a budget of 295.750.000 euros, this pillar is aimed at young people under 30 years of age. The aim is to facilitate their access to the resources necessary to start and develop their own businesses. To support this category, the program finances participation in entrepreneurial training courses for approximately 25.000 young people. Special attention is paid to social inclusion, with a minimum of 10% of participants coming from the Roma community, eligibility being established through a self-declaration. Through this pillar, it is expected to establish 5,250 businesses that will create an estimated 10.600 jobs.

The Start-up Nation 2024 program is a large-scale initiative, designed to meet the diverse needs of the entrepreneurial ecosystem in Romania. Through the allocated resources and its flexible structure, the program aims to become a catalyst for economic growth and social development, stimulating innovation and adaptation to the requirements of a modern and sustainable economy. Participants in this program benefit not only from financial support, but also from the opportunity to acquire skills and knowledge through entrepreneurial training courses that will be carried out as the first activity within the program and that will allow applicants to navigate the business world with more opportunities, thus contributing to the consolidation of an inclusive and prosperous society.

Conclusions

Overall, the post-pandemic entrepreneurial context in Romania is a dynamic and complex one, characterized by rapid changes and adaptation to new economic and social realities. However, with a creative, innovative and resilient approach, Romanian entrepreneurs have the potential to transform these challenges into opportunities and contribute to the recovery and revitalization of the national economy.

In the current context, there is an acute need to develop financing programs that are adapted to the current needs of entrepreneurs in Romania. Such programs must provide adequate financial support for the development and growth of existing businesses, but also to support start-ups.

They must take into account the national smart specialization strategy (Ministry of Research, Innovation and Digitalization, undated), the specifics of different economic sectors and provide concrete and efficient solutions to overcome the obstacles encountered by entrepreneurs in accessing funds. In addition, it is imperative that these programs are constantly improved, taking into account the feedback and real needs of beneficiaries. To ensure business success and sustainable economic development, it is essential that financing programs keep pace with market changes and provide the appropriate tools and resources for entrepreneurs to achieve the desired results.

The development and development of programs adapted to current needs and their continuous improvement can significantly contribute to the success of Romanian entrepreneurs and the sustainable development of the economy.

This paper makes a significant contribution to understanding how entrepreneurship programs work in Romania, through an integrated analysis of public and private entrepreneurship support programs, providing a coherent overview of the current landscape. The identification of deficiencies and dysfunctions in the design and implementation of the programs, based on empirical data obtained from beneficiaries and experts, represents another key point regarding the importance of the study. Through the study, an assessment of the real impact of the analyzed programs can be made, both from an economic and social perspective, with a focus on the sustainability of the established businesses.

The paper has a high relevance for several categories of actors, such as public decision-makers, provides a solid basis for formulating more effective policies, adapts to the real needs of entrepreneurs, for the academic environment, makes a valuable empirical contribution to the specialized literature on entrepreneurship in emerging economies and also for entrepreneurship in the emerging economy, but also for entrepreneurship in the economy and the implicit opportunities for future access available, profit and opportunities for access to the future. program.

The research may determine a series of applications in the near future. Among these, we can mention the development of good practice guides for institutions that implement support programs for entrepreneurs or

the development of performance evaluation models for entrepreneurship programs, which can be used at regional or national level.

Regarding the possible extensions of the research, the following elements on which the study could be focused can be mentioned: comparative study between Romania and other countries in Central and Eastern Europe, to highlight good practices or transferable success models; longitudinal monitoring of businesses established through state programs, to determine the degree of sustainability in the medium and long term; analysis of the impact of digitalization on Romanian entrepreneurship, in the context of our global trends.

Through these contributions, applications and directions for expansion, the work becomes a valuable tool for strengthening the entrepreneurial ecosystem in Romania and for the sustainable development of economic initiatives at the national level.

References

***Agency for Small and Medium Enterprises Cluj-Napoca, 2023

Alakaleek, W., Harb, Y. and Harb, A.A., 2023. The impact of entrepreneurship education: A study of entrepreneurial outcomes. *The International Journal of Management Education*, 21(2), p.100800. https://doi.org/10.1016/j.ijme.2023.100800

Androniceanu, A., Burlacu, S., Drăgulănescu, I.V. and Nicolae, E.E., 2017. New trends of businesses digitalization in Romania and the behavior young consumers. In BASIQ International Conference: New Trends in Sustainable Business and Consumption, Graz, 31, pp.27-35.

Arentz, J., Sautet, F. and Storr, V., 2013. Prior-knowledge and opportunity identification. *Small Business Economics*, 41, pp.461-478. https://doi.org/10.1007/s11187-012-9437-9

Aria, M. and Cuccurullo, C., 2017. Bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), pp.959-975. https://doi.org/10.1016/j.joi.2017.08.007

Åstebro, T., Bazzazian, N. and Braguinsky, S., 2012. Startups by recent university graduates and their faculty: Implications for university entrepreneurship policy. *Research policy*, 41(4), pp.663-677. https://doi.org/10.1016/j.respol.2012.01.004

Bauman, A. and Lucy, C., 2021. Enhancing entrepreneurial education: Developing competencies for success. *The International Journal of Management Education*, 19(1), p.100293. https://doi.org/10.1016/j.ijme.2019.03.005

Bischoff, K., Volkmann, C.K. and Audretsch, D.B., 2018. Stakeholder collaboration in entrepreneurship education: An analysis of the entrepreneurial ecosystems of European higher educational institutions. *The Journal of Technology Transfer*, 43, pp.20-46. https://doi.org/10.1007/s10961-017-9581-0

Blankesteijn, M., Bossink, B. and van der Sijde, P., 2021. Science-based entrepreneurship eduction as a means for university-industry technology transfer. *International Entrepreneurship and Management Journal*, 17(2), pp.779-808. https://doi.org/10.1007/s11365-019-00623-3

Bogers, M., Foss, N.J. and Lyngsie, J., 2018. The human side of open innovation: The role of employee diversity in firm-level openness. *Research Policy*, 47(1), pp.218-231. https://doi.org/10.1016/j.respol.2017.10.012

Bran, F., Balu, O.F., Reynard, C., Rădulescu, C.V., Burlacu, S., Mănescu, C.O. and Gole, I. (2023). Mapping risk and performance business drivers post-pandemic. Future challenges. *Economic Computation and Economic Cybernetics Studies and Research*, 57(4).

Bran, F., Gâf-Deac, I.I., Radulescu, C.V., Vîlcu, E.C., Burlacu, S., Popescu, M.L. and Bodislav, D.A. 2023. Doxastic managerial practice and management of the market economy. *RIVISTA DI STUDI SULLA SOSTENIBILITA,* 0(1), pp.29-62.

Burlacu, S., Bălu, P.E., Bălu, F.O. and Sabie, O.M., 2019. Economic-financial decision and resource management in the context of the law of value. In *Competitivitatea şi inovarea în economia cunoaşterii*, pp.138-143

Ciobanu, G., Burlacu, S., Bodislav, D.A. and Oancea-Negescu, M.D., 2019. Regional and Rural Digitization–an Opportunity to Access Information, Jobs and Growth. *Managerial Challenges of the Contemporary Society. Proceedings*, 12(1), pp.62-67.

Clark, D.N., Reboud, S., Toutain, O., Ballereau, V. and Mazzarol, T., 2021. Entrepreneurial education: An entrepreneurial ecosystem approach. *Journal of Management and Organization*, 27(4), pp.694-714. https://doi.org/10.1017/jmo.2020.26

Cui, J. and Bell, R., 2022. Behavioural entrepreneurial mindset: How entrepreneurial education activity impacts entrepreneurial intention and behaviour. *The International Journal of Management Education*, 20(2), https://doi.org/10.1016/j.ijme.2022.100639

Entrialgo, M. and Iglesias, V., 2016. The moderating role of entrepreneurship education on the antecedentsof entrepreneurial intention. *International Entrepreneurship and Management Journal*, 12, pp.1209-1232. https://doi.org/10.1007/s11365-016-0389-4

Gaf-Deac, I., Radulescu, C.V., Burlacu, S. and Dima, C. 2024. Professional Training in Public Administration in Romania during the COVID-19 Pandemic. In *Proceedings of the International Conference on Business Excellence*, 18(1), pp.819-828.

Ivanycheva, D., Schulze, W.S., Lundmark, E. and Chirico, F., 2023. Lifestyle Entrepreneurship: Literature Review and Future Research Agenda, Journal of Management Studies. https://doi.org/10.1111/joms.13000

Lim, W.M., Kumar, S. and Ali, F., 2022. Advancing knowledge through literature reviews: 'what','why', and 'how to contribute'. *The Service Industries Journal*, 42(7–8), pp.481–513. https://doi.org/10.1080/02642069.2022.2047941

Lindner, J., 2018. Entrepreneurship education for a sustainable future. *Discourse and Communication for Sustainable Education*, 9(1), pp.115-127.

Petrolo, D., Manesh, M.F. and Palumbo, R., 2023. Unpacking business, management, and entrepreneurship education online: Insights from a hybrid literature review. *The International Journal of Management Education*, 21(2), p.100812. https://doi.org/10.1016/j.ijme.2023.100812

Rajpal, M. and Singh, B., 2024. How to drive sustainable entrepreneurial intentions: Unraveling the nexus of entrepreneurship education ecosystem, attitude and orientation. *Corporate Social Responsibility and Environmental Management*, 31(3), pp.1705–1721. https://doi.org/10.1002/csr.2644

Rădulescu, C.V., Angheluta, S.P., Burlacu, S. and Troaca, V.A., 2021. Basic Skills of Students: Reading, Mathematics And Science, *Proceedings of the International Management Conference,* 15(1), p.364-370.

Rădulescu, C.V., Burlacu, S., Bodislav, D.A. and Bran, F., 2020. Entrepreneurial Education in the Context of the Imperative Development of Sustainable Business. *European Journal of Sustainable Development*, 9(4), pp.93-93.

Rădulescu, C.V., Ladaru, G.R., Burlacu, S., Constantin, F., Ioanăș, C., Petre, I.L., 2021. Impact of the COVID-19 Pandemic on the Romanian Labor Market. *Sustainability 2021*, 13, p.271. https://doi.org/10.3390/su13010271

Saeed, S., Yousafzai, S., Yani-De-Soriano, M. and Muffatto, M., 2018. The role of perceived university support in the formation of students' entrepreneurial intention. In Sustainable entrepreneurship, Journal of Small Business Management, 53(4), pp.1127-1145. https://doi.org/10.1111/jsbm.12090

Samuel, A.B. and Rahman, M.M., 2018. Innovative teaching methods and entrepreneurship education: A review of literature. *Journal of Research in Business Economics and Management*, 10(1), pp.1807–1813.

Siegel, D.S. and Wright, M., 2015. Academic entrepreneurship: Time for a rethink? *British Journal of Management*, 26(4), pp.582–595. https://doi.org/10.1111/1467-8551.12116

Ethics and Environmental Protection - Challenges and Responsibilities

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Abstract

The main objective of the research is Formation of an ecological ethic (attitudes, principles, beliefs); At the same time, the formation of a disapproving attitude towards those who violate ecological norms and laws represents a new dimension expressed in this article.

Awareness of the need to save water, electricity, wood, etc. (all natural resources). The general objective of the research is given by increasing people's awareness of nature protection.

In the context of accelerating environmental degradation and global climate crises, the ethical dimension of environmental protection has become increasingly urgent and relevant. This paper explores the normative foundations, practical challenges, and moral responsibilities associated with protecting the natural environment. It begins by examining key philosophical frameworks-such as anthropocentrism, biocentrism, and ecocentrism- that inform contemporary environmental ethics. The study then analyzes the ethical implications of major global challenges, including climate change, biodiversity loss, and resource overconsumption, highlighting the moral dilemmas faced by individuals, corporations, and governments alike. Special attention is given to the concepts of intergenerational justice, ecological responsibility, and the intrinsic value of nature.

The paper argues that a shift in moral perspective-from exploitation to stewardship- is essential for achieving long-term environmental sustainability. By integrating ethical theory with real-world applications, the article emphasizes the need for a more profound ethical commitment to environmental protection at both the individual and systemic levels.Through the systematic research of the literature, it was possible to confirm a niche gap in the field - that represented by the scarcity of scientific information resources on commercial performance and the need to configure some studies that capture the essence of the indicators that lead to performance in the field. In a vast literature of commercial performance, this research is positioned within both theoretical and applied research, which provides clues regarding the connection between factoring and the development of modern trade promotion techniques.

The novelty and fundamental contribution of our paintings to the specialised literature comes from the reality that we examine general environmental safety prices in each the private and non-private sectors and distinguish among organizations and families withinside the non-public sector.

Keyword: ethics, environmental, sustainable development, territory

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Introduction

The protection of nature is also required by the need, which is increasingly felt, to preserve and improve the physical and intellectual health of the population (Mogos et al., 2021). It is no coincidence that in highly industrialized countries, people seek to spend their free time, as far as possible, as far away from the city, at the seaside, in the mountains or somewhere in the countryside (Aaltola, 2021).

People who have a moral vision of environmental problems are followers of an ecological ethics consisting of at least one, but generally of several principles (Bran et al., 2020). It is believed that environmental policies should be evaluated only according to the extent to which they affect people (Almiron and Tafalla, 2019).

In recent decades, the accelerated degradation of the environment - manifested in climate change, loss of biodiversity, pollution of natural resources and massive deforestation - has created an ecological crisis with global implications. This crisis is not only a scientific or economic crisis, but also a deeply moral one. How people relate to nature reflects fundamental ethical values, choices and responsibilities. In this context, environmental protection can no longer be conceived solely as a technical or legal issue, but must also be understood as an issue of justice, solidarity and moral responsibility.

Environmental ethics - as a branch of moral philosophy - provides the necessary framework for analyzing key questions: What do we owe nature? Do we have obligations towards future generations? Can nature be considered a subject of moral rights? These questions are increasingly relevant in a world where human actions have become the main force transforming ecosystems.

The aim of this paper is to explore the theoretical foundations of environmental ethics, to identify the main moral challenges posed by the current ecological crisis and to highlight the responsibilities of social actors - individuals, states, corporations - in the need to protect the environment. The paper also aims to emphasize the importance of a paradigm shift: from a relationship of domination over nature to one of coexistence and care.

By addressing these dimensions, the article provides a conceptual and applied framework for understanding and assuming ethics as an essential foundation for environmental protection in a responsible and sustainable society.

The modification of the environment is manifested in principle through rejections that attack the environment in several forms (Bodislav et al., 2019). One of the forms of aggression on the environment is carried out through material-physical products that can be solid, liquid or gaseous, and another is carried out through influences that can be thermal, sound, electromagnetic, aesthetic and even moral (Rădulescu and Burlacu, 2019).

Among the many environmental problems that humanity faces, one major one is that of waste (Buzoianu, et al., 2024). For thousands of years, man has thrown away everything that was no longer useful to him, everything that was damaged. Things are no different today. And we do not think that all these things that we throw away, sooner or later we will receive them back. but in another form. Waste, in today's society, results in increasingly large quantities from human activity and their improper management can lead to soil, subsoil, water and air pollution (Florescu et al., 2019).

An environmentalist may want to know whether landfilling is harmful to the environment because he or she wants to protect it or because he or she believes that harming human life is morally wrong. There are also people who are apathetic (amoral) about the issue (Bodislav et al., 2020). However, many people do want their actions and those of others to be based on moral principles.

1.Review of the scientific literature

Man sought to know the environment, to use its properties for shelter and defense, to procure food and the materials necessary for his life. He became aware of what was around him, weighing the advantages and restrictions of the places where he lived to ensure the satisfaction of his own needs. From the appearance of prehistoric man to the present, many changes have occurred in the geographical landscape of the Globe, some due to natural causes, others due to human intervention (Ingrole et al., 2021).

From the minimal changes in ancient times, to those of prehistoric man who switched to agriculture, we reach the great changes that have occurred in the last two centuries, due to industry, the ever-increasing population growth, the growing agglomeration of inhabitants in large urban centers, the increase in the density of transportation routes, over large areas, the discharge of toxic substances into running waters or

their elimination into the atmosphere, all of which transformed the natural environment into a specific environment for man, a humanized environment.

The things that people do in their lives, to meet their daily needs, inevitably have effects on the environment. These effects can be harmful to the natural environment, but they also involve social costs that are borne in varying proportions by different sectors of society, affecting their activity in the future. Human activities exert pressure on the environment and change the state in terms of its quality and natural resource stocks. The concept of environment, a chameleon concept, as characterized by Michel Prieur, knows countless valences and is used with more or less different meanings in the many environments of human society (Biermann and Kim, 2020).

A first meaning, originating from the natural sciences and applied to human society, therefore an ecological approach and which refers to the set of elements and de facto balances that condition the life of a biological group; and a second meaning, which is due to the language of architects and urban planners, refers to the area of contact between the built space and the natural environment (therefore between the artificial and the natural space (Du Toit and Pettorelli, 2019).

Therefore, according to Wackernagel et al. (2018), the environment represents an extremely complex combination of natural elements interwoven and dynamically correlated with each other, to which are added in many places, human constructions that modify the primordial natural landscape in the course of historical evolution. The environment plays the role of a living framework, it is a systemic organism in which everything functions as a system.

According to the Dunlap et al. (2000), dangerous activities to the Environment, it includes:

• abiotic and biotic natural resources, such as air, water, soil, fauna and flora, as well as the interactions between these factors;

• assets that make up the cultural heritage;

• the characteristic aspects of the landscape.

Environmental problems have become especially acute in the last half century, a period in which there was no public information and debate on this topic, the problem being simply denied. Usually people recognize a problem as being related to the environment when it directly affects them, or when it is publicized (for example, a company wants to build a factory or a wastewater treatment center in your neighborhood; an existing factory pollutes the air or water and makes the community sick; someone started dumping garbage on the street or started cutting down trees in large areas or started building on undeveloped land). Understanding the phenomena related to the evolution of human society in terms of environmental protection and management must be part of the elementary education of every citizen (Gonzalez et al., 2021).

The resources necessary for life are decreasing at an alarming rate, both on a planetary scale and on a continental, national, regional and local level, and the direct consequences that the average citizen feels are not long in appearing. Today's environmental degradation affects the safety of tomorrow.

There is no doubt that the protection of nature occupies a very privileged position among the concerns and ideals of contemporary consciousness. The succession of ecological catastrophes due to the oil, chemical or nuclear industries, the worsening pollution affecting the planet's atmosphere have favored a mass awareness of the damage caused by the apparently unstoppable progress of the human being. As a result of these relatively *recent revelations*, a broad consensus is reached on the urgency of saving the *common heritage of humanity*. Thus, some authors, with reference to the statements presented above, maintain "the idea that the Earth is in mortal danger has imposed a new dimension of responsibility, a novel conception of human obligations that goes beyond traditional ethics circumscribed to immediate human relations. Human responsibility must now extend to extra-human things, to encompass the dimension of the entire biosphere, since man has the means to endanger the future life of the planet (Ladkin, 2005).

Knowledge of nature without wisdom has brought ignorance of the risks of its alteration, which is the subject of attention today. The balance between man and the environment has been broken by technological progress, economic development and demographic explosion. In this sense, Lewandowsky (2016) spoke of an environmental holocaust, through what McShane (2014) considered as the effect of disregard for nature, namely the loss of the feeling of piety for nature. As long as the quality of human life depends on its natural environment of existence, on the artificial environment that man has created for himself and on the interrelationships between people, the ecological crisis, the invisible bomb, manifests itself through violence against nature, including man, as well as in man's hedonism at the expense of nature, including at the expense of his fellow man (Taylor and Zimmerman, 2005).

The manifestations of the current ecological crisis consist in the depletion of natural resources and the increase in the rate of extinction of plant and animal species (the disappearance of biocenosis spaces), in pollution that warms the planet and destroys the ozone layer and in overpopulation, its density making man incapable of perceiving the face of his fellow man or due to anonymity, depersonalization of affective relationships and inevitable aggression (Sarbu et al., 2020).

Pollution is considered the essence of the ecological crisis, because what is soulless, nature, is easier to destroy and because maximizing profit has no obstacles but becomes a real obstacle in the reconciliation of man with nature while the destructive drive is inherent in man. The fact that there are no non-polluting energies places the world and development at a serious crossroads.

The desertification of the soil and the destruction of its fertile layer (humus) manifested by the decrease in agricultural productivity, then the death of forests and the decrease in subsoil resources in a civilization based on hydrocarbons (whose reserves last for a maximum of 250 years) are another aspect of the current ecological crisis. The accumulation of waste as the price paid for technological development exceeds the degradation capacity of nature or they are non-biodegradable, which is considered the dark side of consumption, man being the only being who pollutes beyond his biological function.

As it shows today, fierce competition in the field of energy or food resources cannot bring anything good to the Earth. Man has managed to destroy the ecological balance of the planet and today's attempts to return something of what he took are largely unsuccessful due to misunderstandings dictated by economic or political interests (Sevigné-Itoiz et al., 2021).

The end of this struggle for resources as it is now unfolding can be easily guessed: a planet emptied of resources and inhabitants with their eyes on other planets to continue satisfying the hunger for resources. However, it is in our power to change these things so that we can enjoy a green and clean planet Earth for many years to come: we just need to give another dimension and another measure to our needs.

2.Research methodology

The choice of a survey technique or the formulation of questions constitute strategic methodological decisions that must be examined each time depending on what is being attempted, since they constitute positions on the object of the research itself. The questionnaire consists of a series of questions that a person should answer, it is a written form that the respondent completes, ticks or circles his answers

The research instrument used is the questionnaire, which has 25 items. A five-point Likert scale was used, which indicates the agreement or disagreement of the subjects on the characteristics studied. Each characteristic is assigned numerical values from 1 to 5. The items are divided into two dimensions: awareness of the interdependence of human activity-environment and the involvement of civil society in environmental protection. The answers are rated with values between 1 and 5, where 1 means total disagreement and 5 total agreement. The time available for completing the test was a maximum of 15 minutes.

The categorical scale is made up of a series of verbal categories that are presented to the person who evaluates to indicate the category that best corresponds to the behavior, knowledge or attitudes..

Among the specific objectives of the research are the following: cultivating interest in environmental knowledge and protecting it; identifying the impact of pollutants on the health of living organisms; Developing decision-making capacities in solving problems regarding environmental pollution and waste management; statistical analysis of data regarding the implications of pollutants on population health; compliance with the standards imposed by the EU regarding the means of protecting the environment; preserving and conserving the environment that surrounds us in order to ensure local ecological balance. In close connection with the research objectives, the following dependent or independent variables were taken into account, namely the awareness of the interdependence of human activity-environment; the involvement of civil society in environmental protection.

The main aim of this research is to analyze and assess the fundamentals, challenges and responsibilities associated with environmental protection, with a focus on integrating ethical principles into environmental policies and practices, in order to contribute to the development of a sustainable and responsible society.

This paper is based on a number of primary and secondary objectives, the most important of which are to identify the main theoretical foundations of environmental protection, with a focus on the relevant ethical

and normative frameworks, to analyze the major challenges affecting the effective implementation of environmental protection policies, and to highlight the moral and institutional responsibilities of social actors in protecting the environment, from individuals to authorities and corporations.

This article is based on two major hypotheses, namely:

H1: Explicit integration of ethical principles into environmental policies leads to greater efficiency and social acceptance of these policies.

H2: The moral responsibility of individuals and institutions is essential for the success of sustainable environmental strategies.

3.Results and discussion

The high favorable results can also be explained by the fact that the university environment offers a greater openness to everyday problems. Access to international publications offers the chance for broader and more consistent information. Although the sample surveyed does not attend courses at a faculty with an environmental profile, in terms of the degree of information, awareness of the interdependence of human activity-environment they obtained an average of over 4 on a scale from 1 to 5. Mass media also has a modeling role through the cases and reports presented.

Regarding the awareness of the interdependence of human activity-environment according to gender, no significant difference was found between female and male respondents. We can state that neither gender nor the faculty attended influences the awareness of the interdependence of human activity-environment in the applied test.

Regarding involvement according to gender, a greater involvement was found on the part of female respondents, compared to male respondents. This situation may be due to the fact that women have a greater inclination towards everyday problems and are generally the ones who do the shopping, which gives them the opportunity to choose an eco-friendly product over another. They have a more strongly developed sensitive side than men.

One reason why the hypothesis is rejected is that the choice of the compared faculties had to be made taking into account the subjects studied. Thus, a faculty could be chosen where subjects related to environmental protection are studied, such as the Faculty of Geography and Geology or the Faculty of Chemical Engineering and Environmental Protection. The difference in profile between the chosen faculties would have led to a significant difference in terms of involvement in environmental protection. Therefore, this close result is also due to the fact that the level of information among students is the same, as they do not have the chance or opportunity, following these specializations, to participate in seminars or volunteering activities that would make them discover the importance of the environment. The behavior of students in the face of such environmental situations is the result of the conditions in which we live and the mentalities we face in everyday life and that shape us.

On the other hand, regarding the level of involvement, it is lower due to the fact that no action has been taken among students to emphasize the magnitude of the impact of human activities on the environment. In a world in full expansion and development, the anthropization of the natural environment is constantly increasing: everything becomes arranged to the detriment of the natural, we enter with “boots” into the bosom of nature without taking into account the natural balance of the earth.

Nature offers us boundless resources, expecting from us that everything proceeds within certain limits so as not to lead to the disappearance of the natural landscape. The most visible effect of the negative influence of man is reflected in the unsightly appearance as a result of the storage of waste in undeveloped places, namely anywhere around us, not just in the trash cans. Although it is one of the most visible effects, there are more important effects in terms of the impact on our health.

Here we can mention human activities that lead to pollution of the three environments of life development: atmosphere, soil and water. The atmosphere is polluted primarily due to factories that do not take into account a minimum of ethical rules and release a whole series of noxious substances. Here is added the effect of road traffic that has been increasingly dense in recent years.

Even though most respondents are aware of the fact that the state of the environment directly influences the activity and health of human society, they have a neutral attitude when it comes to doing something actually.

The hypothesis that gender and the faculty attended influence the dependent variable awareness of the interdependence of human activity-environment is rejected. There were no insignificant differences

between female and male respondents, so we can conclude that gender does not influence this dependent variable.

Regarding the faculty attended, we can state that the respondents surveyed from FEAA had the same average value, following the applied test, as those from Philosophy. The hypothesis that gender and the faculty attended influence the involvement of civil society in environmental protection was partially accepted.

Significant differences appear between the gender of the participants in the sense that female participants consider the involvement of civil society to be significantly more necessary compared to male participants. There are no significant differences between the participants from FEAA and those from Philosophy on the involvement of civil society in environmental protection, so that the faculty does not influence this dependent variable.

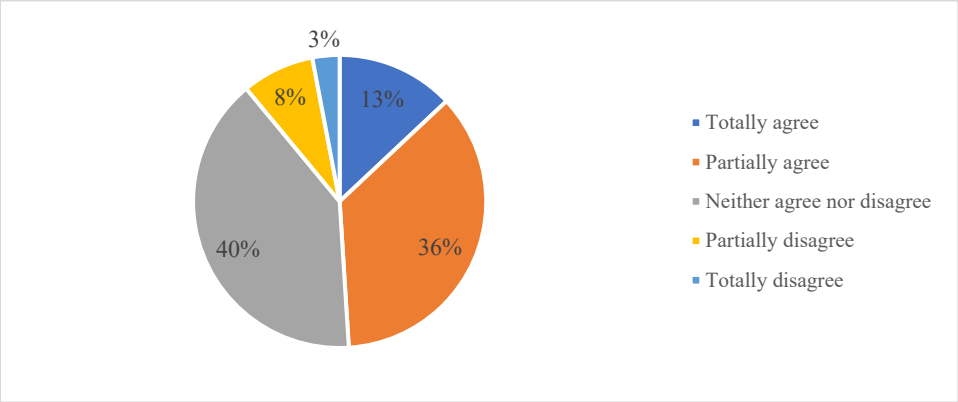

Figure no. 1. Respondents' tendency towards purchasing eco products

Conclusions

Environmental ethics takes into account the fact that an individual has a series of moral obligations that go up to moral obligations towards all the ecosystems of the planet and towards the Earth itself. We can say that man is part of nature, and like any living being, he is born, feeds, grows, multiplies and dies. For food, clothing and housing he uses many products from nature.

Thus, the environment represents an extremely complex combination of interwoven and dynamically correlated natural elements, to which are added in many places, human constructions that modify the primordial natural landscape during historical evolution. The environment plays the role of a framework for life, it is a systemic organism in which everything functions as a system.

Therefore, the causes that led to the manifestation of the current ecological crisis consist in the depletion of natural resources and the increase in the rate of disappearance of plant and animal species (the disappearance of biocenosis spaces), in the pollution that warms the planet and destroys the ozone layer and in overpopulation, its density making man incapable of perceiving the face of his fellow man due to anonymity, depersonalization of affective relationships and inevitable aggressiveness.

Maintaining ecological balance depends on the structure of the economy, the rates of production growth, the volume of productive capital, the degree of environmental pollution, the pace of technical progress, and the expansion of the eco-industry market, which is why it is imperative to correlate economic policies with ethical and environmental protection policies.

In conclusion, to protect nature we must take into account certain specific environmental objectives: cultivating interest in learning about the environment and protecting it; identifying the impact of pollutants on the health of living organisms; developing decision-making skills in solving problems regarding environmental pollution and waste management; statistical analysis of data regarding the implications of pollutants on public health; compliance with the standards imposed by the EU regarding the means of protecting the environment; preserving and conserving the environment that surrounds us in order to ensure local ecological balance; raising awareness of nature and increasing responsibility for environmental problems by informing public opinion; forming an ecological ethic (attitudes, principles, beliefs); forming a disapproving attitude towards those who violate environmental norms and laws; raising awareness of the need to save water, electricity, wood, etc. (all natural resources).

Today's environmental degradation affects tomorrow's safety. There is no doubt that nature protection occupies a very privileged position among the concerns and ideals of contemporary consciousness, therefore we should not treat this problem with indifference but get involved in solving it.

Environmental protection is an essential moral responsibility in the context of the current environmental crises. Environmental ethics invites us to rethink our relationship with nature, promoting respect and care for ecosystems as prerequisites for sustainability. Addressing the complex challenges of environmental protection requires the integration of ethical principles into public policy, education and institutional practices.

Future research should explore concrete ways of applying these principles in various fields (energy, agriculture, industry) and analyze the cultural and social impact of proposed ethical changes. It is also essential to strengthen cooperation between the actors involved - citizens, governments and the private sector- in order to turn moral commitment into effective and sustainable action.

In this way, a sound ethical approach can become the engine of responsible governance capable of ensuring long-term environmental protection.

The practical part aimed at the extent to which two factors, the respondent's gender and the faculty attended, influenced the awareness of the interdependence of human activity-environment and the involvement of civil society in environmental protection.

References

Aaltola, E., 2021. Defensive over Climate Change? Climate Shame as a Method of Moral Cultivation, *Journal of Agricultural and Environmental Ethics*, 34, p.6. https://doi.org/10.1007/s10806-021-09844-5

Almiron, N. and Tafalla, M., 2019. Rethinking the Ethical Challenge in the Climate Deadlock: Anthropocentrism, Ideological Denial and Animal Liberation, *Journal of Agricultural and Environmental Ethics*, 32, pp.255-67. https://doi.org/10.1007/s10806-019-09772-5

Biermann, F. and Kim, R.E., 2020. The Boundaries of the Planetary Boundary Framework: A Critical Appraisal of Approaches to Define a 'Safe Operating Space' for Humanity", *Annual Review of Environment and Resources*, 45, pp.497-521. https://doi.org/10.1146/annurev-environ-012320-080337

Bodislav, A.D., Rădulescu, C.V., Moise, D. and Burlacu, S. 2019. Environmental Policy in the Romanian Public Sector. *The Bucharest University of Economic Studies Publishing House, 312.*

Bodislav, A.D., Radulescu, C.V., Bran, F. and Burlacu, S., 2020. Public policy in the areas of environment and energy. In *6th BASIQ International Conference on New Trends in Sustainable Business and Consumption*, pp.228-235.

Bran, F., Rădulescu, C.V., Bodislav, D.A. and Burlacu, S., 2020. Environmental risks in the context of globalization. *Economic Convergence in European Union*, pp.350-356.

Buzoianu, O.A.C., Iacob, O., Mateescu, V.M. and Burlacu, S., 2024. Balancing Economic, Environmental, and Technological Systems for Sustainable Agricultural Development in Romania. *European Journal of Sustainable Development*, 13(4), pp.153-153.

Du Toit, J.T. and Pettorelli, N., 2019. The Differences Between Rewilding and Restoring an Ecologically Degraded Landscape, *Journal of Applied Ecology* , 56, pp.2467–2471. https://doi.org/10.1111/1365-2664.13487

Dunlap, R.E., van Liere, K.D., Mertig, A. and Jones, R.E., 2000. Measuring Endorsement of the New Ecological Paradigm: a Revised NEP Scale", *Journal of Social Issues*, 56, pp.425-442. https://doi.org/10.1111/0022-4537.00176

Florescu, M.S., Coară, G., and Burlacu, S. 2019. Innovative Solutions for the Detection of Air Pollution in the European Urban Space. In *6th SWS International Scientific Conferences on social sciences,* pp.421-430.

Gonzalez, C.G., Atapattu, S. and Seck, S.L. (eds.), 2021. *The Cambridge Handbook of Environmental Justice and Sustainable Development*, Cambridge: Cambridge University Press.

Ingrole A., Aguirre T.G., Fuller, L. and Donahue S.W., 2021. Bioinspired energy absorbing material designs using additive manufacturing J. Mech. Behav. Biomed. Mater, 119, p.104518. https://doi.org/10.1016/j.jmbbm.2021.104518

Ladkin, D., 2005. Does 'Restoration' Necessarily Imply the Domination of Nature?, *Environmental Values*, 14, pp.203-19 https://doi.org/10.3197/0963271054084911

Lewandowsky, S. and Oberauer, K., 2016. Motivated Rejection of Science", *Current Directions in Psychological Science*, 25, pp.217-222. https://doi.org/10.1177/0963721416654436

McShane, K., 2014. The Bearers of Value in Environmental Ethics", in A. Hiller, R. Ilea and L. Kahn (eds.), *Consequentialism and Environmental Ethics*, New York: Routledge, pp.17-34.

Mogos, R.I., Negescu–Oancea, M.D., Burlacu, S., and Troaca, V.A., 2021. Climate Change and Health Protection in European Union. *European Journal of Sustainable Development,* 10(3), pp.97-108, Doi: 10.14207/ejsd.2021.v10n3p97

Rădulescu, C.V. and Burlacu, S., 2019. Human Pressure on Air Quality in Bucharest. *Competitiveness of Agro-Food & Environmental Economy*.

Sarbu, R., Niculescu A.M., Buzoianu, O.A.C., Gombos, S.P., 2020. Economic-ecological analysis of sustainable development in Romania, - European Journal of Sustainable Development https://doi.org/10.14207/ejsd.2020.v9n4p161

Sevigné-Itoiz, E., Mwabonje, O., Panoutsou, C. and Woods, J., 2021. Life cycle assessment (LCA): informing the development of a sustainable circular bioeconomy? *Phil. Trans* https://doi.org/10.1098/rsta.2020.0352

Taylor, B. and Zimmerman, M., 2005. Deep Ecology, in B. Taylor (ed.), *The Encyclopaedia of Religion and Nature*, London: Continuum

Wackernagel, M., Galli, A., Hanscom, L., Lin, D., Mailhes, L. and Drummond, T., 2018. Ecological Footprint Accounts: Principles, in *Routledge Handbook of Sustainability Indicators*, Simon Bell and Stephen Morse (eds.), London: Routledge, 16.

Comparative Case Study on the Level, Structure and Dynamics of Public Expenditure in Romania and Greece

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Abstract

The paper ambitions to discover the dynamics among additives of public expenditure and public debt the usage of an intertemporal optimization framework. Public expenditure is classed as efficient and less-efficient primarily based totally at the reason that a share of the efficient public expenditure corrects disequilibrium withinside the public debt withinside the lengthy-run. The second-order situations as a result of the version reveal that as phi increases, the marginal social fee of a unit of capital reduces. Thus, past its most efficient level, an growth in phi may want to nevertheless have an effect on public debt inversely; however, this can be on the fee of `crowding out` of personal funding. To take a look at the theoretical illustration and to examine the connection among public expenditure and debt, an empirical evaluation the usage of Greek and Romanian Public Finance data (2019-2023) is completed on this study.

Time collection strategies are hired to check the speculation that capital expenditure of the authorities is efficient public expenditure. Public spending is a fundamental instrument of fiscal policy, with a direct impact on economic growth, fiscal balance and the quality of public services. This comparative study analyses the level, structure and dynamics of public spending in Romania and Greece, two European economies with different trajectories but facing similar challenges related to the efficient use of public funds.

Based on statistical data from the last two decades, the research emphasises the differences and similarities in the allocation of budgetary resources, with a focus on spending on public administration, education, health, investment and public debt service. Economic, political and institutional factors influencing budgetary decisions in the two countries are also analysed. The study provides an integrated perspective on how Romania and Greece are responding through public expenditure policies to social and economic pressures, while drawing conclusions and recommendations on the sustainability and efficiency of spending in the context of EU membership.

The originality of the article lies in the fact that the research targeted by this has an applied importance, given that the information necessary to correlate empirical data with the hypotheses launched within the research and may be beneficial for a future accounting analysis in the case of the two Balkan states.

The intention of this theoretical exploration is to recognize the dynamics of efficient public expenditure with the extent of public debt in mild of the intake and funding alternatives of the consultant agent withinside the economy.

Keywords: governement, Greece, public expenditure, Romania

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Introduction

In the science of public finance, public expenditures are economic and financial relations in monetary form, which are manifested by the state, on the one hand, and individuals and legal entities (institutions, organizations), on the other hand, in order to distribute the state's financial resources for the execution of its functional objectives (Burlacu, Ciobanu et al., 2021).

Currently, public tasks have expanded from the role of public expenditures as resources to cover state needs to ensure activity to the role of budgetary decisions of a political nature that determine the efforts made by the state authority to satisfy the needs of general or collective interest (Bodislav et al., 2020). In order to ensure sustainable development of the public finance compartment, the state budget is annually drawn up, the main component of the National Public Budget (Acemoglu and Akcigit, 2012).

The topicality of the analysis of public expenditures within the state budget refers to highlighting the main needs of the community and the state's efforts to ensure them in the face of limited resources. In parallel, by order of the Ministry of Finance, a new Budget Classification was approved, an instrument that ensures the development of a transparent budget, in particular the functional, organizational, program and economic classification of public expenditures (Ansar et al., 2016).

Public spending covers both non-material and material activities. It is financed through public actions whose content is dominated by general public services, including national defense, but also economic ones. These determine the fulfillment of certain conditions for the functioning of organs and entities belonging to a state, which, in principle, carry out non-material or material activities. Material activities produce goods and services that are reflected through the national product (Anzoategui et al., 2019).

1.Review of the scientific literature

Public expenditure on schooling has been any other key vicinity of research, mainly concerning its effect on human capital and long-time period increase (Rădulescu et al., 2023). Gross& Sampat, (2020) argued that public funding in schooling will increase human capital, which, in turn, can generate sustained monetary increase.

Bloom et al. (2019) confirmed that a shift withinside the composition of public expenditure towards regions inclusive of schooling may have superb and statistically big results on monetary increase in growing economies. These findings had been showed with the aid of using later studies, inclusive of the ones with the aid of using Wang (2011), who observed that schooling expenditure is one of the key elements contributing to increase in numerous nations, and Shuaibu (2016), who explored the elements influencing human capital development (HCD) in 33 African nations from 2000 to 2013, locating that authorities spending on fitness and schooling has a big long-time period effect on HCD.

Galí et al., (2007) studied the effect of public spending on schooling on monetary increase in North Macedonia, the usage of the two-level least-squares instrumental variables technique with statistics from 1917 to 2020. The outcomes suggest that a one-factor boom in public spending on schooling could have a superb impact on monetary increase.

Several research have targeted at the consequences of public expenditure in growing economies, a place with unique traits because of the dearth of infrastructure and human capital (Ladaru et al., 2022). Ram (1986) discovered proof that authorities intake has a fine impact on monetary overall performance and increase in a hundred and fifteen nations. However, different research have stated that public expenditure might also additionally have bad consequences below sure circumstances (Gâf-Deac et al., 2024). For example, Devarajan (1996) confirmed that authorities expenditure on transfers and intake has bad consequences on personal area productivity.

Boehm (2020) strengthened this argument with the aid of using looking at that, in growing economies, training spending is the handiest expenditure considerably connected to increase. However, spending in different sectors, inclusive of protection or social welfare, does now no longer have the equal impact.

Bose et al. (2007) analyzed the effect of presidency sectorial expenditure on monetary increase in Malawi the use of time-collection facts from 1980 to 2007, making use of cointegration evaluation and the mistake correction model. The short-time period outcomes confirmed no great dating among authorities sectorial expenditure and monetary increase. In contrast, the long-time period outcomes indicated a great fine impact of expenditure on agriculture and protection on monetary increase. On the opposite hand, expenditure on training, health, social protection, and delivery and communique become negatively associated with monetary increase.

Ganelli and Tervala (2010) analyzed the effect of public expenditure on monetary increase and poverty discount in growing nations like India. The outcomes indicated that, in states wherein public expenditure on infrastructure improvement inclusive of roads, irrigation, power, delivery, and communique is better, in line with capita profits is likewise better and poverty is lower.

Another key issue influencing the connection among public expenditure and monetary increase is corruption. Duong and Nguyen (2021) located that corruption negatively impacts the productiveness of public expenditure, specifically in areas with excessive degrees of corruption, which limits the effectiveness of public investments in increase.

Coenen et al. (2013) investigated the mutual dependence among corruption and public expenditure performance in a hundred sixty five nations with one of a kind regime types. Their consequences found out that corruption notably impacts public expenditure performance in nations with complete democracies and incorrect democracies.

Furthermore, they located that lowering corruption degrees generated the maximum enormous growth withinside the estimate of public spending performance in authoritarian nations (Popescu et al., 2018) In contrast, the smallest growth withinside the performance estimate turned into found in nations with complete democracies (Bran et al., 2023).

Duong and Nguyen (2021) studied the effect of the casual financial system and corruption, together with authorities spending, alternate openness, overseas direct investment, inflation, and tax revenue, at the monetary increase of BRICS nations.

Using the Bayesian linear regression technique with facts from 1992-2017, the writer concluded that each authorities spending and alternate openness can raise the monetary increase of BRICS nations, with nice effect chances of 75.68% and 67%, respectively. Furthermore, the consequences additionally propose that the casual financial system and manipulate of corruption definitely have an effect on the monetary increase of BRICS nations.nations.

2.Research methodology

Research Methodology for Public Expenditure Start by identifying the core research question(s):

- How efficient is public expenditure in achieving development goals?
- What is the impact of public expenditure on economic growth or poverty reduction?
- How is public spending distributed across sectors (health, education, infrastructure)?

The objective of the research concerns is to learn the concept of cost dynamics which allowed the use of key research methods as follows:

- Analysis of documents, especially those referring to reviews of special literature. This fact allowed the analysis of the content of the mentioned addresses and the development of each topic, both in terms of time and spatial criteria.

- Non-participatory observations, therefore, the development of concepts and interactions between different elements of the research in general.

- Comparative methods in which the most important theoretical and practical elements unique to the different dimensions of the factoring concept are identified through complex approaches. As for the techniques used, these consisted of collecting and processing information and interpreting research data.

For the realisation of this comparative study, a quantitative approach was used, supported by a rigorous documentary and statistical analysis, with the aim of highlighting the evolutions and particularities of public expenditure in Romania and Greece in the period 2019-2023. The research methodology included a series of stages such as the selection of relevant indicators, where the share of public expenditure in GDP was analysed in practice; the functional structure of expenditure (education, health, defence, social protection, etc.); the economic structure (current vs. capital expenditure); the annual dynamics of total expenditure and by category; the budget deficit and public debt.

Graphical methods and comparative tables have been used to highlight the differences and similarities between the two countries, by categories of expenditure and over distinct periods.

The results were interpreted in relation to the specific economic, political and institutional context of each country, including budgetary reforms, conditionality imposed by European and international institutions and the impact of EU accession.

From an informational perspective, this study uses a simultaneous mixed method, combining qualitative studies based on narrative research with quantitative studies on experimental studies.

The nominal absolute change (increase) represents the difference between the amount of expenses recorded in the two periods, which are expressed by the prices charged in each of them.

$$\Delta cP_1^n/_0 = cP_n^1 - cP_n^0 \qquad (1)$$

where $\Delta cP_1^n/_0$ – change in public spending (in nominal terms); cP_n^1 - public expenditures made, in current prices, in the current period; cP_n^0 - public expenditures incurred, in current prices, in the base period.

The real change in public spending is the difference between the amounts of public spending made in two periods, but expressed in terms of the same price level.

$$\Delta cp_{1/0}^r = cP_1^r - cP_0^r \qquad (2)$$

$\Delta cp_{1/0}^r$- change in public spending (in real terms); cP_1^r – public expenditures incurred (in constant prices) in the current period; cP_0^r - public expenditures incurred (in constant prices) in the base period, where:

$$cP_1^r = \frac{cP_1^n}{IP_{1/0}} \qquad IP_{1/0} = \frac{P_1}{P_0}$$

P_1 - price level in the current period; P_0 – price level in the base period.

The nominal relative growth index represents the ratio between the change in public spending in nominal terms in a given period and the size of nominal public spending in the base period..

$$I = \frac{\Delta CP^n}{CP_0^n} * 100$$

3.Results and discussion

According to Eurostat statistical data, it can be seen that there are differences between the two member states of the European Union, namely Romania and Greece, in terms of the level and dynamics of total public expenditure in the period 2019-2023.

The differences can be seen very easily even during the COVID-19 pandemic, when the activity of society was seriously affected by this virus. Because of it, all the economic systems of the world, even those of the countries discussed in the present comparative study, were affected in all areas of activity, such as education (the implementation of online courses within pre-university education) and HORECA consisting in the bankruptcy of certain businesses in the branch that also belongs to tourism.

Analyzing the given context, it can be noted that in Romania there was an upward trend in the growth of total public expenditure, starting with 2019. At the beginning of 2020, the Coronavirus pandemic appeared. Because of this, Romania had to increase total public spending. Thus, in 2020 compared to 2019, they increased by 10.94 million euros.

Greece had an enormous level of expenditure compared to Romania, which was approximately 2 times higher than that of the Romanian state. Greece has approximately 10.5 million inhabitants, while Romania has approximately 19 million inhabitants.

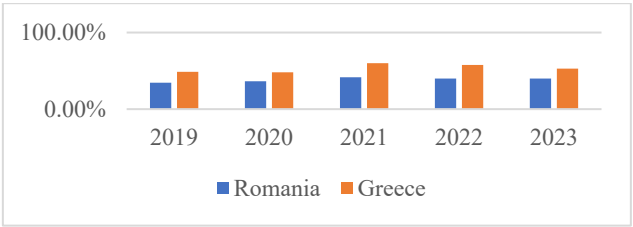

Figure no. 1. Evolution of total public expenditure as a share of GDP in Romania and Greece 2019-2023

Source: Eurostat data

In 2019, in Greece, total public expenditure increased by 498 Euros compared to 2018, and in 2020 and 2021, respectively, total expenditure increased, and will continue to trend upward in 2022. Unemployment increased in 2020 compared to 2019.

The level of total public expenditure in both countries is reflected by the share of total public expenditure in each country's gross domestic product. Compared to Romania, Greece allocates up to 60.2% to public expenditure. If we refer to both the gross domestic product of Greece and Romania, we can conclude that this percentage variation between their public expenditure is highlighted by the difference between the gross domestic product of the two countries.

The dynamics of public expenditure is given by the change in values from the current and previous year. For example, in 2020, when the health crisis began in our country, by 2022 there was an increase in them, which shows that Romania should have started allocating as much money as possible to all areas of activity, such as health and education. According to Eurostat, prices have a higher growth rate in Romania than in Greece. In 2020, the annual inflation rate in Romania was 2.3%, 1.77 times higher than that in Greece, of -1.2%. Factors such as high or low birth rates, the economy, etc. influence the percentage of GDP expenditures in Romania and Greece.

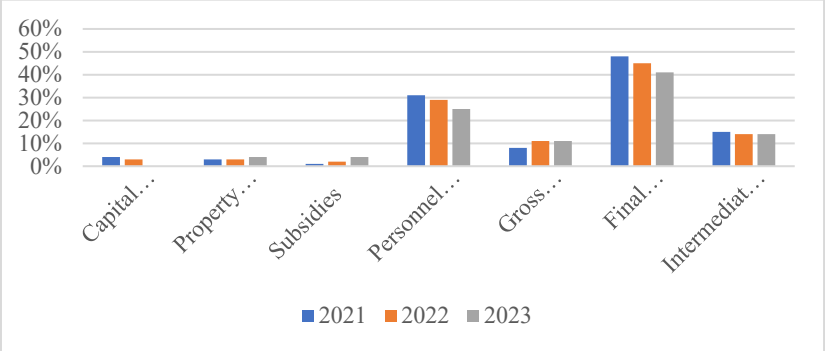

Figure no. 2. Dynamics of public spending in Romania (2021-2023)

Source: Eurostat data

According to the graphs above, differences can be observed between Romania, Greece and the EU average. The highest expenditures at EU level are those for final consumption, the highest value being 44.12% in 2018, but Romania recorded 48.35%, exceeding the average of the European Union member states in that year. Greece had lower expenditures throughout the period compared to our country. The Greek state allocates more money to subsidies compared to Romania and the European Union average, especially in 2022, Romania's intermediate consumption expenditures are higher than those of Greece and the EU member states. In conclusion, in general, the two member states have values higher than those of the EU average, a concrete aspect that can be observed in the tables mentioned above (Figure no. 2).

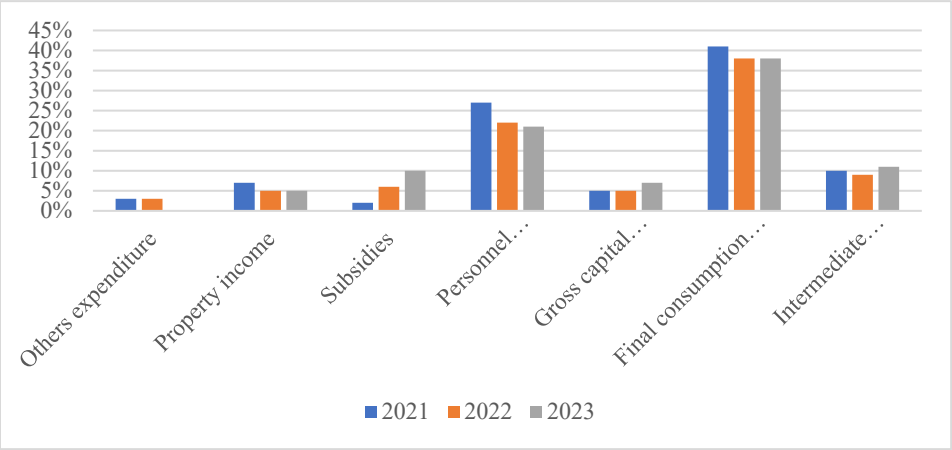

Figure no. 3. Public expenditure dynamics in Greece (2021-2023)

Source: Eurostat data

Romania and Greece must take all measures to reduce the public debt of each state and reduce the gap between income and expenditure. In order to carry out their functions, both countries must resort to various measures to ensure a decent living and social protection for their inhabitants (Figure no.3).

Each of the components of public financial policy presents particularities determined by the content of the issue, the goals and the instruments used to carry out a certain financial activity in a certain field, and among these components, an important place is that of fiscal-budgetary policies.

These are designed as a mixture of fiscal resource policies with those of budgetary expenditure and the budget balance.

Taking fiscal-budgetary measures on the establishment of objectives, responsibilities and all priorities can change the financial system in an efficient way. The fiscal-budgetary measures adopted by the Romanian Government were growth, respectively development, economic stimulation, increase in the gross monthly salary, increase in pensions, etc.

The share of current expenditure in total public expenditure in the period 2019-2023 varies both from one country to another and from one year to another. For example, we can see that in 2022, the Romanian state allocated a share of 25.12% to personnel expenditure, meaning the amount of 2,856.3 million euros, compared to Greece which allocated 22,756 million euros to personnel expenditure, representing only 20.92% of total public expenditure.

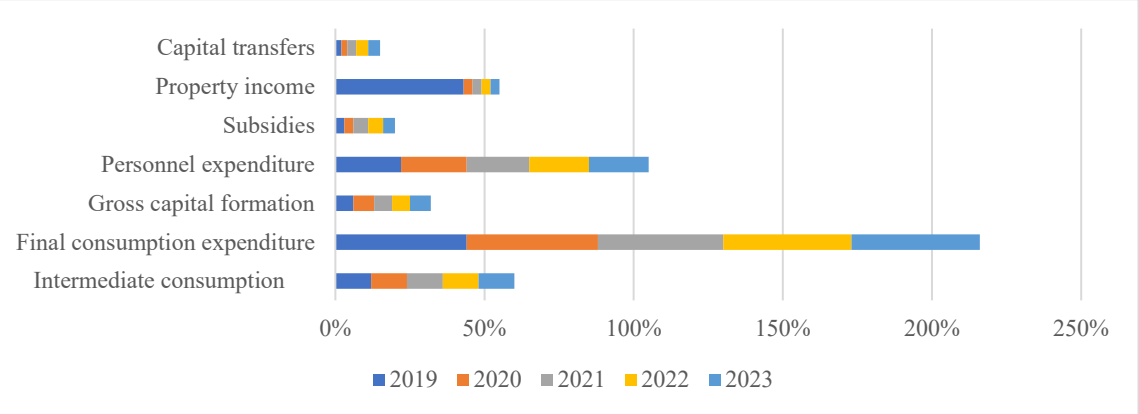

Figure no.4. Economic expenditure structure of EU countries (2019-2023)

Source: Eurostat data

In contrast, the highest share of expenditure for gross capital formation is that of 2022, being 10.9%, 12,477.6 million euros, while Greece recorded a share of 6.9% reported in 2022. The EU average at that time was 6.69%. (Figure no.4)

The economic factor also influences public spending. The degree of economic development of both states is varied from any perspective. Therefore, these fiscal-budgetary measures focused on the proper functioning of society, respectively the economic development of Romania. The aim was, in particular, to make services more efficient, especially public ones, but also to increase the standard of living in both countries. During the pandemic, but especially at its end, the emphasis was placed, both in Romania and in Greece, on people's health, by the fact that the inhabitants of the EU member states were vaccinated against COVID-19.

In an economic sense, the notion of public expenditure expresses the economic processes of GDP distribution, materialized by the allocation and use of monetary (financial) resources, for the implementation of actions considered of public interest, at the national level or of local communities, etc. This meaning also includes the content of economic processes of public consumption of resources, which are carried out in direct connection with satisfying the needs of public social utilities.

The concept of public expenditure expresses a certain category of economic processes and relations that manifest between public (state) authorities, on the one hand, and natural or legal persons, on the other hand, on the occasion of the allocation and use of financial resources administered by these authorities. An expression of the manifestation of finances, the content of expenditure consists of the economic processes

and relations in monetary form through which the distribution and effective use of public financial funds takes place. In this case, the content of public expenditure in terms of financial redistribution of GDP or even national wealth, or the reallocation of resources, through public authorities, in favor of various individuals and legal entities in the position of beneficiaries of social utilities, including public money, must be taken into account.

Within socio-cultural expenditure, the following categories can be identified: health, education, recreation, culture and religion. The highest share of total expenditure for socio-cultural actions is that belonging to social protection, recorded in 2018 when Romania had a share of 33.5%. Greece at that time recorded a share of 41.3% of the total. The EU average at that time was 10.2%. The Romanian Government administers the money to improve the conditions for the educational process, respectively for the treatment and vaccination of the population against coronavirus, so that Romanian society can return to normal.

One of the effective measures of the Government is to increase salaries and pensions. The best of these was the emphasis on public investment. Health is an important area for both countries, with Greece allocating more money to it. Regarding investments in this area, the Government has adopted various fiscal-budgetary measures, such as allocating funds for the modernization of hospitals. At the level of the EU member states, the highest value recorded in these years is 15.5%, which is recorded in 2020.

Conclusions

This paper aimed to study the level, structure and dynamics of public spending in Romania and Greece, but also at the level of the European Union. I wanted to highlight how a health crisis can change the normal course of economic and financial activities of each state, referring to the pandemic period, more precisely between 2020 and 2022.

The main areas regarding the budget classification were that of final consumption expenditure, when Romania allocated 48.35% to final consumption expenditure in 2019, Greece allocating less than this in each year of the respective period.

Finally, there is a difference between Romania and Greece, in the period 2019-2023, even though both are EU member states. According to this comparative analysis, the weights allocated by each geopolitical entity from the point of view of economic classification are highlighted, namely education, health, public order and safety, defense, etc. Romania, from my point of view, must allocate more money to education, health, etc. in order to be able to develop even more from all points of view. However, we cannot forget that there were also such categories belonging to economic activity, in which our country allocated more money than Greece.

One such good example to consider is that of education because during the pandemic, an attempt was made to ensure that the learning process took place under normal conditions or relative to those in other more developed states than ours. On the one hand, the number of their inhabitants, respectively the social categories and the percentage of the gross domestic product used for the two types of expenses, according to the functional and economic classifications, differ. On the other hand, we believe that public institutions and the Government have responsibilities, such as making public spending more efficient and improving the performance of society in general.

Therefore, for a functioning economic system of a state that always yields results, it is important to have a link between the budget and resources. In this way, a balance is formed between income and expenditure, which is established through the annual financing of economic and functional categories.

References

Acemoglu, D. and Akcigit, U., 2012. *Intelectual property rights policy, competition and innovation*", Journal of the European Economic Association, 10(1), pp.1-42. https://doi.org/10.1111/j.1542-4774.2011.01053.x

Ansar, A., Flyvbjerg,., Budzier, A., Lunn, D. 2016. *Does infrastructure investment lead to economic growth or economic fragility? Evidence from China*, Oxford Review of Economic Policy, 32(3), pp.360-390. https://doi.org/10.1093/oxrep/grw022

Anzoategui, D., Comin, D., Gertler, M., Martinez, J., 2019. *Endogenous technology adoption and R&D as sources of business cycle persistence*, American Economic Journal: Macroeconomics, 11(3), pp.67-110. https://doi.org/10.1257/mac.20170269

Bloom, N., Van Reenen, J., Williams, H., 2019. *A toolkit of policies to promote innovation*", Journal of Economic Perspectives, 33(3), pp.163-184. https://doi.org/10.1257/jep.33.3.163

Bodislav, D.A., Radulescu, C.V., Bran, F., and Burlacu, S., 2020. Public policy in the areas of environment and energy. In *6th BASIQ International Conference on New Trends in Sustainable Business and Consumption* (pp. 228-235).

Boehm, C.E., 2020. *Government consumption and investment: does the composition of purchases affect the multiplier?* Journal of Monetary Economics, 115, pp.80-93.

Bose et al. 2007. Public Expenditure and Economic Growth: A Disaggregated Analysis for Developing Countries, The Manchester School, 75(5), pp.533–556. https://doi.org/10.1111/j.1467-9957.2007.01028.x

Bran, F., Balu, O.F., Reynard, C., Rădulescu, C.V., Burlacu, S., Mănescu, C.O. and Gole, I., 2023. Mapping risk and performance business drivers post-pandemic. Future challenges. *Economic Computation & Economic Cybernetics Studies & Research*, 57(4).

Burlacu,S., Ciobanu,G., Troaca, V. and Gombos, C., 2021. The Digital Finance – opportunity of development in the new economy. Proceedings of the International Conference on Business Excellence,15(1), pp.392-405. https://doi.org/10.2478/picbe-2021-0036

Christiano, L.J., Motto, R., Rostagno, M., 2014. *Risk shocks*, American Economic Review, 104(1), pp.27-65.

Coenen, G., Straub, R., Trabandt, M., 2013. *Gauging the effects of fiscal stimulus packages in the euro area*, Journal of Economic Dynamics and Control, 37(2), pp.367-386.

Devarajan, S., Swaroop, V. and Zou, H., 1996. The Composition of Public Expenditure and Economic Growth. Journal of Monetary Economics, 37(2), pp.313–344.

Duong, T. and Nguyen, V., 2021. Shadow Economy, Corruption and Economic Growth: An Analysis of BRICS Countries, Journal of Asian Finance, Economics and Business.

Gaf-Deac, I., Radulescu, C. V., Burlacu, S., and Dima, C., 2024. Professional Training in Public Administration in Romania during the COVID-19 Pandemic. In *Proceedings of the International Conference on Business Excellence* (Vol. 18, No. 1, pp. 819-828. DOI: 10.2478/picbe-2024-0072

Galí, J., López-Salido, J.D. and Vallés, J., 2007. *Understanding the effects of government spending on consumption*", Journal of the European Economic Association, 5(1), pp. 227-270. https://doi.org/10.1162/JEEA.2007.5.1.227

Ganelli, G. and Tervala, J., 2010. *Public infrastructures, public consumption, and welfare in a new-open-economy-macro model*, Journal of Macroeconomics, 32(3), pp. 827-837. https://doi.org/10.1016/j.jmacro.2009.09.009

Gross, D.P., Sampat, B.N., 2020. *America, Jump-started: World War II R&D and the Takeoff of the U.S. Innovation System*, NBER Working Paper.

Ladaru, R.G., Burlacu, S., Guţu, C., Platagea, G.S., 2022. Human resources management - labor crisis. In: 30 years of economic reforms in the Republic of Moldova: economic progress via innovation and competitiveness. Vol.2, 24-25 septembrie 2021, Chişinău. Chişinău, Republica Moldova: Academia de Studii Economice din Moldova, pp.187-194. https://doi.org/10.53486/9789975155649.29

Popescu, M.L., Dobrea, C.R. and Burlacu, S., 2018. Inconsistency in natural resources management and managerial dimension in economic management. In *Proceedings of the 14th Administration and Public Management International Conference" Human Resources Management and Public Organizational Performance*.

Rădulescu, C.V., Mănescu, C.O., Popescu, M.L. and Burlacu, S., 2023. Sustainable Development in Public Administration: Research, Practice, and Education. *European Journal of Sustainable Development*, 12(4), p.27. https://doi.org/10.14207/ejsd.2023.v12n4p27

Enhancing Physical and Mental Health Through the Strategic Use of Social, Economic and Cultural Capital

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Abstract

This paper delves into Pierre Bourdieu's conceptualization of capital—specifically, social, cultural, and economic capital—and its significant impact on physical and mental health (Bourdieu 1977, 1979, 1986). It explores how these three forms of capital directly affect well-being, with a particular focus on their individual and combined influences. The analysis of social capital includes four key indicators to deepen the understanding of Bourdieu's concept and its implications for health. Cultural capital is dissected into three categories as defined by Bourdieu (1986): embodied cultural capital, institutionalized cultural capital and objectified cultural capital.

The paper employs principal component analysis to identify the relationship between social, cultural and economic capital and physical and mental health. Predictive regressions are used to quantify the effects of various types of capital on health outcomes, while clustering techniques are applied to explore whether specific patterns exist within different countries.

The analysis reveals that cultural and social capital significantly influence health, beyond just economic capital. While economic capital strongly affects mental health, it has a lesser impact on physical health, influencing only subjectively reported physical health. Participation in voluntary activities and frequent family interactions positively affect mental health and physical health, respectively. Cultural capital plays a key role, with institutionalized cultural capital linked to mental health and objectified cultural capital to physical health, particularly for objectively reported physical health. These findings suggest that non-economic factors, especially social and cultural resources, are essential to understanding health disparities.

This approach aims to provide a comprehensive and detailed analysis of how social, cultural, and economic capital shape physical and mental health across diverse contexts.

Keywords

Physical health, mental health, social capital, economic capital, cultural capital.

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Introduction

The complex network of social determinants influencing health outcomes has been a central subject of interdisciplinary research across sociology, public health, and economics. Pierre Bourdieu, a leading figure in sociological theory, provides a solid framework for examining these determinants through his concepts of social, cultural and economic capital (Bourdieu, 1977). Bourdieu's theory elucidates how different forms of capital influence individuals' life chances, behaviors and, in the end, their health. This paper aims to explore the influence of social, cultural and economic capital on mental and physical health from a

Bourdieusian perspective, highlighting the interdependencies and disparities that characterize modern societies.

Bourdieu's conceptualization of capital goes beyond the economic sphere, incorporating social and cultural dimensions that critically shape an individual's opportunities and constraints. Social capital, defined as resources accessible through networks of relationships and social ties, plays a crucial role in providing emotional support, information and practical assistance, all of which are essential for maintaining mental and physical health. Cultural capital, encompassing education, knowledge, skills and cultural consumption, affects health by shaping health-related behaviors, attitudes towards health care and the ability to navigate complex health care systems. Economic capital, i.e. the financial resources available to an individual, has a direct impact on access to health care, nutritious food, safe housing and other determinants of health (Bourdieu, 1986).

Studies such as Abel (2008), Uphoff (2013) or Veenstra (2007) consistently demonstrate that people with higher levels of social, cultural and economic capital have better health outcomes. For example, strong social networks are associated with lower levels of stress, better mental health and greater longevity. Similarly, higher cultural capital is often correlated with healthier lifestyles, better health literacy and proactive health-seeking behaviors. Economic capital, perhaps the most direct impact, enables access to quality health care, healthier living environments and reduces financial stress that can negatively affect mental health.

1. Review of the scientific literature

Bourdieu (1986) rejects the conventional capitalist theory that capital must have a quantifiable and marketable value in order to be considered capital and considers that the existence of capital is not only economic in nature, but also social and cultural. In Bourdieu's conception, economic capital is not limited only to the possession of these goods, but also to the ability to use these possessions to gain advantage. We must distinguish between the two theoretical ways in which economic capital can influence a person's health. In the materialist interpretation, material resources offer more possibilities when it comes to access to health and nutrition. In the psychosocial interpretation, a lack of economic capital leads to an increase in stress and a decline in mental health.

Bourdieu (1979) defines cultural capital as the totality of knowledge, skills and education possessed by an individual. This type of capital includes both tangible and intangible cultural resources. Cultural capital can in turn be divided into three different categories: embodied cultural capital , represented by the long disposition of body and mind, objectified cultural capital , represented by cultural assets, which are considered the traces or achievements of cultural capital, and institutionalized cultural capital , a form of objectification that offers unique properties, such as educational diplomas. Institutionalized cultural capital is often used as a determinant of health in research (Muntaner, 2007). There are also articles that find a correlation between mental health and embodied cultural capital " in this form, cultural capital becomes a key component linking people's social position to behavioral aspects of health inequality" (Abel, 2008)

Social capital in Bourdieu's view describes the resources embedded in social networks and interpersonal relationships to which a person has access. Through the prism of historical view, Bourdieu deciphers how social capital becomes a major factor in the perpetuation of social inequalities and serves as a mechanism of exclusion or marginalization. One element of his analysis is that Bourdieu does not mention how this social capital should be measured. It is worth noting that Bourdieu equates power with money, thus putting the two specific types of capital, social capital and economic capital, in the balance. In Bourdieu's conception, these types of capital should not be analyzed individually, but in continuous interaction with all other types of capital.

In the scientific literature, most studies and publications have been done on the influence of social capital on mental and physical health. Ehsan et al. (2019) conduct a meta-analysis of these studies considering also how social capital is defined. Although there is a general trend showing an improvement in mental health with increasing social capital, we cannot ignore the existence of systematic reviews that are in direct contradiction depending on the type of social capital analyzed. Uphoff et al. (2013) show that for individuals in disadvantaged positions, bonding social capital improves health, while bridging and structural social capital are associated with poor health. Villalonga-Olives and Kawachi (2017) show that bonding social capital is correlated with poorer health and bridging social capital associated with improved health.

Cultural capital is the least studied in relation to mental and physical health, but it may play an important role. "If it is true that cultural capital has qualities comparable to other forms of capital, then it may also be true that the accumulation of such capital leads to improved health outcomes" (Khawaja and Mowafi ,

2006). Wilkinson et al. (2007) demonstrated that individuals' involvement in cultural activities is positively correlated with self-reported health status after controlling for socio-demographic variables. Similar studies have found a net negative effect between different types of social capital on mortality (Bygren et al., 2009; Glass et al., 1999; Konlaan et al., 2000; Hyyppä et al., 2006; Väänänen et al., 2009). The limitation of these studies is the idea that these health benefits can be attributed to the increase in physical movement with participation in these cultural events and not due to these events themselves.

The mechanism by which cultural capital can influence mental and physical health is unclear, but Bygren et al. (2009), proposes three different mechanisms: the biological part focuses on the effect of social capital on brain structure and cognitive abilities, the psychological part focuses on the improvement of the expression of feelings of the individuals concerned and the philosophical part focuses on the positive effect of aesthetic experiences that help individuals conceptualize and accept their situation. Elchardus (2009), Katz-Gerro (2004), and Veenstra (2007) propose explanations closer to Bourdieu's work, whereby cultural capital can be an essential element in social hierarchy.

Economic capital has the best-researched effect on mental and physical health. Both the material and psychosocial effects, both discussed above, are well researched in the scientific literature. López-Casasnovas and Saez, (2020) conclude that there is a strong, inverse correlation between debt and health levels. Jumbri et al. (2019) find a strong correlation between the increase in the level of health and the increase in GDP per capita in the respective country. Freedman et al. (2019) treat economic capital as a buffer zone for people with disabilities and for quartiles 2 and 3 of economic capital there is a mitigation of worsening mental health with increasing levels of disability.

Pinxten and Lievens (2014) study the effect of social, cultural and economic capital on health levels and find important positive correlations for all these interactions except cultural capital on mental health.

2. Data and research methodology

The data used in this analysis were extracted from EUROSTAT and The World Happiness Report. The data to be used in the regression models as explanatory variables are: cultural capital, social capital and economic capital. All data were selected for the year 2015, as it was the only year in which some of the measures used in this analysis were quantified on EUROSTAT in terms of social capital.

Table no. 1. Variables included in data analysis

Capital type	Indicator	Variable	Source data
Cultural capital	Embodied cultural capital	Percentage of population having completed upper secondary education (high school)	Eurostat: https://doi.org/10.2908/EDUC_UOE_ENRS04
	Institutionalized cultural capital	Percentage of the population having completed tertiary level education (having completed a university degree or specialization)	Eurostat: https://doi.org/10.2908/EDUC_UOE_ENRT01
	Objectified cultural capital	Number of cultural institutions(museums, libraries, etc) per 1000 people	Eurostat: https://doi.org/10.2908/SBS_OVW_ACT
Social capital	Family	Frequency of getting together with friends or family	Eurostat: https://doi.org/10.2908/ILC_SCP10
	Trust	Level of trust in other people(from 1 to 10)	Eurostat: https://doi.org/10.2908/ILC_PW03
	Help	Persons having someone to talk to about personal matters or ask help	Eurostat: https://doi.org/10.2908/ILC_SCP15 https://doi.org/10.2908/ILC_SCP17
	Social participation	Persons participating in (in)formal volutary activities	Eurostat: https://doi.org/10.2908/ILC_SCP19
Economic capital	Economic capital	Real GDP per Capita	Eurostat: https://doi.org/10.2908/NAMA_10_PC
Physical Health	Objective physical health	Healthy life years projected at birth	Eurostat: https://doi.org/10.2908/SDG_03_11
	Subjective physical health	Self-perceived health	Eurostat: https://doi.org/10.2908/HLTH_SILC_02
Mental Health	Mental Health	Hapiness index	The Hapiness Report: https://worldhappiness.report/

Source: Created by the authors

The diagram below illustrates the interdependencies between the variables studies in this analysis, indicating the relationship between cultural, social and economic capital and mental and physical health. Our analysis follows a structured approach to examine the relationships between different forms of capital and their influence on physical and mental health across EU countries.

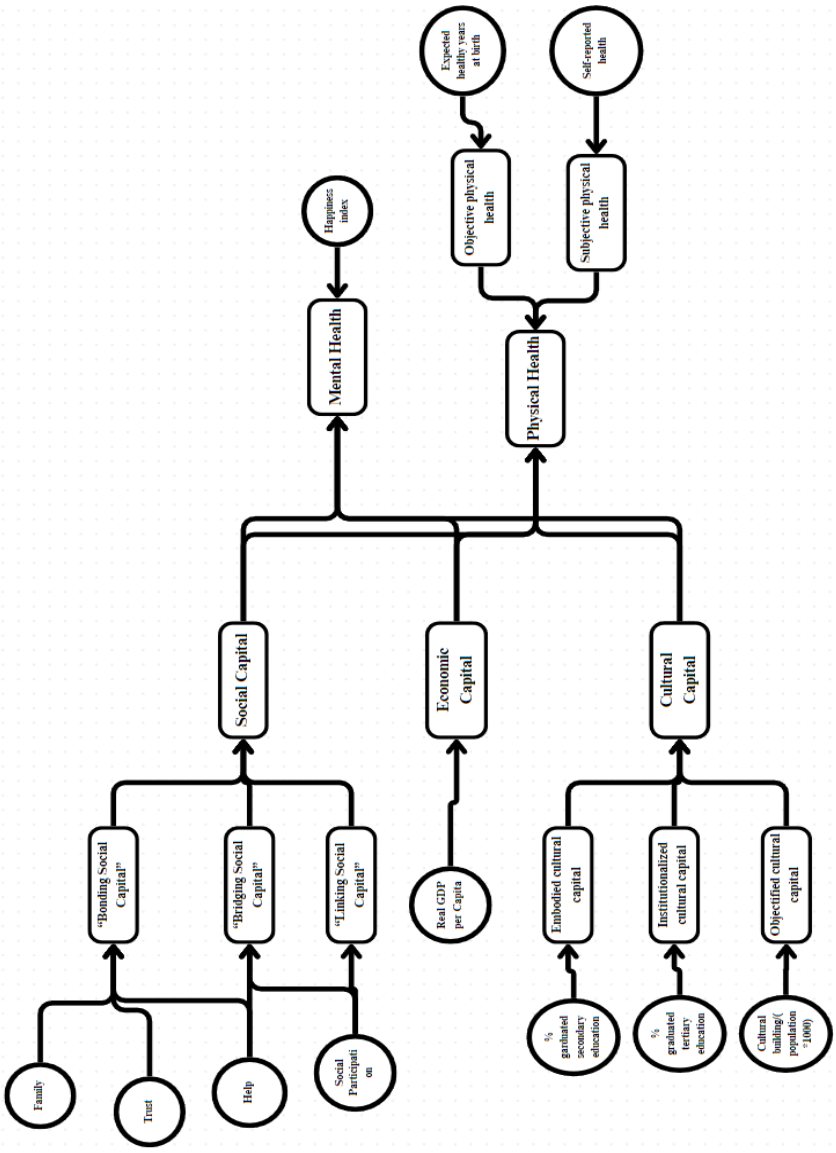

Figure no.1. The relationship between cultural, social and economic capital and mental and physical health

Source: Created by the authors

We begin by applying principal component analysis (PCA) to explore the interdependencies among all variables, including both dependent and independent variables. This helps in reducing dimensionality and identifying the most significant components that capture the variance in the dataset. Then we conduct a regression analysis to assess the impact of each category of capital (economic, social, and cultural) on physical health and then separately on mental health. This allows us to establish direct relationships between different forms of capital and health outcomes. Given the presence of country-specific variations, we perform a cluster analysis to identify patterns among EU countries based on their levels of cultural, social, and economic capital. This step helps in grouping countries with similar characteristics, allowing for a more nuanced interpretation of results. Finally, we apply a nested regression analysis based on the clusters identified in the previous step. This approach enables us to determine whether accounting for these clusters improves the explanatory power of our model in predicting physical and mental health outcomes based on cultural, social, and economic capital.

By following this methodology, we aim to gain deeper insights into the role of different types of capital in shaping health outcomes while considering country-specific variations within the EU.

Results

By applying principal component analysis (PCA), from the initial 11 variables, three principal components were identified, each with an explanatory power greater than 1. These three components together account for 63% of the initial variance in the variables. The first principal component is mainly positively determined by trust, volunteer participation, economic capital, mental health and physical health. There are no negatively influenced variables in this component. The second principal component is mainly positively determined by family relationships, the ability to talk about personal problems, objectified cultural capital and physical health. The third principal component is mainly positively determined by trust, the ability to discuss personal problems and embodied cultural capital. It is negatively influenced by family relationships and economic capital.

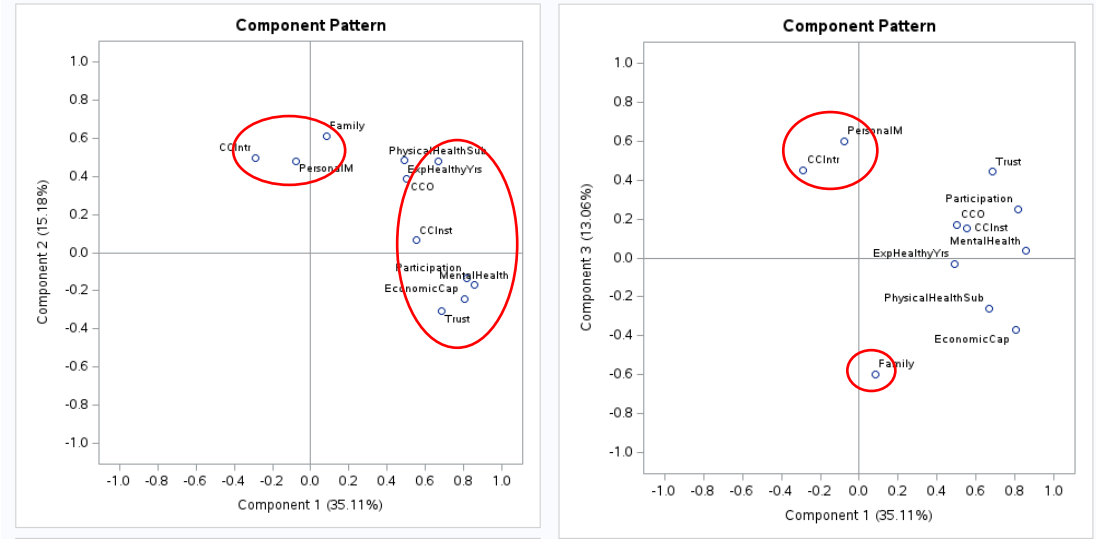

Figure no. 2. The projection of variables onto the planes defined by the first three principal components

Source: Created by the authors

Volunteer participation, trust, mental health, and economic capital are consistently positively correlated across multiple components. Objectified cultural capital is significantly associated with both measures of physical health: objective and self-reported. Moreover, we observe an important correlation between family relationships, the ability to discuss personal problems and embodied cultural capital. Institutionalized cultural capital and objectified cultural capital are related to mental and physical health showing their combined effect on well-being.

To analyze the impact of forms of capital on physical and mental health, multiple linear regression models with interaction and without interaction between the explanatory variables were used. The dependent variables were mental health, objectively reported physical health and subjectively reported physical health. Many estimated parameters from these regressions models were not significant at 0.05 level.

The impact of Social, Cultural and Economic Capital on Mental Health: Using a simple linear regression model, social capital accounts for 55% of the variance in mental health. The only significant predictor is participation in volunteer activities, which has a coefficient of 0.69 and a p-value of 0.005 (Table 2 - M1). Using a multiple linear regression model without interactions, institutionalized cultural capital is a significant predictor at a 95% confidence level, with a coefficient of 0.04 and a p-value of 0.04. At a 90% confidence level, embodied cultural capital also shows significance, with a coefficient of -0.03 and a p-value of 0.07. Secondary education positively impacts mental health, while tertiary education has a negative effect. The adjusted R-squared for this model is 0.17. When interactions are included, two variables become significant at a 90% confidence level: institutionalized cultural capital (coefficient of 0.12) and the interaction between institutionalized and embodied cultural capital (coefficient of -0.001). The adjusted R-squared remains at 0.17 (Table 2 - M2). Economic capital has a positive effect on mental health, with a coefficient of 0.04 and a p-value of 0.001. The adjusted R-squared for this model is 0.53 (Table 2 - M3). A multiple

regression model including all three types of capital reveals that trust in others, embodied cultural capital, and economic capital are significant predictors with coefficients of 0.38, 0.03, and 0.04, respectively. This model provides the best prediction for mental health, with an adjusted R-squared of 0.71; however, multicollinearity presents an issue in this case (Table 2 - M4).

Table no. 2. Result regression models

Variables	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11
	Dependent V: Mental Health				Dep. V:Subjective Phy. Health				endent Variable: Objective		
Family	NS	-	-	NS	0,64	-	-	0,51	NS	-	-
Trust	NS	-	-	0,38	NS	-	-	NS	NS	-	-
Help	NS	-	-	NS	NS	-	-	NS	NS	-	-
Voluntary Participat	0,69	-	-	NS	0,68	-	-	NS	NS	-	-
Objectified CC	-	-0,03	-	NS	-	0,25	-	0,22	-	1,24	-
Institutionalized CC	-	0,044	-	NS	-	NS	-	NS	-	NS	-
Embodied CC	-	NS	-	0,03	-	NS	-	NS	-	NS	-
Economic Capital	-	-	0,04	0,04	-	-	0,05	0,05	-	-	NS
Intercept	6,2	7,31	5,22	2,76	0,05	-0,88	-1,37	-1,94	0	58,34	0
R^2	0,57	0,23	0,55	0,74	0,31	0,13	0,34	0,51	0	0,31	0
Adj R^2	0,55	0,17	0,53	0,71	0,26	0,1	0,32	0,45	0	0,28	0
AIC	7,36	23,3	8,44	-2,86	57,84	58,45	54,89	45,69	0	119,96	0

Source: Authors' contribution.

The impact of Social, Cultural and Economic Capital on Self-Reported Physical Health: A linear regression model without interactions reveals two significant social predictors: interactions with family, friends, and relatives (coefficient of 0.64, p-value of 0.02) and participation in volunteer activities (coefficient of 0.68). The adjusted R-squared for this model is 0.26 (Table 2 - M5). With interactions included, four variables are significant: frequency of interactions with family, friends, and relatives (coefficient of 0.73), trust in others (coefficient of 0.97), and their interactions (coefficient of 1.19). The interaction between these variables and the percentage of people who feel they have friends to confide in is also significant (coefficient of -2.03). The adjusted R-squared increases to 0.53 in this case. By applying a multiple regression model without interactions, the only significant cultural predictor is objectified cultural capital, with a coefficient of 0.25 and an adjusted R-squared of 0.10(Table 2 - M6). When interactions are considered, the significant variable is the interaction between the three types of cultural capital, with a coefficient of 0.00008 and an adjusted R-squared of 0.16. Economic capital significantly predicts self-reported physical health, with a coefficient of 0.05 and a p-value of 0.001. The adjusted R-squared for this model is 0.32 (Table 2 - M7). Estimating a regression model including family interactions, objectified cultural capital, and economic capital identifies all three as significant predictors with coefficients of 0.51, 0.22, and 0.05, respectively. The adjusted R-squared for this model is 0.45 (Table 2 - M8).

The impact of Social, Cultural and Economic Capital on Objective Physical Health: Neither the regression model without interactions nor the model with interactions identifies any significant social predictors for objective physical health (Table 2 - M9). By applying a regression model without interactions, the only significant predictor is objectified cultural capital, with a coefficient of 1.25 and an adjusted R-squared of 0.28 (Table 2 - M10). For cultural capital, the only significant predictor is the interaction between the three types of cultural capital, with a coefficient of 0.0004 and an adjusted R-squared of 0.37. The linear regression model without interactions for economic capital does not produce a valid result for predicting objective physical health (Table 2 - M11). A linear regression model without interactions applied for all capital types shows that objectified cultural capital is the only significant predictor, with a coefficient of 1.26 and an adjusted R-squared of 0.27 (Table 2 - M12). When interactions are included, the interaction between objectified cultural capital and economic capital becomes significant, with a coefficient of 0.04 and an adjusted R-squared of 0.38.

By applying *Ward method for hierarchical clustering* of countries included in the analysis based on the independent variables, we obtained 3 clusters. The first cluster is represented by the Nordic countries such as Denmark, Finland, Sweden, as well as the Netherlands, Ireland and Slovenia. The second cluster is made up of the Baltic countries, Estonia, Latvia, Lithuania, as well as countries from central and western Europe, Luxembourg, Poland, France, Belgium and Cyprus. The third cluster is the largest one and contains countries from central and south-eastern Europe, such as Spain, Malta, Italy, Greece, Croatia, Serbia, Bulgaria, Romania, Hungary, Slovakia, Czech Republic, Germany, Austria, as well as Portugal and Spain.

Additionally, when examining the clustering order, we observe that countries geographically close to each other tend to cluster together, such as Austria and Germany, Romania and Hungary, Slovakia and the Czech Republic, France and Belgium, Latvia and Estonia, Poland and Lithuania, as well as Serbia, Bulgaria and Croatia. Through these clusters that emerge in the first steps, we see the close links in terms of the three types of capital of the neighboring countries. Thus, we can observe the existence of a cultural or social individualism of certain societies and we can analyze whether this particularism can positively influence our power to explain previously created regressions.

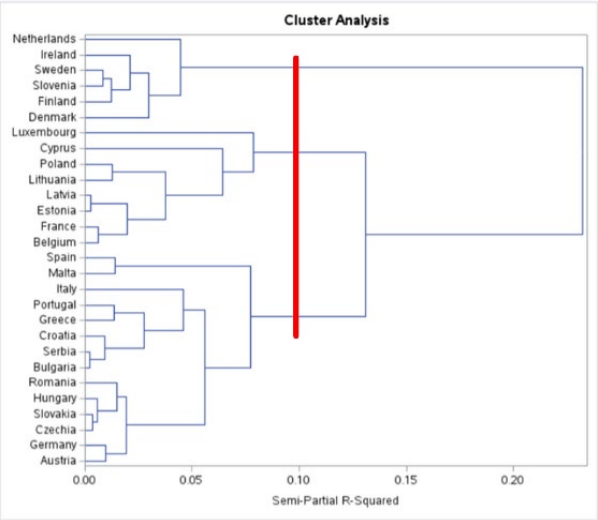

Figure no.3. The dendrogram obtained by applying Ward method

Source: Authors' contribution.

To better emphasize the importance and existence of cultural and social individualism of certain societies, we will rerun the regression created above while also accounting for the variation of the independent variables within their clusters using a nested approach.

Table no.3. Results of the nested model

Variables	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
	Dependent V: Mental Health				Dependent V: Subj. Phy. Health				Dependent V: Ob	
Type of Capital	Social C	Cult. C.	Eco. C.	All 3	Social C	Cult. C.	Eco. C.	All 3	Social C	Cult. C.
Adj R^2 before nesting	0,55	0,17	0,53	0,71	0,26	0,1	0,32	0,44	0	0,28
Adj R^2 after nesting	0,55	0,23	0,53	0,71	0,51	0,1	0,32	0,63	0,16	0,28
Difference	0	0,06	0	0	0,25	0	0	0,19	0,16	0

Source: Authors' contribution.

We observe that out of the 12 regressions, 5 can be improved by using clusters as categorization variables for the explanatory variables. From this analysis, it seems like the most important change happens within the social capital metric. Based on this, we can conclude that the presence of social individuality in certain countries influences how different types of capital interact with people's health.

Conclusions and discussions

Following an extensive analysis of mental and physical health through the lens of Pierre Bourdieu's capital theory, we conclude that there is strong evidence supporting his assertion that, beyond economic capital, cultural and social capital also play a significant role in influencing a person's health.

When we talk about economic capital, its influence on physical and social mental health is indisputable. But in this analysis, we could see that economic capital has a greater influence on mental health than on physical health. Also, after decomposing physical health into subjectively-reported physical health and physical health reported objectively, we observe that economic capital only influences subjectively reported physical health and not the objectively reported one. Thus, for life expectancy, economic capital is not significant. This conclusion is counterintuitive, but it can be explained by the fact that this analysis is concerned with the difference between countries and doesn't take into account intra-social aspects.

At the social capital level, participation in voluntary activities has an influence on mental health, while the frequency of relationships with family and friends is correlated with physical health. When we decompose physical health into objectively reported physical health and subjectively reported physical health, we observe that the frequency of family relationships is only influential for subjective health, whereas subjectively reported physical health is not correlated with any type of social capital.

At the level of cultural capital, institutionalized cultural capital is the only significantly correlated with mental health. For physical health, the only type of cultural capital significant is objectified cultural capital. After decomposing physical health into health subjectively reported physical health and objectively reported physical health, we observe the persistence of objectified cultural health as a significant factor for both dependent variables, but the correlation is stronger for objective physical health.

References

Abel, T., 2008. Cultural capital and social inequality in health. *Epidemiol Community Health*, 62(7) p.13.

Bourdieu P., 1977. *Outline of a Theory of Practice*. Cambridge University Press.

Bourdieu, P., 1979. *La distinction: critique sociale du jugement [Distinction: a social critique of the judgement of taste].* Paris: Editions de Minuit.

Bourdieu, P., 1986. *The Forms of Capital. Pp. 241-258 in Handbook of Theory and Research for the Sociology of Education.* New York: Greenwood Press

Bygren, L.O., Weissglas, G., Wikström, B.-M., Konlaan, B.B., Grjibovski, A., Karlsson, A.-B., Andersson, S.-O. and Sjöström, M., 2009. Cultural Participation and Health: A Randomized Controlled Trial Among Medical Care Staff. *Psychosomatic Medicine*, [online] 71(4), pp.469–473. https://doi.org/10.1097/PSY.0b013e31819e47d4.

Ehsan, A., Klaas, H.S., Bastianen, A. and Spini, D., 2019. Social capital and health: A systematic review of systematic reviews. *SSM - Population Health*, [online] 8, p.100425. https://doi.org/10.1016/j.ssmph.2019.100425.

Freedman, V.A., Cornman, J.C., Carr, D. and Lucas, R.E., 2019. Late life disability and experienced wellbeing: Are economic resources a buffer? *Disability and Health Journal*, [online] 12(3), pp.481–488. https://doi.org/10.1016/j.dhjo.2019.02.003.

Elchardus, M., 2009. Self-control as social control. *Poetics*, [online] 37(2), pp.146–161. https://doi.org/10.1016/j.poetic.2009.01.001.

Glass, T.A., De Leon, C.M., Marottoli, R.A. and Berkman, L.F., 1999. Population based study of social and productive activities as predictors of survival among elderly Americans. *BMJ*, [online] 319(7208), pp.478–483. https://doi.org/10.1136/bmj.319.7208.478.

Hyyppä, M.T., Mäki, J., Impivaara, O. and Aromaa, A., 2006. Leisure participation predicts survival: a population-based study in Finland. *Health Promotion International*, [online] 21(1), pp.5–12. https://doi.org/10.1093/heapro/dai027.

Jumbri, I.A., Ikeda, S., Jimichi, M., Saka, C. and Managi, S., 2019. Inequality of health stock and the relation to national wealth. *International Journal for Equity in Health*, [online] 18(1), p.188. https://doi.org/10.1186/s12939-019-1096-x.

Katz-Gerro, T., 2004. Cultural consumption research: review of methodology, theory, and consequence. *International Review of Sociology*, [online] 14(1), pp.11–29. https://doi.org/10.1080/0390670042000186743.

Khawaja, M. and Mowafi, M., 2006. Cultural Capital and Self-Rated Health in Low Income Women: Evidence from the Urban Health Study, Beirut, Lebanon. *Journal of Urban Health*, [online] 83(3), pp.444–458. https://doi.org/10.1007/s11524-006-9051-8.

Konlaan, B.B., Bygren, L.O. and Johansson, S.E., 2000. Visiting the cinema, concerts, museums or art exhibitions as determinant of survival: a Swedish fourteen-year cohort follow-up. *Scandinavian Journal of Public Health*, 28(3), pp.174–178.

López-Casasnovas, G. and Saez, M., 2020. Saved by Wealth? Income, Wealth, and Self-Perceived Health in Spain during the Financial Crisis. *International Journal of Environmental Research and Public Health*, [online] 17(19), p.7018. https://doi.org/10.3390/ijerph17197018.

Pinxten, W. and Lievens, J., 2014. The importance of economic, social and cultural capital in understanding health inequalities: using a Bourdieu-based approach in research on physical and mental health perceptions. *Sociology of Health & Illness*, [online] 36(7), pp.1095–1110. https://doi.org/10.1111/1467-9566.12154.

Uphoff, E.P., Pickett, K.E., Cabieses, B., Small, N. and Wright, J., 2013. A systematic review of the relationships between social capital and socioeconomic inequalities in health: a contribution to understanding the psychosocial pathway of health inequalities. *International Journal for Equity in Health*, [online] 12(1), p.54. https://doi.org/10.1186/1475-9276-12-54.

Väänänen, A., Murray, M., Koskinen, A., Vahtera, J., Kouvonen, A. and Kivimäki, M., 2009. Engagement in cultural activities and cause-specific mortality: Prospective cohort study. *Preventive Medicine*, [online] 49(2–3), pp.142–147. https://doi.org/10.1016/j.ypmed.2009.06.026.

Veenstra, G., 2007. Social space, social class and Bourdieu: Health inequalities in British Columbia, Canada. *Health & Place*, [online] 13(1), pp.14–31. https://doi.org/10.1016/j.healthplace.2005.09.011.

Villalonga-Olives, E. and Kawachi, I., 2017. The dark side of social capital: A systematic review of the negative health effects of social capital. *Social Science & Medicine*, [online] 194, pp.105–127. https://doi.org/10.1016/j.socscimed.2017.10.020.

Wilkinson, A.V., Waters, A.J., Bygren, L.O. and Tarlov, A.R., 2007. Are variations in rates of attending cultural activities associated with population health in the United States? *BMC Public Health*, [online] 7(1), p.226. https://doi.org/10.1186/1471-2458-7-226.

Talent in Transit: Understanding Brain Drain in the Balkan EU Research Systems

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Abstract

This article explores the dynamics of brain drain in the research systems of four Balkan EU countries (Romania, Bulgaria, Greece, and Croatia) through a qualitative evidence synthesis of academic and institutional literature published between 2012 and 2024. The study examines the main factors for brain drain and skilled immigration, consequences, and the proper policy responses to the emigration of highly skilled professionals, with a focus on the sectors of research and innovation.

The article's analysis was based on a meta-synthesis of 33 relevant sources, including 26 peer-reviewed articles, 3 non-indexed publications, and 4 international reports. The evidence has been categorized, by theme, into push and pull factors, economic impact, brain drain consequences for national research systems, and public policy interventions. A dedicated section is also included, which examines the role of EU funding instruments and structural funds in shaping institutional capacity and influencing talent retention.

Shared structural challenges have been identified across the region, including underfunding, limited career options, and weak reintegration mechanisms for returning researchers. Despite access to EU funding, national systems often lack the governance and strategic alignment required to convert EU financing into effective talent retention policies, while the concept of brain circulation is remaining more aspirational than operational in most contexts.

The article tries to create literature novelty by offering a cross-country comparative analysis of skilled migration within the EU's southeastern periphery and by highlighting the disconnect between EU-level program logic and domestic realities. It provides insights relevant for policy actors at both national and European levels. Recommendations include the integration of talent strategies into research governance reforms and more coherent engagement with academic diasporas.

Keywords

Brain Drain, Research Systems, Balkan EU Countries, Talent Retention, EU Funding, Push–Pull Factors, Skilled Migration.

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Introduction

Brain drain, meaning the emigration of highly skilled individuals (e.g., Ganga et al., 2016), has remained a persistent challenge for several European Union (EU) member states, including Central and Eastern Europe generally (Batog et al., 2019), and with some prominence in the Balkan EU member states. Despite targeted investment policies being applied in the region for over a decade, countries such as Romania, Bulgaria, Greece, and Croatia continue to experience significant outflows of human capital, especially in the research and innovation sectors. These trends are shaped by a complex relationship of structural push factors (e.g., Krammer, 2017; Gherhes et al., 2020) throughout the Balkan region, attractive pull dynamics from Western Europe, and limited capacity to retain or reintegrate talent.

While the phenomenon of brain drain has been widely acknowledged across Europe (Ganga et al., 2016; Batog et al., 2019) and the entire globe, with various policy responses proposed, such as the role of education subsidies (Shimada, 2019), there are limited comparative analyses that focus specifically on the European Union Balkan states. Moreover, the role of EU funding in shaping research ecosystems and its potential to counteract brain drain has yet to be critically examined in an integrated framework.

This article addresses this gap by conducting a qualitative evidence synthesis (QES) of 33 relevant sources published between 2012 and 2024. It explores the drivers and effects of brain drain across four EU member states in the Balkan region, with a particular focus on the research sector. The study also reviews the effect of the EU funding instruments on national research systems and their role in alleviating talent drain.

1. Literature review

The emigration of highly skilled individuals, commonly referred to as "brain drain," is a persistent global phenomenon with significant implications for both sending and receiving nations (Ganga et al., 2016; Batog et al., 2019). This review will outline the conceptual understanding of brain drain, explore its key drivers and consequences, discuss common policy approaches to its mitigation, and specifically examine the intended role of European Union (EU) funding mechanisms in addressing research capacity and talent mobility, thereby setting the context for the subsequent analysis of the Balkan EU states.

1.1. Defining Brain Drain and Skilled Migration

Brain drain typically indicates an outflow of human capital, particularly individuals with tertiary education or specialized skills, from one country or region to another. While often viewed negatively by sending countries due to the loss of potential innovators and contributors to national development, the concept of "brain circulation" is also a concept that is being discussed, suggesting a more dynamic and potentially beneficial two-way or multi-nodal flow of talent (Boc, 2020). Skilled migration, therefore, encompasses not just permanent relocation but also various forms of mobility, including student exchanges and temporary research stays, which can sometimes be precursors to longer-term emigration if domestic conditions are unfavorable (Ganga et al., 2016).

1.2. Key Drivers of Brain Drain: Push and Pull Factors

The decision for skilled individuals to emigrate is typically driven by a complex interplay of "push" factors in their home country and "pull" factors in destination countries. Push factors often include limited economic opportunities, low salaries, inadequate research infrastructure and funding, lack of meritocracy, political instability, and poor governance (Hinks and Davies, 2015; Oldac, 2023). Conversely, pull factors comprise higher remuneration, better career advancement prospects, access to advanced research facilities and networks, more stable political and economic environments, and a higher quality of life in destination countries.

1.3. Impacts of Brain Drain on Sending Countries

The consequences of brain drain for sending countries are multifaceted. Economically, it can lead to shortages of qualified personnel in critical sectors, a reduced return on national investment in education, and a dampened capacity for innovation and competitiveness. For research systems, the departure of scientists and academics can result in diminished research output, fewer scientific publications and patents, and weakened international collaborations. While remittances from emigrants can provide some economic benefits, they often do not fully compensate for the loss of human capital and its broader developmental impact.

1.4. Policy Approaches to Mitigating Brain Drain

Governments and institutions have adopted various strategies to mitigate brain drain. These broadly include efforts to improve domestic economic and professional opportunities (retention strategies), incentives for emigrants to return (return strategies), and initiatives to engage with the diaspora to leverage their skills and networks for national development even from abroad. Addressing systemic issues such as governance, corruption, and the quality of research and educational institutions are also considered crucial components of comprehensive brain drain mitigation policies (Shimada, 2019).

1.5. The Role of European Union Funding in Research, Innovation, and Mobility

The European Union utilizes a range of funding mechanisms to bolster national research systems, intending to foster cohesion and diminish inter-regional inequalities across Europe, which indirectly addresses factors contributing to research brain drain (Arcalean et al., 2012; Boc, 2020).

Key instruments like the Structural Funds (including ERDF and ESF) and the Cohesion Fund aim to reduce economic and social imbalances that often push researchers to emigrate (Arcalean et al., 2012). By investing in infrastructure, education, and employment opportunities in less developed regions, these funds theoretically aim to create more attractive domestic environments.

Horizon Europe, the EU's flagship research and innovation program, supports cutting-edge research (including AI), enhances educational investment, and potentially diminishes brain drain through strategic implementation (Khan, 2021). Mobility programs like Erasmus+ primarily focus on education but can influence researcher mobility, ideally fostering "brain circulation" (Boc, 2020).

Furthermore, EU strategies like the Digital Single Market and the European Strategy for AI seek to create an attractive internal market for talent (Socol and Iuga, 2024). Specific instruments like the Policy Support Facility (PSF) directly assist Member States in reforming their RandI systems, while National Recovery and Resilience Plans (RRPs) allow countries to target reforms and investments to counteract brain drain (Commission, 2023). Cooperation programs like URBACT, Interreg, Europe for Citizen, and the Alpine Space Program also provide avenues for local and regional authorities to collaborate on tackling brain drain challenges (Boc, 2020).

Collectively, these funds aim to create attractive domestic opportunities, promote research excellence, facilitate knowledge exchange, reduce regional disparities, and enhance the quality of research institutions across the EU (Commission, 2023; Socol and Iuga, 2024). However, the effective translation of these broad EU-level objectives into tangible brain drain mitigation at the national level, particularly within the specific context of the Balkan EU states, remains a complex issue warranting further investigation. This study seeks to explore this interface by examining the perceived drivers, impacts, and policy responses to brain drain in selected Balkan EU countries, including the role of EU funding.

2. Methodology

This article is based on a qualitative evidence synthesis (QES), drawing from a diverse body of literature to examine the patterns, drivers, and policy responses to brain drain across selected Balkan EU member states. The approach follows the logic of a meta-synthesis, combining empirical insights from multiple sources to produce an integrative, thematically structured analysis.

A total of 33 documents were included in the synthesis. Of these, 26 were peer-reviewed journal articles indexed in Scopus, 3 were non-indexed articles, and 4 were policy or institutional reports published by international organizations. The majority of sources were published between 2015 and 2024, with three earlier publications (from 2012 and 2014) having been retained due to the relevance of their findings during that period of time. These older sources, however, were not central to the formulation of conclusions and were treated mostly as background references.

The analysis focused on four EU countries in the Balkan region: Romania (11 articles), Greece (5 articles), Croatia (2 articles), and Bulgaria (3 articles). In addition, 8 comparative EU-wide studies and 4 international reports were included to provide broader contextual insights into the brain drain phenomenon and related mobility trends.

Articles were selected based on their relevance to the concept of brain drain, with a preference for those addressing brain drain explicitly in the areas of research or areas that involve research or innovation. In countries or sectors where targeted literature was limited, studies addressing broader forms of skilled or educational migration were also considered, particularly when they offered insights into drivers, impact, or institutional responses relevant to brain drain dynamics.

All documents were fully analyzed and coded into a structured table, which recorded key metadata such as the focus on a particular country (Romania, Greece, Bulgaria and Croatia), publication year, methodology used and policy relevance. Thematic coding was applied to identify recurring patterns under the categories of push factors, pull factors, economic impact, impact on research, and policy responses. These codes were then used to organize the analysis presented in Sections 3 and 4.

The analysis excludes non-EU Balkan countries, as well as grey literature not produced by respectable international organizations. Moreover, due to limited access to official statistical data on brain drain, no statistical or econometric analysis was conducted. The main focus of the article is on qualitative interpretation, with comparative and policy-oriented insights drawn from existing academic and institutional literature.

3. Results and Discussion

Overall, the synthesis of the selected literature reveals a complex and multilayered picture of brain drain in the Balkan EU countries. While national contexts vary in intensity and policy response, several recurrent themes emerge across Romania, Bulgaria, Greece, and Croatia. The analysis is structured around five key dimensions: structural push factors, external pull incentives, economic consequences, the impact on national research systems, and policy responses aimed at mitigating talent loss. These thematic categories reflect both the scale and the depth of challenges faced by the region, and provide a comparative foundation for interpreting the broader implications of skilled migration in the targeted region.

3.1. Push Factors – Comparative Insights

Economic dissatisfaction serves as a primary push factor across all four Balkan nations. In Romania, unsatisfying salary levels are a major driver (Gherhes et al., 2020; Iacob (Bâra), 2018), compounded by broader economic instability (Iacob (Bâra), 2018). Greece faces similar issues with low salaries (Panagiotakopoulos, 2020) stemming from the severe crisis aftermath (Kousis et al., 2022). Limited or unsuitable employment opportunities plague Romania (Gherhes et al., 2020), and Greece, where there's low demand for skilled labor (Labrianidis et al., 2022b). Bulgaria's challenges stem from its difficult economic transition (Georgiev and Ohtaki, 2016), while Croatia experiences lack of employment especially post-recession and EU entry (Pintarić and Župarić-Iljić, 2024). Professionally, limited career advancement prospects push individuals from Romania (Iacob (Bâra), 2018), Greece (Labrianidis et al., 2022a; Panagiotakopoulos, 2020), and Croatia (Tomić and Taylor, 2018). Furthermore, poor working conditions, including lack of equipment in Romania (Petroff, 2016), problematic business culture and lack of job security in Greece (Panagiotakopoulos, 2020), discouraging environments in Romania (Botezat and Moraru, 2020), and limited collaboration opportunities in Bulgaria (Krammer, 2017), all contribute to the decision to emigrate.

Beyond economic and professional concerns, deep-seated socio-political issues fuel brain drain. High levels of corruption and a lack of meritocracy are significant push factors in Romania (Iacob (Bâra), 2018 - implicit link), Greece (Panagiotakopoulos, 2020), and Croatia (Pintarić and Župarić-Iljić, 2024). Political and legislative instability adds to the uncertainty in Romania (Iacob (Bâra), 2018) and characterized Bulgaria's post-communist years (Georgiev and Ohtaki, 2016). Greece uniquely highlights a crisis of social values and lack of trust in institutions (Kousis et al., 2022; Panagiotakopoulos, 2020), while Croatia reports a generally negative societal climate and sense of hopelessness (Pintarić and Župarić-Iljić, 2024). Deficiencies in public services, such as the poor status of the healthcare system in Romania (Giurgiuca et al., 2018) or lack of state support for welfare in Greece (Panagiotakopoulos, 2020), also drive emigration. Finally, issues within the education systems, including perceived low quality or haphazard reforms in Bulgaria (Georgiev and Ohtaki, 2016) and a mismatch with labor market needs in Croatia (Pintarić and Župarić-Iljić, 2024), act as further push factors for skilled individuals.

The decision to emigrate from these Balkan countries stems from multiple identified factors. While inadequate economic rewards and limited job opportunities provide a strong initial impetus, deep dissatisfaction with the socio-political landscape, which is marked by corruption, instability, and institutional mistrust, along with constrained professional development and concerns about the quality of public services and education, solidify the push towards seeking opportunities elsewhere.

3.2. Pull Factors – Opportunities Abroad and the Lure of Excellence

Destination countries exert a strong pull primarily through superior economic and professional prospects. The allure of significantly higher income, greater financial security, and an improved standard of living is a major motivator for emigrants from Romania (Apostu et al., 2022; Giurgiuca et al., 2018), Greece (Labrianidis et al., 2022b; Kousis et al., 2022; Panagiotakopoulos, 2020), and Croatia (Pintarić and Župarić-Iljić, 2024), as well as Bulgaria, where individuals seek better economic opportunities (derived from Georgiev and Ohtaki, 2016). Equally important are enhanced career opportunities, including better chances for professional advancement, access to further training and development, and international recognition; these factors are highlighted for Romania (Gherhes et al., 2020; Giurgiuca et al., 2018; Iacob (Bâra), 2018), Greece (Labrianidis et al., 2022b; Kousis et al., 2022), Croatia (Pintarić and Župarić-Iljić, 2024), and Bulgaria, where better professional development and research facilities are sought (derived from Georgiev and Ohtaki, 2016; Krammer, 2017). For many, particularly in Greece, the availability of more interesting, fulfilling jobs that match their specialization and offer greater job satisfaction is a key attraction (Labrianidis et al., 2022b; Panagiotakopoulos, 2020).

Beyond financial and career incentives, the appeal of destination countries lies in better overall living and working environments. Superior working conditions, better facilities, and access to advanced technology,

especially noted for Romania (Giurgiuca et al., 2018; Séchet and Vasilcu, 2015; Gherhes et al., 2020) and Croatia (Pintarić and Župarić-Iljić, 2024), draw professionals seeking more effective and satisfying work experiences. High-quality educational programs and research opportunities attract students and academics from Romania (Flanja and Nistor (Gâz), 2017) and Croatia (Pintarić and Župarić-Iljić, 2024), while better training is a pull for Greece (Kousis et al., 2022) and Bulgaria, where higher quality education is desired (derived from Georgiev and Ohtaki, 2016). Furthermore, perceived political and economic stability attracts emigrants from Romania (Mitrică et al., 2022), Greece (Panagiotakopoulos, 2020), and Bulgaria (derived from Georgiev and Ohtaki, 2016). More meritocratic systems appeal to those leaving Romania (Iacob (Bâra), 2018 - inferred from push), Greece (Panagiotakopoulos, 2020), and Croatia (Pintarić and Župarić-Iljić, 2024). Better social welfare in Greece (Panagiotakopoulos, 2020) and an overall higher quality of life in Romania (Flanja and Nistor (Gâz), 2017), Greece (Panagiotakopoulos, 2020), and Croatia (Pintarić and Župarić-Iljić, 2024) are significant attractions. Facilitated mobility within the EU, particularly noted for Croatia (Pintarić and Župarić-Iljić, 2024), further lowers the barrier to emigration.

Ultimately, foreign destinations present a compelling package for many skilled individuals from these Balkan nations. They offer not just solutions to the economic and professional frustrations experienced at home, but also the promise of a more stable, rewarding, and opportunity-rich environment for personal and professional growth.

3.3. The Impact of Brain Drain on Balkan EU Research and Economic Systems: QES Findings and Discussion

The emigration of highly skilled individuals represents a significant economic blow to Romania, Greece, Bulgaria, and Croatia, primarily through the substantial loss of valuable human capital (Iacob (Bâra), 2018; Kousis et al., 2022; Georgiev and Ohtaki, 2016; Pintarić and Župarić-Iljić, 2024). This depletion manifests as shortages of qualified personnel in crucial sectors, notably healthcare in Romania (Botezat and Moraru, 2020) and Croatia (Pintarić and Župarić-Iljić, 2024), but also impacting IT, construction, and education in Romania (Gherhes et al., 2020). A consistent consequence across the region is the negative impact on innovation capacity and national competitiveness. Greece experiences reduced scientific citations and patent applications following skilled emigration (Labrianidis et al., 2023), while Bulgaria suffers from weak innovation performance, stalled competitiveness, and low-sophistication exports due to the loss of talent (Krammer, 2017). Similarly, Romania's innovation potential is hindered by the departure of STEM graduates and inventors (Gherhes et al., 2020; Mitrică et al., 2022), and Croatia views the outflow as a threat to its overall competitiveness and potential for productivity gains (Tomić and Taylor, 2018).

Broader economic development is also hindered by brain drain. The loss constitutes a poor return on national investment in education, as the benefits are realized elsewhere, a point noted for Romania (Iacob (Bâra), 2018) and Croatia (Pintarić and Župarić-Iljić, 2024). This outflow can potentially dampen economic growth and slow income convergence with more advanced economies, as suggested for Romania (Iacob (Bâra), 2018), and reduces Greece's potential for economic recovery (Kousis et al., 2022). Furthermore, emigration contributes to negative demographic trends that strain social systems like pensions and healthcare financing, a concern highlighted in Croatia (Tomić and Taylor, 2018), and can exacerbate regional socio-economic disparities within countries like Romania (Mitrică et al., 2022) and potentially Bulgaria (Krammer, 2017). While remittances from emigrants provide some financial inflow, they are often seen as insufficient to compensate for the multifaceted economic damage caused by the loss of skilled individuals, as noted in Romania (Iacob (Bâra), 2018) and Croatia (Tomić and Taylor, 2018). Romania also notes the potential for positive contributions via diaspora networks and brain circulation (Mitrică et al., 2022; Petroff, 2016).

The research sectors in Romania, Greece, Bulgaria, and Croatia are significantly weakened by the emigration of highly skilled individuals, leading to a direct loss of researchers, scientists, and academics (Iacob (Bâra), 2018; Vasile, 2012; Labrianidis et al., 2023; Georgiev and Ohtaki, 2016; Tomić and Taylor, 2018). This depletion of human capital translates directly into diminished research capacity and output. Specific impacts include reduced scientific citations and patent applications in Greece (Labrianidis et al., 2023), limited research volume and slower scientific advancement in Romania (Drumea and Mirela, 2015), and a decline in global publication share, dimming scientific impact, and weak patenting in Bulgaria (Krammer, 2017). Croatia also faces reduced research output and innovation potential due to the outflow of its tertiary-educated youth (Tomić and Taylor, 2018). The loss is acutely felt, described as losing valuable "knowledge procreators" in Greece (Labrianidis et al., 2023) and resulting in a scarcity of qualified professionals in Bulgaria (Georgiev and Ohtaki, 2016).

Beyond the direct loss of personnel and output, brain drain causes broader systemic damage to the research environment. It leads to an underutilization of national investments in higher education, as skilled graduates

leave Romania (Iacob (Bâra), 2018), and weakens crucial linkages between research institutions and industry in Bulgaria (Krammer, 2017). The emigration hinders the adoption of new research technologies and practices in Bulgaria (Georgiev and Ohtaki, 2016) and poses challenges for establishing robust international collaborations in Croatia (Tomić and Taylor, 2018). Furthermore, the lack of adequate funding, technology, and attractive career paths within domestic research institutions often acts as a push factor in Romania, exacerbating the problem (Petroff, 2016), while the brain drain itself can negatively impact the education system that trains future researchers in Bulgaria (Georgiev and Ohtaki, 2016). Although mitigation efforts exist, such as Croatia's diaspora engagement programs, their long-term effectiveness remains unclear (Tomić and Taylor, 2018).

Consequently, brain drain imposes a significant economic burden on these Balkan nations, while being a major impediment to scientific and technological advancement in these Balkan nations. It erodes the human capital base, weakens key sectors, stifles innovation and competitiveness, and hinders long-term development prospects. By draining the pool of qualified researchers and weakening the research infrastructure, it fundamentally undermines the countries' capacity for innovation and their ability to compete in a knowledge-based global economy.

3.4. Policies and Good Practices QES and Discussion – Addressing Brain in the Balkans

A common thrust in policy recommendations across the four Balkan nations involves strengthening domestic economic and professional opportunities to reduce emigration incentives. This includes significantly increasing wages, especially for skilled professionals in Romania (Botezat and Moraru, 2020; Gherhes et al., 2020; Giurgiuca et al., 2018), providing targeted financial incentives like tax breaks or scholarships in Greece (Kousis et al., 2022; Labrianidis et al., 2022b, 2023) and Bulgaria (Krammer, 2017), ensuring economic stability in Romania (Iacob (Bâra), 2018), and actively creating high-quality job opportunities aligned with graduate skills, particularly in RandD and high-tech sectors in Romania (Gherhes et al., 2020; Mitrică et al., 2022) and Greece (Kousis et al., 2022). Enhancing career development prospects in Romania (Gherhes et al., 2020; Iacob (Bâra), 2018) and improving the overall work environment there (Botezat and Moraru, 2020; Iacob (Bâra), 2018) are also key. Reforming education systems is critical, focusing on improving quality in Romania (Mitrică et al., 2022), better alignment with labor market needs through practice-based approaches in Croatia (Tomić and Taylor, 2018) and Bulgaria (Krammer, 2017), and developing specific skills training in Bulgaria (Krammer, 2017).

Beyond economic measures, addressing systemic socio-political issues and fostering innovation are crucial. Aggressively tackling corruption is recommended for Romania (Botezat and Moraru, 2020; Iacob (Bâra), 2018) and Greece (Kousis et al., 2022). Ensuring political stability in Romania (Iacob (Bâra), 2018) and improving public administration and services like healthcare in Romania (Apostu et al., 2022; Botezat and Moraru, 2020; Giurgiuca et al., 2018; Séchet and Vasilcu, 2015) and Greece (Kousis et al., 2022) are also advised. Investing significantly in RandD, modernizing research infrastructure, and creating attractive career paths for researchers are vital for retaining talent in science and technology in Romania (Mitrică et al., 2022; Apostu et al., 2022) and Bulgaria (Krammer, 2017). Engaging the diaspora is a shared strategy, ranging from implementing targeted return migration programs in Romania (Mitrică et al., 2022; Petroff, 2016) and Croatia (Tomić and Taylor, 2018) to Greece's pragmatic focus on leveraging expatriate potential through "virtual return" networks and collaborations (Kousis et al., 2022; Labrianidis et al., 2022b, 2023). Such policies must also consider the agential perspective of migrants, where return does not automatically equate to contribution, and home country dynamics play a significant role in their willingness to engage (Oldac, 2023). Furthermore, specific educational policies, such as carefully designed subsidies, could potentially mitigate the initial student migration that often precedes permanent skilled emigration (Shimada, 2019). Supporting entrepreneurship in Bulgaria (Krammer, 2017) and improving overall quality of life in Romania (Botezat and Moraru, 2020; Iacob (Bâra), 2018) are also seen as important retention factors.

Across analyzed literature the need for comprehensive, integrated national strategies is highlighted. Effectively countering brain drain requires simultaneous action on multiple fronts—economic, political, educational, and social—to address the root causes of emigration while building a more attractive and rewarding environment for skilled professionals to remain or return.

3.5. The Role and Challenges of EU Funding in Mitigating Balkan EU Brain Drain: QES Findings and Discussion

Despite significant EU investment, several structural barriers impede the effective absorption and impact of funds aimed at mitigating research brain drain. A lack of sufficient coordination across local, regional, national, and EU governance levels can lead to fragmented efforts and hinder coherent policy implementation (Boc, 2020). Weak institutional capacity, excessive bureaucracy, lack of transparency, and poor governance within recipient regions or nations represent major obstacles, as effective fund

management is crucial for success; indeed, poor governance can itself be a push factor for emigration (Boc, 2020; Commission, 2023). Persistent socio-economic disparities and inequalities across Europe, potentially leading to a "two-speed Europe," fundamentally drive brain drain, and if EU funds fail to substantially reduce these gaps, their impact on retention will be limited (Boc, 2020). Furthermore, the structural characteristics of regional economies, such as high agricultural employment, can limit their capacity to absorb knowledge spillovers generated by EU investments (Arcalean et al., 2012). Policies may also fail if they do not adequately understand and address the specific needs and expectations of the researchers they aim to retain (Boc, 2020). Attracting and retaining talent also requires addressing broader structural impediments beyond employment, such as quality of life factors, access to services, and cultural integration support (Boc, 2020). In some contexts, shortcomings in national research policies, political interference, cultural factors like paternalism, and a lack of meritocratic processes like peer review in funding allocation can undermine the effectiveness of EU funds (Marino and Cirillo, 2014). Finally, the transferability of successful best practices between regions can be limited by differing local competencies, national regulations, and resource availability (Boc, 2020).

A significant challenge arises from the disconnect between the logic underpinning EU funding mechanisms and the diverse realities within individual member states. While the EU pursues broad objectives like cohesion and competitiveness, national governments often grapple with distinct priorities, short-term pressures, and unique structural challenges that may not align perfectly with the EU's long-term vision or specific funding criteria (Marino and Cirillo, 2014; Khan, 2021). The inherent heterogeneity of the EU means that a uniform funding approach may not adequately cater to the specific needs, institutional capacities, or socio-economic contexts of all member states (Socol and Iuga, 2024). National administrative complexities, bureaucratic hurdles, and varying governance capabilities can create practical barriers to implementing EU-funded projects effectively, regardless of the soundness of the underlying EU logic. National political agendas and cultural attitudes towards research and innovation can also influence how receptive member states are to EU priorities (Marino and Cirillo, 2014). Moreover, the complex and varied drivers of brain drain within specific national contexts may require tailored solutions that extend beyond the standard EU funding frameworks (Socol and Iuga, 2024). Potential power imbalances within the EU could also mean that funding logic is shaped more by stronger states, making it less suitable for others (Mathies and Cantwell, 2022). This disconnect underscores the difficulty of applying a supranational funding strategy across a diverse continent and highlights the need for flexibility and better alignment between EU goals and national implementation realities.

To enhance the effectiveness of EU funds in retaining researchers and mitigating brain drain, several policy reforms are suggested. A fundamental step is increasing investment in higher education and research programs like Horizon Europe to provide more competitive funding opportunities (Socol and Iuga, 2024). Strategic implementation of existing initiatives, such as the European Universities Initiative, is also crucial (Khan, 2021). Funding allocation criteria should be reformed to prioritize transparency and meritocracy, applying strict scholarly peer review consistently to combat biases and ensure support for high-quality research (Marino and Cirillo, 2014). Funds should be more strategically targeted towards regions heavily affected by brain drain, specifically enhancing domestic opportunities, salaries, and working conditions (Socol and Iuga, 2024). Supporting knowledge spillover effects and educational programs within source countries could also create incentives to stay or return (Socol and Iuga, 2024). Enhancing collaboration networks within the EU, encouraging brain circulation through mobility programs, and actively supporting return migration and diaspora engagement are vital (Boc, 2020; World Bank, 2019). Addressing broader structural barriers related to quality of life and institutional effectiveness, potentially supported by EU funds, is necessary (Boc, 2020). Finally, improving the coordination between different EU funding sources is needed for greater coherence (Boc, 2020). The underlying logic should shift towards fostering 'brain circulation' within a competitive and cohesive European Research Area, rather than simply preventing departures, requiring long-term, strategic policies that address root causes (Khan, 2021).

Conclusions and Policy Recommendations

The persistent challenge of research brain drain in Balkan EU Member States, despite significant EU financial support, highlights the limitations of external funding without concurrent domestic reform. Analysis reveals strong push factors prevalent in the region, including persistently low salaries, widespread corruption, political instability, institutional fragility, and severely limited career paths (Gherhes et al., 2020; Panagiotakopoulos, 2020; Iacob (Bâra), 2018; Pintarić and Župarić-Iljić, 2024). These deeply rooted issues create a difficult environment for retaining highly skilled researchers and directly counteract the compelling pull factors offered abroad, such as substantially higher wages, superior professional opportunities, advanced research infrastructure, and more stable, meritocratic environments (Apostu et al.,

2022; Labrianidis et al., 2022b; Pintarić and Župarić-Iljić, 2024). This outflow results in significant economic and research sector damage – including the loss of crucial human capital, reduced innovation capacity, weakened national competitiveness, and diminished scientific output (Iacob (Bâra), 2018; Labrianidis et al., 2023; Krammer, 2017; Tomić and Taylor, 2018).

The effectiveness of EU funding instruments, while valuable for infrastructure and mobility, is often constrained by substantial barriers within these nations. Weak governance, inadequate institutional capacity for absorption and management, prevalent socio-economic disparities, and weak reintegration mechanisms hinder the conversion of funds into sustainable retention outcomes (Boc, 2020; Commission, 2023).

Furthermore, a notable disconnect frequently exists between the EU's broad, cohesion-oriented funding logic and the specific, diverse national contexts, priorities, and talent strategies (Marino and Cirillo, 2014; Socol and Iuga, 2024).

Addressing this structurally embedded phenomenon, which shows common patterns suggesting a regional dynamic, therefore requires moving beyond ad hoc funding interventions toward a synergistic approach. EU support must be strategically coupled with comprehensive, integrated national strategies focused on deep-seated reforms. Policy recommendations consistently emphasize tackling corruption, improving education quality and relevance, investing strategically in RandD ecosystems (beyond just infrastructure), enhancing institutional effectiveness, and actively engaging diasporas while improving conditions for returnees (Botezat and Moraru, 2020; Kousis et al., 2022; Tomić and Taylor, 2018). At the EU level, research and cohesion policies should be recalibrated to better incentivize these crucial national reforms and support holistic ecosystem-building, fostering genuine brain circulation within a more equitable European Research Area. Tackling brain drain is essential not only for national development but for the long-term sustainability and dynamism of the European Research Area as a whole.

References

Apostu, S.A., Vasile, V., Marin, E. and Bunduchi, E., 2022. Factors Influencing Physicians Migration—A Case Study from Romania. *Mathematics,* 10(3), p.505. https://doi.org/10.3390/math10030505

Arcalean, C., Glomm, G. and Schiopu, I., 2012. Growth effects of spatial redistribution policies. *Journal of Economic Dynamics and Control,* 36(7), pp.988-1008 https://doi.org/10.1016/j.jedc.2012.01.004

Batog, C., Crivelli, E., Ilyina, A., Jakab, Z., Lee, J., Musayev, A., Petrova, I. and Scott, A., 2019. Demographic Headwinds in Central and Eastern Europe. *IMF European Departmental*, 19(12), p.119. https://doi.org/10.5089/9781498319768.087

Boc, E., 2020. Brain drain in the EU: Local and regional public policies and good practices. *Transylvanian Review of Administrative Sciences,* 59, pp.23-39. https://doi.org/10.24193/tras.59E.2

Botezat, A. and Moraru, A., 2020. Brain drain from Romania: What do we know so far about the Romanian medical diaspora? *Eastern Journal of European Studies,* 11, pp.309-334

Commission, P. S. F. E. 2023. From brain drain to brain circulation: The PSF supports national policy-makers in designing major RandI reforms. European Commission.

Drumea, C. and Mirela, B.C., 2015. Competitiveness through innovation for the Romanian Economy. Allocations Correlated with Outputs. *Procedia Economics and Finance*, 32(2), Pp.1541-1549, https://doi.org/10.1016/S2212-5671(15)01544-0

Flanja, D.P. and Nistor (Gâz), R.M., 2017. Brain Drain: Are We Losing Our Minds? A Study on The Romanian Human Capital F(L)Ight. On-Line *Journal Modelling the New Europe*, 24

Ganga, R., Silva, J. P., Gomes, R., Vaz, H., Lopes, J. T., Silva, S., Cerdeira, L., Cabrito, B., Magalhães, D., Machado-Taylor, M. de L., Peixoto, P., Patrocínio, T., and Brites, R., 2016. Portuguese Scientists' Migration: A study on the 2008 crisis aftermath. *International Migration*, 54(6). pp.43-55. https://dx.doi.org/10.1111/imig.12271

Georgiev, S. and Ohtaki, S., 2016. Evolution and implementation of quality management practices in the manufacturing sector in Eastern Europe after the end of communism: The case of Bulgaria. *International Journal of Quality and Reliability Management,* 33(6), pp.804-829 https://doi.org/10.1108/IJQRM-03-2014-0030

Gherhes, V., Dragomir, G.M. and Cernicova-Buca, M., 2020. Migration Intentions of Romanian Engineering Students. *Sustainability,* 12(18), p.7417. https://doi.org/10.3390/su12124846

Giurgiuca, A., Rosca, A.E., Matei, V.P., Giurgi-Oncu, C., Zgarbura, R., Szalontay, A.S. and Costa, M.P., 2018. European Union Mobility, Income and Brain Drain. The Attitudes towards Migration of Romanian Psychiatric Trainees. *Revista de Cercetare si Interventie Sociala,* 63, pp. 268-278

Hinks, T. and Davies, S., 2015. Intentions to Return: Evidence from Romanian Migrants. Policy Research Working Paper, 7166

Iacob (Bâra), R., 2018. Brain Drain Phenomenon in Romania: What Comes in Line after Corruption? A Quantitative Analysis of the Determinant Causes of Romanian Skilled Migration. *Romanian Journal of Communication and Public Relations,* 20(2), https://doi.org/10.21018/rjcpr.2018.2.259

Khan, J., 2021. European academic brain drain: A meta-synthesis. *European Journal of Education,* 56(2), pp.265-278. https://doi.org/10.1111/ejed.12449.

Kousis, M., Chatzidaki, A. and Kafetsios, K., 2022. Challenging Mobilities in and to the EU during Times of Crises: The Case of Greece. *Springer,* pp.1-23. https://doi.org/10.1007/978-3-031-11574-5_1

Krammer, S.M.S., 2017. Science, technology, and innovation for economic competitiveness: The role of smart specialization in less-developed countries. *Technological Forecasting and Social Change*, 123, pp.95-107. https://doi.org/10.1016/j.techfore.2017.06.028

Labrianidis, L., Sykas, T., Sachini, E. and Karampekios, N., 2022a. Highly educated skilled migrants are attracted to global cities: The case of Greek PhD holders. *Population, Space and Place*, 28(3), https://doi.org/10.1002/psp.2517

Labrianidis, L., Sykas, T., Sachini, E. and Karampekios, N., 2022b. Innovation as a cause of highly skilled migration: Evidence from Greece, *International Organization for Migration*, 61(3), pp.222-236. https://doi.org/10.1111/imig.13035

Labrianidis, L., Sykas, T., Sachini, E. and Karampekios, N., 2023. The impact of highly skilled emigrants on the origin country's innovation performance: The case of Greece. *International Journal of Manpower*, 44(8), pp.1605-1621. https://doi.org/10.1108/IJM-11-2022-0537

Marino, I.R. and Cirillo, C., 2014. The State of Research in Europe and in Italy: The Risks of Short-Sighted Decisions. *Digestive Diseases and Sciences*, 59(9), pp.2036–2039. https://doi.org/10.1007/s10620-014-3303-3

Mathies, C. and Cantwell, B., 2022. Intra-regional mobility of PhD students in the European Union: The outcomes of region-making policy? *Policy Reviews in Higher Education,* 6(2), pp.230–251. https://doi.org/10.1080/23322969.2022.2105256

Mitrică, B., Damian, N., Grigorescu, I., Mocanu, I., Dumitraşcu, M. and Persu, M., 2022. Out-migration and social and technological marginalization in Romania. Regional Disparities. *Technological Forecasting and Social Change,* 175, p. 121370. https://doi.org/10.1016/j.techfore.2021.121370

Oldac, Y.I., 2023. The contributions of study abroad to home countries: An agential perspective. Higher Education, 86, pp.1471–1487. https://doi.org/10.1007/s10734-022-00980-z

Panagiotakopoulos, A., 2020. Investigating the factors affecting brain drain in Greece: Looking beyond the obvious. World Journal of Entrepreneurship. *Management and Sustainable Development*, 16(3), pp.207-218. https://doi.org/10.1108/WJEMSD-10-2019-0076

Petroff, A., 2016. Reversing the brain drain: Evidence from a Romanian brain networking organization. International Migration, 54(5), pp.122-135. https://doi.org/10.1111/imig.12268

Pintarić, L. and Župarić-Iljić, D., 2024. Full Waiting Rooms, Empty Offices: Motives for the Emigration of Physicians from Croatia. *Migration and Ethnic Themes,* 40(1), pp.63–89

Séchet, R. and Vasilcu, D., 2015. Physicians' migration from Romania to France: A brain drain into Europe? Cybergeo: *European Journal of Geography*, https://doi.org/10.4000/cybergeo.27249

Shimada, A., 2019. The education policy challenge to the brain drain problem. *International Journal of Education Economics and Development,* 10(4), pp.335-355.

Socol, A., and Iuga, I. C. 2024. Addressing brain drain and strengthening governance for advancing government readiness in artificial intelligence (AI). *Kybernetes,* 53(13), pp.47-71. https://doi.org/10.1108/K-03-2024-0629

Tomić, C. H. and Taylor, K., 2018. Youth unemployment, the brain drain and education policy in Croatia: A call for joining forces and for new visions. *Policy Futures in Education,* 16(4), pp.501-514. https://doi.org/10.1177/1478210317751267

Vasile, V., 2012. Crisis impact on employment and mobility model of the Romanian university graduates. *Procedia Economics and Finance*, 3, pp.315-324. https://doi.org/10.1016/S2212-5671(12)00158-X

World Bank. 2019. *Migration and Brain Drain in Europe and Central Asia* (Europe and Central Asia Economic Update Fall 2019). Washington, DC: World Bank. [online] Available at: https://openknowledge.worldbank.org/entities/publication/6b3011b7-a660-5065-b9a4-282ff6f6c73a [Accessed 10 May 2025].

Crisis Management Strategies in the Media Industry During COVID-19

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Abstract

This research explores which crisis management strategies wer adopted by small and medium-sized companies in the Romanian media industry during the COVID-19 pandemic. The study aims to analyze how these companies adapted to the crisis by implementing strategic models, digital transformation, cost reduction and diversification of revenue sources. A quantitative research method was used by applying a structured questionnaire distributed to 341 media companies, obtaining 273 valid responses. The data was processed and analyzed using the IBM SPSS Statistics program and multiple regression analyses were also performed to identify the factors that influenced the level of impact on the companies. The results show that most companies relied on cost reduction measures, business model innovation (introduction of subscriptions and digital services) and the implementation of hybrid work to cope with the crisis. The decline in general revenues and advertising revenues significantly increased the perception of the impact of the crisis, while investments in digitalization contributed to diminishing the negative effects. The study confirms the relevance of using strategic models such as Porter's Five Forces and Blue Ocean Strategy in increasing organizational resilience. The paper brings original contributions on the adaptation strategies used by Romanian media companies, providing empirical evidence in a context insufficiently investigated in the international literature. It highlights the importance of agility, technological investments and strategic diversification in strengthening organizational resilience. The results provide valuable recommendations for media companies that want to improve their preparedness for future crises, emphasizing the need for digital innovation, revenue diversification and proactive crisis management strategies.

Keywords

Crisis management, Media industry, COVID-19, Digital transformation, Organizational resilience, Strategic management

DOI: 10.24818/BASIQ/2025/11/034

Introduction

Going through a crisis has become a no rmal part in today's society. Companies had to go through the crisis generated by the COVID-19 pandemic, which was not a time of economic prosperity. These companies did not get a chance to recover, because this crisis was followed by another economic crisis that was generated by the war in Ukraine. After this crisis, came the next one, which was a politic crisis. Regardless of the times that we live in, a company needs to adapt and remain profitable. This research analyzis from a strategic management perspective how Romanian companies from the Mass-Media industry have adapted to the COVID-19 crisis. In the specialized literature, increased significance is given to the study of

management strategies during the crisis (Grondys et al., 2021, especially when it comes to the context of the COVID-19 pandemic (Haryono, 2023). Mass media, an essential sector in informing the public, has not been immune to the economic and social changes caused by the crisis (Park, 2022). Behind every newspaper, TV station, radio channel or news website, there is a company that must pay bills, employees and generate profit in order to be able to carry out its activity. Thus, we identified that in the specialized literature, not so much attention is paid to Romanian companies operating in this sector. The research carried out in this study aims to explore the management strategies used by mass media companies to survive and adapt to the crisis, but also to face new challenges generated by the pandemic, such as digitalization, revenue diversification and adaptive leadership.

1. Review of the scientific literature

In order to maintain their sustainability, media organizations have adopted various management strategies during the crisis. Haryono and Wijaya (2023) highlighted in a study five essential stages of crisis management: crisis research, forming a crisis management team, strategic planning, implementing a new work system and adapting to the new organizational culture. These measures are fundamental to maintaining resilience in the face of sudden economic changes.

Also, the meta-analysis conducted by Xu et al. (2024) highlights the fact that information overload can lead to news avoidance, which affects both media consumption and advertising revenues. Thus, effective content management and adaptation of information distribution strategies are essential to maintaining the audience. Thus, companies that do not understand this principle risk self-sabotaging and losing their target audience.

In an attempt to survive the crisis, many media organizations have resorted to revenue diversification and digitalization. For example, the study by Jääskeläinen and Yanatm (2020) analyzes the transition of European news agencies to diversified business models, which include digital services and strategic partnerships. Similarly, Finneman et al. (2023) shows a grim reality, according to which local newspapers in the United States of America have resorted to donations, grants and public financing models to maintain their operations.

Regarding digital transformation, Park's research (2022) highlights the importance of using big data analytics to understand and anticipate changes in the media, thus providing a competitive advantage through technological innovation.

The literature details established strategic models, such as Porter's Five Forces analysis or Blue Ocean strategy, which have been used to manage crises in the media industry. Research by Feng and Zhang (2009) shows that the implementation of Blue Ocean strategy is only possible when accompanied by the development of the organization's core competencies to ensure long-term success. Similarly, Nikos' (2018) study on the Cyprus hotel industry shows that the application of Porter's Five Forces can help organizations improve their strategic positioning during times of crisis. Thus, these two management strategies can be a real solution for companies facing new types of crises and obstacles.

The role of leadership is a key aspect when it comes to management. Wardman (2020) highlights the importance of adaptive and inclusive leadership in managing the pandemic, identifying thirteen essential strategies for effective leadership in crisis situations. Barrett and Shipway's (2024) study confirms this perspective, highlighting that revenue diversification, customer-centricity, and innovation are critical factors in the success of sporting event organizations during the COVID-19 crisis.

Advertising strategies are a key factor in maintaining the resilience of media organizations, as they generate revenue for the company. Herrera-Rodriguez et al. (2022) conducted a study in the southern region of Tamaulipas, Mexico, which highlighted a positive correlation between the use of conventional and digital advertising and the resilience of small and medium-sized enterprises during the pandemic. The conclusions of this research show the importance of combining multiple advertising channels to ensure business sustainability in a crisis context.

Hu et al. (2022) adopted a configurative approach to examine how the combinations of financial, cognitive, and behavioral capabilities of Chinese film and television firms influenced their performance during the COVID-19 pandemic. The study suggests that large firms with limited financial resources need to exploit their cognitive capabilities to compensate for financial deficiencies, while small firms need to adopt strategies based on behavioral capabilities to respond quickly to the crisis.

Riha et al. (2021) demonstrated how, in a broader context, companies can use interactive technologies, for example, radio – SMS. Used in crisis situations, such as COVID-19, this approach can be used to obtain qualitative data in research on the impact of crises on society and industries.

Over the years, the quantitative method through the use of questionnaires has evolved significantly by integrating new technologies, especially electronic elements and tools that use the internet. These help to make the data collection process much more accurate and efficient, leaving less room for human error (Vaisburg, 2020).

Modern methodologies include the use of so-called telephone-assisted questionnaires (SATI), computer-assisted personal interviews (CAPI), and programs for conducting online questionnaires, such as via email, or questionnaires conducted through websites, social media, but also the gamification of questionnaires to increase the response rate and increase the involvement of respondents (Vaisburg, 2020).

In multi-cultural research, it is customary to combine qualitative and quantitative research methods, especially in cases where it is necessary to address linguistic and conceptual challenges. In these cases, cognitive science technologies are used in the development and design stage of the questionnaire, but also in its interpretation (Hines, 1993).

According to Usher (2021), reflection plays an essential role in the interpretation of results in qualitative and quantitative research, because, thanks to it, the results can be interpreted without prejudice or other subjective influences in the research process. The use of mixed methods that combine ethnographic data with questionnaire research can show complementary perspectives, especially in the conduct of sociological studies (Baur and Hering, 2017).

Moreover, questionnaire research continues to be a core method in social studies methodology, because it brings together both the theoretical framework and its practical applicability (Nelson, 2016). In educational research, the quantitative method is used quite often to establish empirical links. However, research by Pereira (2016) suggests that the most appropriate approach is to combine qualitative and quantitative methods to obtain a holistic understanding of phenomena.

Grondys et al. (2021) conducted an analysis of the perception of economic risks of Polish SMEs during the pandemic, revealing the impact of financial and operational uncertainties on their survival. The study highlights the need for proactive risk management to ensure the sustainability of the sector.

Thus, our literature review suggests that crisis management strategies in the media industry should focus on revenue diversification, digitalization, the application of established strategic models such as Porter's Five Forces or Blue Ocean, and, of course, adaptive leadership. Also, an important role is played by both the development of organizational capabilities and advertising, as it can generate significant funds that the company needs for resilience during future crises.

2. Research methodology

2.1. Questionnaire design and data collection

During the period March 1, 2025 – March 31, 2025, the research was conducted using the quantitative method, using a questionnaire. The questionnaire was titled “Crisis management strategies in the media industry during COVID-19”. It was developed with the aim of analyzing the management strategies used by media companies in Romania to deal with the crisis caused by the COVID-19 pandemic. The methodology for developing the questionnaire was based on previous work in the field.

The study conducted by Szentesi et al (2021) provided the operational framework for formulating the questions in the questionnaire developed for the study and an important context regarding the digital transformation and the challenges that we encountered in Romanian companies. This information contributed to the formulation of questions related to technological adaptation in crisis management. The study by Kotler and Keller (2016) provided a strong theoretical basis in formulating questions related to management strategies used by companies.

Also, the study by Anderson and Sullivan (1993) contributed to the formulation of questions that analyze the perception of company owners on the phenomenon that affected their companies, and how they had to adapt to maintain public trust and attention. These references ensured the scientific foundation of the questionnaire. Of course, the questionnaire questions were adapted to the specifics of crisis management strategies in the media industry.

The questionnaire was structured on 22 questions, measured with a Likert scale (1-5), and formulated to evaluate the different management strategies adapted by media companies in Romania.

2.2. Company Selection

The companies that were selected for this research are active in the Romanian media sector. They cover areas such as radio, television, printed newspapers or magazines and online news sites. They were selected based on the following criteria: small and medium-sized enterprises (SMEs), established after 1990, with a national geographical representation, from all over Romania. Thus, following the questionnaire, 262 companies with between 1-9 employees and 11 companies with between 10-49 employees responded. Of these, 258 were established between 2010-2019, 5 were established between 1990-1999, 8 were established between 2000-2008 and 2 were established after 2020.

2.3. Data Collection

For data collection, the questionnaire was distributed through multiple channels to maximize response rate: WhatsApp, Facebook, Email and direct phone calls to explain the importance of the research and encourage participation. Responses were collected anonymously, using the Google Forms website, thus ensuring the confidentiality of the participants.

2.4. Response rate and data collection period

341 companies were contacted for this research. Of these, 273 completed the questionnaire. Thus, the response rate was 80.06%. Data collection was carried out via Google Forms, and all questions were marked as mandatory, therefore, there were no incomplete responses. The data collection period was one month.

2.5. Data cleaning and analysis

After the data collection process was completed, the data cleaning stage followed. The data were then processed and coded manually in Microsoft Excel. Subsequently, they were processed using IBM SPSS. 21 for a more in-depth analysis.

This research also makes its own and original contribution by providing an overview of the resilience strategies that were used by Romanian media companies during the COVID-19 period. The tactics applied by small and medium-sized enterprises (SMEs) to adapt and survive market changes were identified. At the same time, perhaps the most important aspect of this research was the identification of successful methods and practical recommendations for future crises in the media industry.

3. Results and discussion

This research analyzes how Romanian media enterprises, especially SMEs, have managed the challenges brought by the COVID-19 pandemic. 273 people responded to the questionnaire, representing administrators (40.7%), managers (54.9%) and shareholders (4.4%). of companies active in the written press, radio, TV and, predominantly, in online publications.

3.1. Management strategies adopted during the crisis

Companies in Romania faced new challenges in the face of uncertainties caused by the COVID-19 crisis. The main management strategies analyzed were the Blue Ocean strategy and Porter's strategies. A percentage of 22% of respondents stated that they used Blue Ocean strategies to adapt to the crisis. Porter's five forces reveal the strategic difficulties that companies faced during the crisis. Customer power, changing behavior, decreasing revenues, strongly affected 78.02% of respondents. Industry competition, increased rivalry, shrinking advertising market affected 80.02% of respondents. Supplier power and increasing production costs affected 78.3% of respondents. The threat of new competitors, such as digital alternatives or influencers affected 66.3% of respondents. The threat of substitute products, audience migration to social networks or TikTok affected 69.9% of respondents.

3.2. Business model change and innovation

The COVID-19 crisis has had a significant impact on Romanian media companies. 45.8% introduced a subscription model during the crisis, and 6.2% were forced to switch from print to digital. Some companies introduced digital products and services, such as podcasts or live streaming (24.5%), while others introduced other new products and services (53.1%).

The majority of companies (63.7%) had to survive the crisis using their own resources, while only 2.2% received government support, and 34.1% accessed a bank loan. To reduce costs, 70.7% of companies had salary cuts, 26.7% reduced office space, and 72.9% reduced other non-essential services. These companies were also forced by circumstances to change their way of working. Thus, 33.3% of companies worked completely remotely, and 60.4% worked in a hybrid system. A percentage of 37% changed the focus of content and focused only on news and current events related to the crisis. The majority of companies (53.1%) invested in new technologies, and 42.5% of companies reduced prices to attract new customers.

3.3. Communication during a crisis

Effective communication between management and employees during a crisis was vital to the survival of 24.9% of respondents. At the same time, 41% of respondents (Figure no.1) claim to have adopted a collaborative and employee-focused management style, involving employees in decision-making. A percentage of 38.5% maintained strong relationships with advertisers and partners.

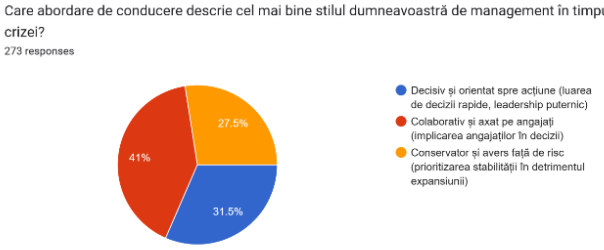

Figure no. 1. Graphical representation

3.4. Perception of resilience and the future

Following their managerial experience during the COVID-19 crisis, respondents learned important lessons for resilience in times of uncertainty and crisis. Increased attention is paid to diversified income streams (32.6%) (Figure no.2). Respondents also emphasized the importance of quickly adapting to digital trends (28.2%).

3.5. Analysis and interpretation of multiple regression models

In this research, the dependent variable used in the multiple regression models is "AFFECT level", which reflects the level of affect perceived by Romanian media companies during the crisis caused by the COVID-19 pandemic. This variable was constructed based on the responses collected through the questionnaire, using a Likert-type scale, and measures the negative impact felt by companies on their economic and operational activity (Table no. 1).

Figure no.2. Graphical representation

Table no. 1. Dependent variable AFFECT level

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3,350	,239		14,029	,000	2,880	3,820					
	Cost cuttings	,272	,053	,298	5,139	,000	,168	,376	,298	,298	,298	1,000	1,000
2	(Constant)	2,709	,274		9,870	,000	2,169	3,250					
	Cost cuttings	,228	,052	,249	4,350	,000	,125	,331	,298	,256	,244	,961	1,040
	INCOM decrease	,188	,043	,248	4,332	,000	,103	,274	,297	,255	,243	,961	1,040
3	(Constant)	2,150	,317		6,773	,000	1,525	2,775					
	Cost cuttings	,178	,053	,195	3,340	,001	,073	,284	,298	,200	,184	,888	1,126
	INCOM decrease	,170	,043	,224	3,944	,000	,085	,254	,297	,234	,218	,945	1,058
	Pub income decrease	,188	,057	,194	3,332	,001	,077	,300	,294	,199	,184	,894	1,119
4	(Constant)	2,360	,325		7,266	,000	1,720	2,999					
	Cost cuttings	,208	,054	,228	3,847	,000	,102	,315	,298	,229	,210	,847	1,181
	INCOM decrease	,182	,043	,241	4,255	,000	,098	,267	,297	,252	,232	,932	1,072
	Pub income decrease	,194	,056	,200	3,469	,001	,084	,304	,294	,207	,189	,892	1,120
	Digitalization need	-,100	,039	-,146	-2,555	,011	-,178	-,023	-,020	-,154	-,139	,917	1,091

a. Dependent Variable: AFECT level

The AFFECT level was influenced by factors such as: reduced operational costs, overall revenue decline, advertising revenue decline and the pressure to adapt to new digitalization requirements. In the tested models, the AFFECT level is expressed numerically and is used to assess how different predictors contributed to increasing or decreasing the level of impact on media companies.

The interpretation of the coefficients in the regression models shows how each strategy or economic factor influenced the level of impact. Positive coefficients indicate an increase in the level of impact depending on the increase in the respective predictor, and negative coefficients (such as the need for digitalization) suggest an inverse relationship, where the increase in digitalization contributed to reducing the perceived impact of the crisis.

The evolution of the tested models shows that the impact of the crisis on media companies in Romania was determined by a combination of economic and organizational factors. Cost reductions, falling revenues and falling advertising revenues increased the level of impact, while adaptation to digitalization had a protective effect. The developed models are statistically validated, do not present multicollinearity problems and provide a solid basis for formulating strategic recommendations in managing future crises.

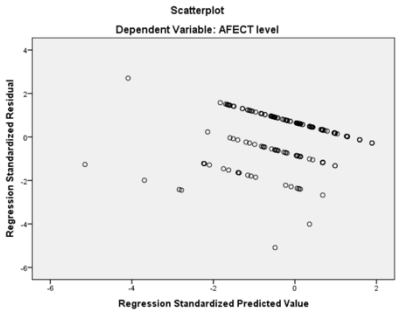

Figure no. 3. Scatterplot – Dependent Variable: AFFECT level

To test the validity of the regression model assumptions, a scatterplot (Figure no. 3) of the standardized residuals against the predicted standardized values was performed. The distribution of points suggests a slight clustering, possibly generated by the similar nature of the companies analyzed (SMEs in the media industry). However, no clear systematic trend or severe heteroscedasticity is observed, which supports the validity of the regression model used.

Conclusions

The research confirms that the COVID-19 pandemic has been a major test of resilience for the Romanian media industry, especially for small and medium-sized enterprises. The results show that the crisis management strategies adopted were diverse and included both reactive measures and proactive structural adaptation initiatives.

Blue Ocean strategies and the application of Porter's Five Forces analysis were used in significant proportions by companies, as they tried to identify new opportunities or manage external pressures more effectively. Changes in consumer behavior, declining revenues and increased online competition were the main challenges faced by media companies.

The crisis accelerated digitalization processes, leading many companies to adopt subscription-based business models, develop digital products and services (such as podcasts and live broadcasts) and gradually reduce their dependence on print. Investments in technology and the transition to hybrid work models have proven essential to maintaining activity during the period of uncertainty.

On a financial level, most companies have had to make significant cost cuts, affecting salaries, office space and external services. The data also shows a limited use of government aid, which highlights the need for better collaboration between the public sector and the media in crisis situations.

Internal communication and adaptive leadership played an important role in maintaining organizational cohesion, and companies that actively involved employees in decision-making showed increased resilience.

The multiple regression models analyzed show that cost reductions, a decrease in general revenues and advertising revenues had a negative impact on the perceived level of impact. In contrast, investments in digitalization had a protective effect, reducing the perception of economic impact.

In conclusion, to successfully manage future crises, Romanian media companies must prioritize diversifying revenue streams, accelerate digital transformation, adopt flexible strategic models, and develop adaptive organizational skills. The study also highlights the importance of anticipating risks and developing an organizational culture oriented towards innovation and resilience.

Despite the valuable insights provided, this study has a few limitations. The research is based only on the self-reported data collected through questionnaires, which may be subject to biases, such as, for example, selective memory of the respondents. Second, the sample consists predominantly of small and medium-sized media companies, which may limit the generalizability of the findings to larger companies or media conglomerates. And third, the lack of qualitative data does limit the depth of understanding regarding decision-making processes and the culture of the organization during the crisis.

Future research could adopt a longitudinal approach to evaluate how the strategies implemented during the COVID-19 crisis have influenced the long-term sustainability of media companies. Also, incorporating qualitative methods, such as interview or case studies, would provide a deepen insights and understanding of the internal dynamics of crisis response and leadership behavior.

References

Anderson, E.W. and Sullivan, M.W., 1993. The antecedents and consequences of customer satisfaction for firms. *Marketing Science*, 12(2), pp. 125-143. http://dx.doi.org/10.1287/mksc.12.2.125

Barrett, Z. and Shipway, R., 2024. Crisis Management Response Strategies of Small-Scale Sport Event Organizations to the Effects of the COVID-19 Pandemic. *Event Management*, 28(3), pp.441-459.

Baur, N. and Hering, L., 2017. Combining Ethnography and Surveys Mixed Methods Research Designs Beyond Combining Qualitative Interviews with Quantitative Surveys', *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, 69(2), pp. 387-414. DOI: 10.1007/s11577-017-0468-8.

Feng, F. and Zhang, M.S., 2009. The Rational Reflection on Blue Ocean Strategy-The Implementation Perspective Analysis of a Strategy Theory. Strategic Management Engineering: Enterprise, *Environment and Crisis*, pp.597-601.

Finneman, T., Mari, W. and Thomas, R. J., 2023. I Didn't Know How We Were Going to Survive": U.S. Community Newspapers' Resilience During COVID-19. *Journalism Practice*, 17(5), pp.893-910. http://dx.doi.org/10.1080/17512786.2021.1957703

Grondys, K., Slusarczyk, O., Hussain, H. I. and Androniceanu, A., 2021. Risk assessment of the SME sector operations during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 18(8). http://dx.doi.org/10.3390/ijerph18084183

Haryono, C.G. and Wijaya, C., 2023. The crisis management strategies of Indonesian event organizers in the face of COVID-19. *Journal of Hospitality and Tourism Insights*, 6(4), pp.1552-1568.

Herrera-Rodriguez, M., Gutierrez-Ortiz, M.E., and Torres-Fernandez, C., 2022. Impact of conventional and digital advertising on the resilience of MSMEs in southern Tamaulipas during COVID-19. CienciaUAT, 17(1), pp.73-88. http://dx.doi.org/10.29059/cienciauat.v17i1.1603

Hines, A.M., 1993. Linking Qualitative and Quantitative Methods in Cross-Cultural Survey-Research - Techniques from Cognitive Science, *American Journal of Community Psychology*, 21(6), pp.729-746. DOI: 10.1007/BF00942245.

Hu, C.G., Yun, K.H., Su, Z.Q., and Xi, C., 2022. Effective crisis management during adversity: Organizing resilience capabilities of firms and sustainable performance during COVID-19. Sustainability, 14(20). http://dx.doi.org/10.3390/su142013664

Jääskeläinen, A. and Yanatm, S., 2020. How do media-owned national news agencies survive in the digital age? *Journalism*, 21(12), pp.1877-1895. https://doi.org/10.1177/1464884919883492

Kotler, P. and Keller, K.L., 2016. Marketing management. 15th edn. Pearson Education.

Nelson, J., 2016. The Practice of Survey Research: Theory and Applications: A Review, *Qualitative Report*, 21(4), p. 643.

Nikos, M., 2018. The Cyprus Industry Against Porter's 'Five Forces Analysis' in the Middle of the Financial Crisis. *EuroMed Academy of Business Conference Book of Proceedings*, pp.1603-1605.

Park, Y.E., 2022. Developing a COVID-19 Crisis Management Strategy Using News Media and Social Media in Big Data Analytics. *Social Science Computer Review*, 40(6), pp.1358-1375. https://doi.org/10.1177/08944393211007314

Pereira, G. and Ortigão, M.I.R., 2016. Quantitative Research in Education: Some Considerations, *Periferia*, 8(1), pp. 66-79. https://doi.org/10.12957/periferia.2016.27341

Riha, J., Lopes, C.A., Ibrahim, N.A. and Srinivasan, S., 2021. Media and Digital Technologies for Mixed Methods Research in Public Health Emergencies Such as COVID-19: Lessons Learned From Using Interactive Radio-SMS for Social Research in Somalia. *Journal of Mixed Methods Research*, 15(3), pp.304-326. https://doi.org/10.1177/1558689820986748

Szentesi, S.G., Cuc, L.D., Lile, R. și Cuc, P.N., 2021. Internet of Things (IoT), challenges and perspectives in Romania: A qualitative research, *Amfiteatru Economic*, 23(57), pp. 448-464. http://dx.doi.org/10.24818/EA/2021/57/448

Usher, L.E., 2021. The Case for Reflexivity in Quantitative Survey Research in Leisure Studies: Lessons from Surf Research', *Annals of Leisure Research*, 26(2), pp. 269-284. http://dx.doi.org/10.1080/11745398.2021.1974905

Vaisburg, A.V., 2020. A Review of Modern Electronic Quantitative Survey Methods of Sociological Research, *Vestnik Tomskogo Gosudarstvennogo Universiteta-Filosofiya-Sotsiologiya-Politologiya*, 55, pp. 185-195. http://dx.doi.org/10.17223/1998863X/55/19

Xu, J. H., He, Z. Y., Guo, D. F. and Ding, Y., 2024. How do media-owned national news agencies survive in the digital age? Business diversification in Austria Presse Agentur, Press Association and Tidningarnas Telegrambyra. *Journalism.*

Wardman, J. K., 2020. Recalibrating pandemic risk leadership: Thirteen crisis ready strategies for COVID-19. Journal of Risk Research, 23(7-8), pp.1092-1120. https://doi.org/10.1080/13669877.2020.1842989

Entrepreneurs' Perception of Green Spaces: A Bibliometric Analysis of the Connections between Business and Urban Sustainability

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Abstract

Green spaces play an essential role in promoting sustainability and quality of life, and entrepreneurs' perception of them can significantly influence economic development strategies. The study investigates this relationship through a bibliometric analysis, highlighting how the entrepreneurial environment reacts to the presence and integration of green spaces in the urban context. The research uses data from the Web of Science, covering the period 2008–April 2025, to identify the main academic trends, dominant concepts and relevant collaborations between authors. The results show that green spaces are not only perceived as aesthetic or ecological elements, but also as opportunities for innovation and social responsibility. The analysis of term and author networks reveals a multidisciplinary approach, highlighting the increasing importance given to the environment in business strategies. Thus, the study offers an updated perspective on how entrepreneurs relate to green infrastructure, highlighting its role in supporting sustainable development.

Keywords

Entrepreneurship, green spaces, bibliometric analysis, urban sustainability.

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Introduction

In the context of accelerated urbanization, the climate crisis and the increasingly urgent need for sustainable development, contemporary cities are forced to rethink their infrastructure and economic priorities. Green spaces – parks, urban gardens, tree lines, peri-urban forests – are becoming essential components not only of the quality of urban life, but also of local entrepreneurial dynamics. In parallel, interest in green entrepreneurship is growing, an emerging form of economic initiative that integrates principles of ecological responsibility and sustainable development. Despite this development, the relationship between the presence of green spaces and entrepreneurs' perception of these urban resources remains insufficiently explored. Although numerous studies highlight the benefits of green spaces for population health, pollution reduction and social cohesion, less attention has been paid to how entrepreneurs relate to these spaces: do they perceive them as opportunities or constraints? do they integrate them into business strategies or ignore them? contribute to their development and preservation or consider them exclusively the domain of public administration?

1. Review of the scientific literature

The literature on entrepreneurship and urban sustainability has diversified considerably in recent decades, with the amplification of global concerns for climate change, sustainable development and urban regeneration. Particular attention is paid to how entrepreneurs perceive and value green spaces as an integral part of their economic, social and environmental strategies (Vlasov, 2022; Koo and Kwon, 2025). This approach reflects a shift from traditional paradigms of economic growth to responsible and regenerative business models that include green infrastructure in the logic of entrepreneurial development (Yu and Gibbs, 2020; Liu, Alias and Hamid, 2025). The urban environment offers not only spaces for economic development, but also opportunities for innovation in sustainability. Studies highlight that urban entrepreneurs, especially those involved in creative industries or circular economies, increasingly rely on the valorization of green spaces to create added value (Palau-Salvador et al., 2019). Green spaces are thus becoming a strategic component in urban branding, attracting customers and stimulating social innovation. This integration of the ecological dimension into urban entrepreneurial architecture gives cities a competitive advantage in the process of attracting investments and strengthening social resilience. This relationship is particularly accentuated in post-industrial cities or areas undergoing urban regeneration, where community gardens and parks become tools for social cohesion and incubators for social entrepreneurship (Davis et al., 2025; Long and Block, 2021). Thus, green spaces are no longer perceived exclusively as recreational infrastructure, but as multifunctional urban resources that contribute to economic revitalization and social inclusion. The literature identifies several forms of entrepreneurship that integrate the green dimension: eco-entrepreneurship, sustainable entrepreneurship, and social entrepreneurship with ecological valences (Shabbir and Batool, 2025; Mhlongo, Ntshangase and Ezeuduji, 2025). All of these forms focus on reducing environmental impact, promoting eco-innovation, and contributing to sustainable development goals. Conceptually, these types of entrepreneurship are based on a holistic view of economic value, including positive externalities generated for the community and the environment.

Hu and Tresirichod (2025) propose the Green Entrepreneurial Orientation model, suggesting that companies that integrate ecological values into their organizational culture perform better from a sustainable point of view. Thus, entrepreneurs' perception of green spaces is not unitary, but depends on several factors: the sector of activity, the level of ecological education, local culture and urban policies (Chen et al., 2022; Raimi and Bamiro, 2025). Some entrepreneurs perceive green spaces as strategic resources for differentiation and customer loyalty, others as administrative obstacles or additional costs. Qualitative studies also reveal that green spaces are often correlated with employee well-being, creativity and productivity (Carfì and Donato, 2022), suggesting a direct link between the quality of the urban environment and the economic performance of companies. The literature shows that community gardens, urban parks and other forms of green infrastructure can become platforms for alternative economic activities: urban farms, green cooperatives, ecological education workshops or sustainable festivals (Beeri et al., 2020). These activities contribute to the economic revitalization of marginalized neighborhoods, provide jobs and reduce social vulnerabilities, especially in informal areas (Adewunmi et al., 2023; Saleh and Drouillon, 2025). An emerging direction in the literature is research on the role of women entrepreneurs in promoting ecological and social values (Amjad and Khan, 2025; Sodhi and Dwivedi, 2025). Tükel et al. (2025) show that women's involvement in recreational activities is associated with a greater entrepreneurial orientation towards sustainability. These results are relevant in the context of inclusive cities, where gender entrepreneurship contributes to sustainable transformations.

Institutional support and public policies play a crucial role in stimulating green entrepreneurial initiatives. Examples from China (Huang et al., 2025), where low-carbon city policies are correlated with the growth of sustainable entrepreneurship, confirm that urban governance can function as an accelerator for green innovation. European urban regeneration projects (Davis et al., 2025; Xu, Yang and Zheng, 2025) also provide examples of good practices regarding the integration of green spaces into local development strategies, community involvement and the promotion of public-private partnerships. Contemporary literature shows that entrepreneurship education with sustainable values is a fundamental pillar for the training of a new generation of business leaders (Bibu et al., 2024; Yin, Jiang and Tong, 2025). University programs that include modules on sustainability, urban environment and green innovation favor the emergence of forms of entrepreneurship oriented towards the common good (Liu et al., 2025). A relevant example is that of educational initiatives integrated with technologies such as VR and AI (Li et al., 2022), which allow the simulation of business scenarios in green urban environments and foster experiential learning. Case studies from South Africa (Lekgau, Daniels and Tichaawa, 2025), Pakistan (Amjad and Khan, 2025), China (Zhu, 2025) or South America confirm the diversity of forms of green entrepreneurship. Each region proposes solutions adapted to the cultural, economic and institutional context. This diversity highlights the importance of international collaboration and the transfer of good practices, as well as the

need for a comparative framework that allows for the transnational analysis of the impact of green places on entrepreneurship. The literature on entrepreneurs' perceptions of green spaces highlights an emerging field at the intersection of economics, ecology, and urbanism. This research direction has major transformative potential, both theoretically and practically, contributing to the development of resilient, inclusive, and well-being-centered cities. To fully realize its potential, an effort is needed to integrate global, regional, and local perspectives within collaborative and applied research, with a focus on spatial justice, social innovation, and ecological resilience.

2. Research methodology

This research investigates how the scientific literature reflects the connections between entrepreneurship and green spaces, through a bibliometric analysis applied to the Web of Science Core Collection database, for the period 2018–April 2025. This interval is marked by the increase in international interest in urban sustainability, the emergence of new ecological business models and the consolidation of public policies favorable to the green economy. The paper aims to identify the main research directions, relevant actors and emerging themes related to how urban green spaces are perceived, valued and integrated by entrepreneurs in their development strategies (Table no. 1).

Table no 1. Data collection in WOS Core Collection between April 2018 and 2025

Year of publication	Number of items (all document types)
2018	71
2019	84
2020	103
2021	135
2022	172
2023	178
2024	219
April 2025	73
Total	**1255**

Table no. 1 highlights the evolution of the number of articles published in this field during the selected period. A constant increase in academic interest is noted, from 71 articles in 2018 to 219 in 2024, with a total of 1255 papers by April 2025. This dynamic confirms the consolidation of the research field located at the intersection of green spaces and entrepreneurship, in the context in which cities are becoming increasingly attentive to the ecological impact of economic development. The moderate increase in the period 2018–2020 (from 71 to 103 articles) reflects the incipient interest in the potential of green spaces to support local entrepreneurial initiatives – especially in areas such as sustainable tourism, community gardening or creative industries. Starting with 2021, the number of publications increases more sharply, reaching 135 articles in 2021, then 172 in 2022 and 178 in 2023, indicating the diversification of practical applications and the expansion of interdisciplinary approaches. During this period, researchers are increasingly exploring the role of entrepreneurs in the regeneration of green spaces and in mobilizing urban communities to protect the environment. The year 2024 marks a peak, with 219 papers, signaling a maturation of the field and a consolidation of research on the concepts of green entrepreneurship and nature-based business models. This intensification of scientific interest is most likely determined by the synergy between environmental policies, the increased demand for green spaces in post-pandemic cities and the new economic opportunities generated by the ecological transition. In the first months of 2025, 73 articles have already been identified, which suggests that a high publication trend is maintained. This fact supports the idea that topics related to entrepreneurship and green spaces continue to attract the interest of researchers, practitioners and policymakers, being perceived as key elements in the transition of cities towards sustainability. The evolution reflected in the table validates the choice of the analyzed period and confirms the existence of a solid scientific corpus, which allows the mapping of major research directions and collaboration networks around these two fundamental concepts. Using VOSviewer software (version 1.6.15), bibliometric maps were generated that highlight scientific collaboration networks and the impact of publications on understanding the connections between entrepreneurship and green spaces.

3. Results and discussion

Figure no. 1, created with the VOSviewer software (version 1.6.15), allowed the identification of a total of 393 relevant terms, grouped into 7 clearly delimited thematic clusters and connected by 12,973 links, with a total connection strength of 27,592. The high semantic density of the network highlights a mature, well-structured and strongly interdisciplinary research field, in which the concepts of entrepreneurship and green spaces are found at the center of various thematic interactions, relevant for sustainable urban development. Cluster 1 (green, center-left) dominated by the term "entrepreneurship" is centrally positioned and represents the conceptual core of the network. This cluster is connected with terms such as technology, efficiency, investment, growth, policy, research and development and green technology. Its central position suggests that entrepreneurship functions as a point of intersection between the economic and ecological dimensions of the city. The interconnection with terms such as environmental protection and clean technology indicates an *emerging integration of green spaces into sustainable entrepreneurial strategies (Chen et al., 2022). Cluster 2 (red, southwest) is positioned in the lower left of the map and revolves around the terms green economy, governance, climate change, urbanization and energy transition. It brings into discussion the systemic dimension and ecological policies, within which green spaces are seen as essential infrastructure for resilient cities and attractive for entrepreneurial initiative. The connection with entrepreneurship is made indirectly, through the themes related to green growth and environment, which emphasize the value of green spaces as a competitive advantage for urban businesses (Yu and Gibbs, 2020). Cluster 3 (yellow, northeast) located in the upper right, is centered on terms such as green innovation, firm performance, competitive advantage, capabilities, business performance and green entrepreneurial orientation. This cluster directly supports the link between investments in green spaces and entrepreneurial performance, providing an analytical perspective on how the valorization of natural resources contributes to obtaining economic advantages (Palmié et al., 2024). Cluster 4 (blue, southeast), located in the lower right part of the map, includes terms such as education, entrepreneurial intention, self-efficacy, students, university and attitudes. The relevance of this cluster for the research topic lies in the fact that it highlights the formation of an ecological entrepreneurial culture from the educational environment, with an emphasis on the integration of green values in the mentality of young entrepreneurs. Also, the emphasis on green entrepreneurship and sustainability orientation indicates an inclination towards business in harmony with nature, among the new generation of entrepreneurs. Cluster 5 (purple, northwest), narrower and located in the upper part of the image, includes terms such as signaling theory, empirical evidence and green product innovation, reflecting the methodological and conceptual dimension of research in the field. Although more technical, this cluster supports the empirical validation of the relationships between green spaces and innovative entrepreneurial strategies. Cluster 6 (orange, east) occupies the right-center position and is composed of terms such as models, orientation, behavior, creativity, decision-making and corporate responsibility, suggesting the psychological and decision-making aspects involved in the adoption of green entrepreneurial practices. The connection of this cluster with "entrepreneurship" is visible in the concern for how the perception of green spaces influences entrepreneurial behavior and business sustainability. Cluster 7 (pink, center-south), where we find social entrepreneurship, challenges, framework, development and community, is positioned immediately below "entrepreneurship" and connects the economic and social dimensions. This cluster reflects the involvement of social entrepreneurs in green regeneration projects, urban agriculture and circular economy, supporting the idea that positive perceptions of green places can fuel social innovation (Beeri et al., 2020).

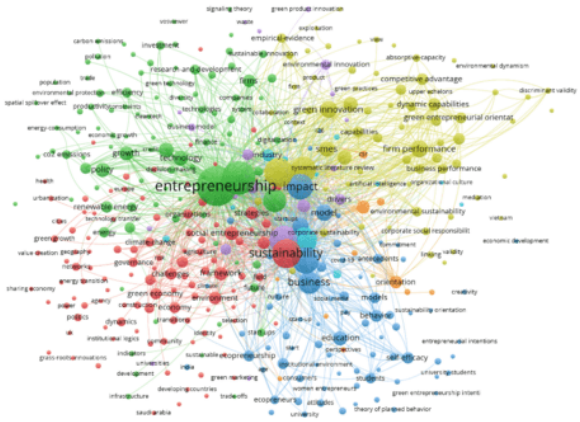

Figure no. 1. Term co-occurrence map based on text data (2018 – April 2025) - Network visualization

Overall, the structure of the semantic network and the positioning of the clusters confirm that "entrepreneurship" is a pivotal concept around which themes such as sustainability, green innovation, education, ecological policies and social cohesion gravitate. The presence and positioning of these clusters show that green spaces are not just urban backdrops, but relevant economic actors in modern entrepreneurial strategies, and entrepreneurs' perception of them becomes an essential indicator for the sustainable cities of the future. Figure no. 2 provides an overlay visualization made with the VOSviewer software (version 1.6.15), which allows analyzing the temporal evolution of the concepts associated with the theme "entrepreneurship and green spaces", in the interval 2018 – April 2025. Although the semantic structure of the network preserves the conceptual configuration presented previously, the colors assigned to the terms provide valuable information regarding the dynamics of scientific interest over time, according to the color scale illustrated in the lower part of the image.

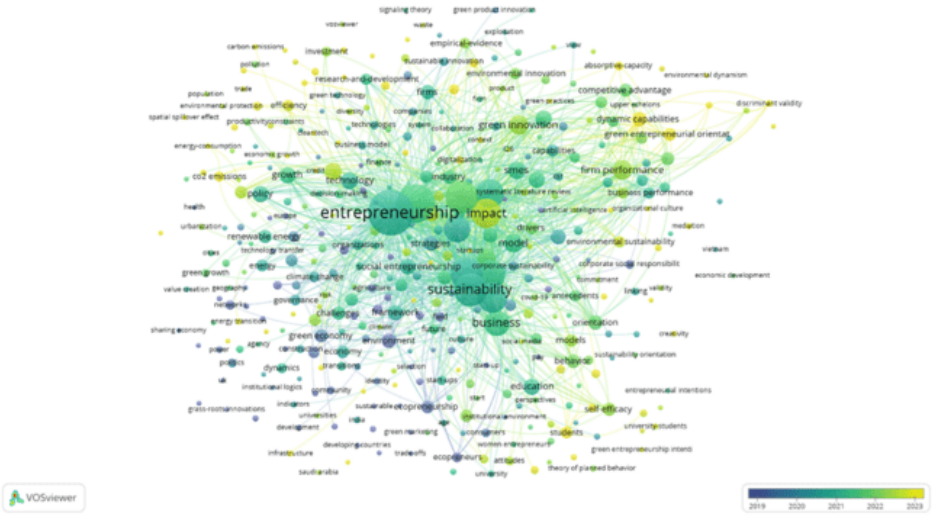

Figure no. 2. Overlay Viewing in VOSviewer

The terms marked with cool shades (blue, purple) indicate the topics predominantly addressed in the period 2018–2020. In this area, terms such as green economy, governance, grass-roots innovations, sharing economy or value creation are found, which suggests that the initial concerns focused on the conceptual and political framework of sustainability and the role of entrepreneurship in the green transition. These terms, although not central to the network, have formed the theoretical basis of some themes that will gain visibility in the following years. In contrast, the terms highlighted in warm shades (green, light yellow) are those that were intensively explored in the period 2021–2025. These include green entrepreneurial orientation, environmental sustainability, firm performance, self-efficacy, green innovation and students. The appearance of these terms in recent colors highlights the emergence of a research direction oriented towards the integration of sustainability into entrepreneurial strategies, with an emphasis on economic results and the formation of a new generation of environmentally conscious entrepreneurs.

Figure 3 presents a density visualization generated with the VOSviewer software, illustrating the frequency of occurrence of terms in the scientific literature related to entrepreneurship and green spaces. Each point on the map corresponds to a keyword, and the intensity of the color expresses the level of concentration: yellow and orange for high-density areas, green and blue for low-density. This representation allows the identification of dominant thematic cores, as well as emerging areas in an early stage of development (Figure no. 3).

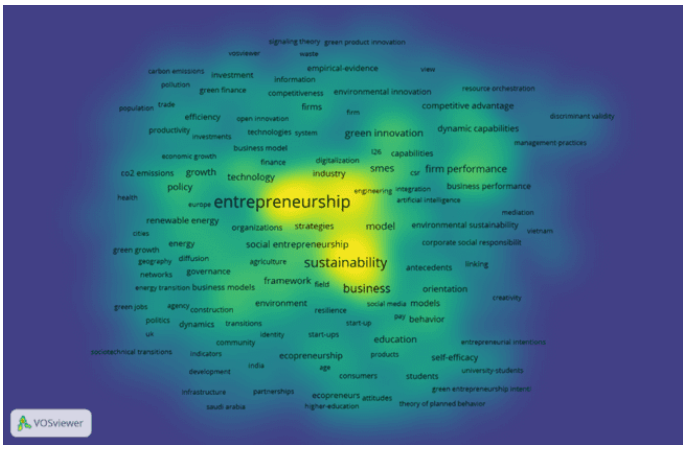

Figure no. 3. Viewing element density in VOSviewer

The center of the map is occupied by high-density terms, such as "entrepreneurship", "sustainability", "business", "technology", "policy" and "firm performance", colored in intense yellow. This indicates that these constitute the central and recurring themes in the analyzed literature, confirming the status of entrepreneurship as a thematic pivot in research related to sustainability and economic performance. At the same time, the dense presence of the terms strategies, model, growth and innovation underlines the emphasis placed on the development of green business models, oriented towards efficiency and ecological responsibility. In the peripheral areas, highlighted by shades of green-blue, we find terms such as eco-entrepreneurship, green entrepreneurship intent, green marketing, community, urban agriculture and infrastructure. These concepts, although less frequent, indicate emerging research directions that explore the role of entrepreneurs in urban regeneration and the valorization of green spaces as elements of social and economic innovation. The lower frequency of these terms reflects the fact that entrepreneurs' perception of green spaces is a topic under consolidation, with significant interdisciplinary development potential. Terms such as social entrepreneurship, governance, renewable energy and green economy, present in medium-density areas, indicate the intersection of entrepreneurship and ecological concerns at a systemic level, confirming that green spaces are increasingly perceived as economic and social assets in the sustainable development of cities (Yu and Gibbs, 2020; Vlasov, 2022).

Conclusions

Based on the detailed bibliometric analysis conducted in this research, focused on the relationship between entrepreneurship and green spaces in the context of urban sustainability, a number of significant conclusions can be formulated regarding current and future directions of research. The study used a robust set of bibliometric tools – in particular the VOSviewer software – to analyze the evolution of concepts, scientific collaboration networks, semantic density and geographical distribution of academic interest, providing a coherent and comprehensive picture of the field during the period 2018–April 2025. Data extracted from the Web of Science highlights a constant and accelerated growth in the volume of publications on sustainable entrepreneurship and the integration of green infrastructure into business strategies. The number of articles tripled over the analyzed period, from 71 papers in 2018 to over 200 in 2024, confirming that scientific interest in the connection between economy and urban ecology has become a priority topic. The predominance of research articles is complemented by a diversity of academic documents, from systematic reviews to case studies and theoretical contributions, reflecting a field in full maturation and with a solid interdisciplinary architecture. The constructed semantic maps demonstrated that central terms such as "entrepreneurship", "sustainability", "green innovation" and "firm performance" are positioned in the conceptual core of the literature, signaling a pronounced focus on the economic dimension of sustainability. Notably, the frequent appearance of terms such as eco-entrepreneurship, urban green infrastructure, green marketing or social entrepreneurship suggests a growing interest in the practical application of green spaces in business strategies and highlights the complexity of the relationships between the built environment, nature and economic innovation. Visualizing the temporal evolution of relevant terms shows a clear transition of academic interest: in the early years, research was focused on general concepts such as "green economy" or "renewable energy", while in the recent period (2021–2025) the emphasis has shifted towards behavioral and strategic terms such as green entrepreneurial orientation, self-efficacy, students, attitudes and performance. This shift indicates a deepening of the analysis of how

entrepreneurs perceive, value and integrate green spaces into organizational culture and business decisions. The thematic density analysis confirmed that the field is dominated by economic and strategic concepts, while terms from the social or urban area – such as community, urban regeneration, ecosystem services or governance – remain relatively underrepresented. This observation suggests that, although research has evolved significantly, the integration of the urban and social dimension of green spaces in the analysis of entrepreneurship requires further in-depth study, through qualitative methods, field studies and intersectoral research. Geographically, the analysis of international collaborations confirms the central role of China in producing knowledge on green spaces and entrepreneurship, with close links to countries in Asia, Europe and the Middle East. The United States remains relevant through the quality and impact of publications, while countries such as India, Pakistan, Malaysia and Romania are emerging players in applied research, demonstrating a growing interest in adapting sustainability concepts to local urban contexts. Germany, France and the United Kingdom continue to be dominant European hubs, with scientific activity oriented towards public policies and urban innovation. The map of collaborations also reflects a gradual globalization of research, with the increasing participation of countries from the Global South and transnational academic networks. Based on these results, several strategic directions for future research can be formulated. First, it is necessary to investigate in depth entrepreneurs' perceptions of the role of green spaces in generating economic, social and symbolic value. Qualitative research, based on local case studies and interviews with entrepreneurs, can complement quantitative approaches.

References

Adewunmi, Y., Chigbu, U.E., Mwando, S., Kahireke, U., 2023. Entrepreneurship role in the co-production of public services in informal settlements-A scoping review. *Land Use Policy*, 125, DOI:10.1016/j.landusepol.2022.106479.

Amjad, S., Khan, M.Z., 2025. From Mindset to Action: The Interplay of Psychological Capital and Risk-Taking in Women's Entrepreneurship in Balochistan. *Pakistan, Human Systems Management*, 7(6) DOI:10.1177/01672533251331494.

Beeri, I., Gottlieb, D., Izhaki, I., Eshet, T., Cohen, N., 2020. The Impact of Training on Druze Entrepreneurs' Attitudes Towards and Intended Behaviors Regarding Local Sustainability Governance: A Field Experiment at the Mount Carmel Biosphere Reserve, *Sustainability*, 12(11), DOI:10.3390/su12114584.

Bibu, N., Lisetchi, M., Mihaesu, V. and Solomon, A., 2024. Entrepreneurship Education As A Pillar Of The Sustainability Of Cultural And Creative Industries. The Case Of The Tracce Project, *Acta Technica Napocensis Series-Applied Mathematics Mechanics And Engineering*, Volume 67 Page:935-942 Special Issue SI,

Carfí, D, Donato, A., 2022. Plastic-Pollution Reduction and Bio-Resources Preservation Using Green-Packaging Game Coopetition, *Mathematics*, Volume 10 Issue 23, DOI:10.3390/math10234553.

Chen, X.H., Ma, M.H., Gant, R. and Zhang, X., 2022. Exploring The Role Of Innovation And Entrepreneurship In Environmental Sustainability: Evidence From Gba Cities In China, *Fresenius Environmental Bulletin*, Volume 31 Issue 9 Page:9378-9389.

Davis, T., Vandeventer, J.S., Warnaby, G and Bull, M., 2025. Urban regeneration and social entrepreneurship: A microhistorical study of a Community Land Trust, *Business History*, DOI:10.1080/00076791.2025.2485208.

Hu, W.L., Tresirichod, T., 2025. Green Entrepreneurial Orientation and Sustainable Performance: A Moderated Mediation Analysis in Chinese Manufacturing, *Tehnicki Glasnik-Technical Journal*, Volume 19 Issue 2 Page:252-260, DOI:10.31803/tg-20241018061352.

Huang, Q, Su, Z.H. and Yu, J.T., 2025. How low-carbon transition affects entrepreneurship: Evidence from China's low-carbon city pilot policy, *Journal of Environmental Management*, Volume 381, DOI: 10.1016/j.jenvman.2025.125247.

Koo, H.J., Kwon, K.H., 2025. A Meta-Analysis Study on the Factors Influencing Entrepreneurship Performance in the Beauty Industry, *Journal of Distribution Science*, Volume 23 Issue 2 Page:77-89, DOI:10.15722/jds.23.02.202502.77.

Lekgau, R.J., Daniels, T. and Tichaawa, T.M., 2025. The Sharing Economy, Inclusive Tourism Development and Entrepreneurship: A Case Study from South Africa, *Modern Geografia,* Volume 20 Issue 1 Page:65-82, DOI:10.15170/MG.2025.20.01.04.

Li, W.T., Xue, Z.J., Li, J.Y., Wang, H.K, 2022. The interior environment design for entrepreneurship education under the virtual reality and artificial intelligence-based learning environment, *Frontiers in Psychology*, Volume 13, DOI:10.3389/fpsyg.2022.944060.

Liu, T.T., Walley, K., Pugh, G. and Adkins, P., 2025. Entrepreneurship and trans-national education (TNE): insight based on entrepreneurial trait theory and the reflections of returnee Chinese graduates, *Journal of Entrepreneurship in Emerging Economies,* Volume 17 Issue 7 Page:226-250, DOI10.1108/JEEE-02-2024-0069.

Liu, Y., Alias, B.S. and Hamid, A.H.A., 2025. Student Entrepreneurship Competence and Its Contribution to Sustainable Development: A Systematic Review in the Context of Chinese Higher Education, *Sustainability*, Volume 17 Issue 7, DOI:10.3390/su17073148.

Long, T.B., Blok, V., 2021. Niche level investment challenges for European Green Deal financing in Europe: lessons from and for the agri-food climate transition, *Humanities & Social Sciences Communications*, Volume 8 Issue 1, DOI:10.1057/s41599-021-00945-0.

Mhlongo, Z., Ntshangase, S.D. and Ezeuduji, I.O., 2025. Youths' entrepreneurial intention for tourism and nontourism businesses: The influence of entrepreneurship education and gender, *Journal of the International Council for Small Business*, DOI:10.1080/26437015.2025.2469266.

Palau-Salvador, G., de Luis, A., Pérez, J.J. and Sanchis-Ibor, C., 2019. Greening the post crisis. Collectivity in private and public community gardens in Valencia (Spain), *CITIES*, Volume 92 Page:292-302, DOI:10.1016/j.cities.2019.04.005.

Palmié, M., Miehé, L., Mair, J. and Wincent, J., 2024. Valuation entrepreneurship through product-design and blame-avoidance strategies: How Tesla managed to change the public perception of sustainable innovations, *Journal of Product Innovation Management*, Volume 41 Issue 3 Page:644-676, Special Issue SI, DOI:10.1111/jpim.12732.

Raimi, L., Bamiro, N.B., 2025. Role of Islamic sustainable finance in promoting green entrepreneurship and sustainable development goals in emerging Muslim economies, *International Journal of Social Economics,* DOI:10.1108/IJSE-05-2024-0408.

Saleh, R., Drouillon, P., 2025. Innovative cultural entrepreneurship. Testing and prototyping solutions in 6 European regions, *CITIES*, Volume 162, DOI:10.1016/j.cities.2025.105924.

Shabbir, M.S., Batool, F., 2025. Social Entrepreneurship for Community Development: The Role of Social Capital in Establishing Sustainable Enterprises, *Journal of Social Entrepreneurship*, DOI:10.1080/19420676.2025.2492060.

Sodhi, S., Dwivedi, A.K., 2025. What Do Entrepreneurs with Disability Want? Understanding the Needs for Entrepreneurship Capacity Building Training Programmes, *Industry 4.0 and Advanced Manufacturing*, VOL 2, I-4AM 2024, Page319-331, DOI:10.1007/978-981-97-6176-0_27.

Tükel, Y., Akçakese, A., Demirel, M., Torun, G., 2025. The role of leisure involvement in fostering entrepreneurship orientation among Turkish women: a resource-based view, *Leisure Studies*, DOI:10.1080/02614367.2025.2495260.

Vlasov, M., 2022, In Transition Toward the Ecocentric Entrepreneurship Nexus: How Nature Helps Entrepreneurs Make Ventures More Regenerative Over Time, *Organization & Environment*, Volume 34 Issue 4 Page:559-580, Special Issue SI, DOI:10.1177/1086026619831448.

Xu, M., Yang, L. and Zheng, J., 2025. Application of collaborative filtering based on deep learning in college students' entrepreneurship project recommendation system, *Journal of Computational Methods in Sciences and Engineering*, DOI:10.1177/14727978251318997.

Yin, Z.H., Jiang, X.M. and Tong, P.R., 2025, Role conflicts and coping strategies of academic entrepreneurs in an immature entrepreneurship environment, *Humanities & Social Sciences Communications*, Volume:12 Issue 1, DOI:10.1057/s41599-025-04800-4.

Yu, Z., Gibbs, D., 2020. Unravelling the role of green entrepreneurs in urban sustainability transitions: A case study of China's Solar City, *Urban Studies*, Volume 57 Issue 14 Page:2901-2917, DOI:10.1177/0042098019888144.

Zhu, Y.F., 2025. The impact of corruption on resident entrepreneurship behavior and its mediating effect analysis: An empirical study based on China, *PLOS ONE*, Volume 20 Issue 4, DOI:10.1371/journal.pone.0317814.

Applying the Solow-Swan-Romer Framework to European Funds and NGEU: A Literature Review with a Focus on Romania

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Abstract

This paper reviews the application of the Solow-Swan and Romer growth models in order to analyze the impact of European Union Cohesion Policy, European Funds and NextGenerationEU on economic convergence, with a focus on Romania. Building on previous work on the topic, it examines studies on capital accumulation, technological progress, and efficiency factors — particularly transport infrastructure, accessibility, governance, water/waste/urban/health/educational infrastructure, quality of health/educational services, demographics, and urban agglomeration — in the European Union and Romania. The review identifies gaps in region-specific analyses, population evolution, and agglomeration effects, justifying a tailored model for Romania's growth dynamics. It emphasizes NextGenerationEU's reform-driven approach as complementary to Cohesion Policy, enhancing efficiency in neoclassical models.

Keywords

Cohesion Policy, NextGenerationEU, Neo-classical theory, Macroeconomic impact.

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Introduction

The European Union (EU) Cohesion Policy, allocating ~33% of the EU budget (€347 billion in 2007 – 2013, €352 billion in 2014–2020), aims to reduce economic disparities through investments in infrastructure, human capital, and innovation (Bachtler, Mendez and Wishlade, 2013). NextGenerationEU (NGEU), with €750 billion (2020 – 2024), complements this via the Recovery and Resilience Facility (RRF), targeting digital and green transitions (Bańkowski et al., 2022).

Costache and Boloș (2024) argue that Cohesion Policy enhances efficiency factors (e.g., infrastructure, governance, health/education services) in neoclassical growth models, crowding-in growth. The Solow-Swan model predicts conditional convergence through capital accumulation, while Romer's endogenous growth theory emphasizes innovation and human capital (Solow, 1957; Romer, 1990).

This paper reviews literature applying these models to EU funds and NGEU, focusing on Romania, a new member state with persistent regional disparities complemented by population decline. It addresses: (1) How have Solow-Swan and Romer models been used to study Cohesion Policy and NGEU?; (2) What are the Romania-specific findings and gaps, particularly regarding efficiency factors, population growth, and urban agglomeration? The review justifies a tailored model for Romania's regional growth.

1. Review of the scientific literature

1.1. Solow-Swan Model and Cohesion Policy

The Solow-Swan model posits that output $(Y = K^{\alpha}(AL)^{1-\alpha})$ depends on capital (K), labor (L), and technology (A), with capital accumulation $(\dot{K} = sY - \delta K)$ driving conditional convergence (Solow, 1957). Barro and Sala-i-Martin (1992) extend this framework, emphasizing conditional convergence across regions, providing a theoretical basis for disparity reduction goals.

Labor supply grows at the population growth rate (n), $(\dot{L} = nL)$, which, if negative, reduces aggregate output but increases capital per worker (Prettner and Bloom, 2020).

Crucitti et al. (2022) and European Commission (2023) estimate a 1.5–2% annual convergence rate for EU regions, including Romania, supported by ERDF and CF investments in transport infrastructure (€70 billion in 2014–2020), with stronger effects in less-developed regions like for example Nord-Est region in Romania (Haiduc, Nicoară and Neagu, 2024; Crucitti et al., 2024). Calderon and Serven (2014) provide a broader perspective, noting that infrastructure investments globally enhance economic growth, reinforcing their critical role in Romania's lagging regions. Becker, Egger and von Ehrlich (2018) report similar rates (1–2%) for Objective 1 regions (1989–2013), driven by infrastructure and human capital investments. Cappelen et al. (2003) earlier confirmed similar convergence trends in pre-2004 EU regions, setting a precedent for Romania's post-accession experience. Rodriguez-Pose and Fratesi (2004) and Esposti and Bussoletti (2008) further demonstrate that Objective 1 funds drive regional convergence.

Hong, Chu and Wang (2011) find that land transport infrastructure (e.g., highways, railways) boosts regional growth in China, with stronger effects in underdeveloped areas, suggesting applicability to Romania's infrastructure-poor regions like Nord-Est. Haiduc, Nicoară and Neagu (2024) confirm a strong correlation between transport infrastructure spending and EU economic growth, particularly in land transport, while Nistor and Popa (2014) highlight high returns in Romania's lagging regions like Nord-Est.

Crescenzi and Rodriguez-Pose (2012) note that transport's growth effects vary, mediated by governance and accessibility, with Rodriguez-Pose (2020) emphasizing institutional quality as a critical factor. Eden and Kraay (2014) show that public capital crowds-in private investment, enhancing growth, aligning with Costache and Boloş (2024). Convergence depends on institutional efficiency, with Ederveen et al. (2006) arguing that funds are most effective in regions with strong public services.

Ramajo et al. (2008) emphasize interregional spillovers from infrastructure, enhancing accessibility, while Glaeser (2011) argues that urban agglomeration boosts productivity, mitigating population decline's impact in urban poles.

1.2. Romer's Endogenous Growth and NGEU

Romer (1990) models technological progress $(\dot{A} = \gamma H_A A)$ as endogenous, driven by human capital (H_A) and innovation. Cohesion Policy's ESF+ and ERDF R&D investments align with this framework, with Becker et al. (2010) reporting 3–7% productivity gains in funded regions. Bradley and Untiedt (2012) estimate 4–10% GDP increases in new member states, driven by education and innovation. Mankiw, Romer and Weil (1992) augment the Solow model with human capital, showing that education and health investments enhance growth, critical for Romania's convergence. NGEU's RRF (€650 billion) enhances Romer's model by funding digital infrastructure and human capital, with Bańkowski et al. (2022) projecting a 1.5% EU GDP rise by 2026. Paliova and Lisivkova (2022) estimate a 0.5–1% GDP boost for CEE countries, including Romania, from RRF investments.

Tondl and Vuksic (2003) highlight that institutional barriers, such as corruption and bureaucratic inefficiencies, constrain the effectiveness of Structural Funds in promoting endogenous growth, necessitating model adaptations to incorporate governance quality (Rodriguez-Pose and Garcilazo, 2015). Zhang and Fan (2004) show that combining infrastructure with education accelerates convergence, while Arbia, Battisti and Di Vaio (2010) highlight institutions' role in regional growth. Urban agglomeration supports innovation, with Glaeser (2011) noting that cities like Cluj-Napoca drive productivity despite population decline. Prettner and Bloom (2020) warn that negative population growth reduces the R&D workforce, necessitating efficiency factors like health and education services. Hong, Chu and Wang (2011) suggest that transport infrastructure facilitates knowledge spillovers, supporting Romer's framework.

1.3. Romania-Specific Findings

Romania, receiving €19.2 billion (2007–2013), €22.5 billion (2014–2020), and €15 billion (2021–2023, including NGEU), saw GDP per capita rise from 52% to 78% of the EU average by 2022 (Eurostat, 2023). Population decline (19.05M in 2023 vs. 21.5M in 2007) and out-migration reduce labor supply, but urban agglomeration in centers like Cluj-Napoca mitigates this by concentrating skilled workers (Glaeser, 2011).

EU funds have supported SMEs and infrastructure development, contributing to employment growth and economic activity, particularly in less-developed regions (Zaman and Georgescu, 2014; Antohi et al., 2020). Coppola et al., 2023 shows that the same phenomena happened in Italy. Haiduc, Nicoară and Neagu (2024) suggest that transport infrastructure investments yield high returns in regions like Nord-Est, where motorway density is 0 km/sq.km. Hong, Chu and Wang (2011) and Nistor and Popa (2014) reinforce growth potential for regions like Nord-Est, while Crucitti et al. (2022) highlights GDP growth of 4.25–4.47% in Romania's lagging regions, such as Nord-Est, driven by Cohesion Policy investments in infrastructure and education (Crucitti et al., 2024).

Blouri and von Ehrlich (2020) highlight spillovers from transport infrastructure, aligning with Costache and Boloş (2024)'s crowding-in emphasis. European Commission (2021) note that NGEU's €14.2 billion RRF for Romania supports digital (20.5%) and green (41%) transitions, with reforms simplifying procurement and enhancing administrative capacity to improve governance efficiency. Carraro et al. (2022) underscore Romania's inclusion in NGEU's recovery framework, emphasizing sustainable growth through digital and green investments. However, absorption rates (80–90% vs. Poland's 95%) and bureaucratic inefficiencies limit impacts (Zaman and Georgescu, 2014). Education and health, supported by ESF+, face challenges, with Romania's tertiary attainment (22.5% vs. EU 43.1%) and high avoidable mortality (694.8 vs. EU 294.1) indicating gaps (Eurostat, 2023).

Bostan et al. (2022) argue that infrastructure and education investments yield higher SME growth in Nord-Est, but governance issues persist in limiting fund effectiveness. Fidrmuc et al. (2019) find convergence benefits but note institutional constraints. Rodriguez-Pose (2020) emphasizes Romania's low governance quality in rural areas like Nord-Est. Augusztin et al. (2025) further highlight that institutional quality significantly enhances EU fund effectiveness in Romania, particularly in addressing governance inefficiencies.

Albulescu and Goyeau (2013) find that EU funds contribute to economic growth through infrastructure and education, though low absorption limits short-run impacts. Pfeiffer et al. (2023), European Commission (2021), and Paliova and Lisivkova (2022) project a ~0.8% GDP boost for Romania by 2027 from RRF-funded digital infrastructure and education. Matei and Opritescu (2017) estimate a 0.7% GDP increase from transport projects. Crescenzi and Giua (2016) call for region-specific analyses to address disparities (e.g., Nord-Vest's urban hubs vs. Nord-Est's agricultural reliance).

Antohi et al. (2020), highlights the critical role of European funds in boosting Romania's economic development, particularly through SME support and regional investments. This is confirmed by latest Eurostat data showing an increase of Romania's GDP per capita from 52% to 78% of the EU average between 2007 and 2023, even though governance challenges remain a hurdle to maximizing these gains. Surubaru (2021) details Romania's RRF implementation, noting challenges in governance and administrative capacity that affect fund utilization.

2. Research methodology

The literature review employed a systematic approach to identify and analyze studies on the application of Solow-Swan and Romer growth models to EU Cohesion Policy and NextGenerationEU, with a focus on Romania's regional convergence.

Academic databases (e.g., Scopus, Web of Science, Google Scholar) and institutional repositories (e.g., European Commission, Eurostat) were searched using keywords such as "Solow-Swan," "Romer," "Cohesion Policy," "NGEU," "Romania," "regional convergence," and efficiency factors (e.g., "transport infrastructure," "governance," "urban agglomeration").

Inclusion criteria prioritized peer-reviewed articles, working papers, and reports from 2003–2024, emphasizing Romania-specific studies and recent EU-wide analyses (post-2018) to capture current Cohesion Policy (2014–2020, 2021–2027) and NGEU developments.

Sources were excluded if they lacked relevance to growth models, EU funds, or Romania's context. A total of 50 sources were selected, with 14 directly addressing Romania.

The analysis followed a thematic framework, categorizing studies by their application to Solow-Swan (e.g., capital accumulation, infrastructure, Crucitti et al., 2024) and Romer models (e.g., human capital, innovation, Becker et al., 2010), and their relevance to Romania's efficiency factors (Transport infrastructure, Accessibility, Governance, Water/waste/urban/health/educational infrastructure, Quality of health and education services and Urban agglomeration).

Each source was evaluated for its contribution to understanding regional disparities (focusing on Nord-Vest vs. Nord-Est regions of Romania), governance challenges, and fund impacts, with gaps identified through comparative analysis (e.g., limited regional models, Crescenzi and Giua, 2016). Iterative cross-referencing ensured accuracy, addressing initial citation errors (e.g., Bostan et al., 2022 for Antohi et al., 2020) and prioritizing primary sources (e.g., European Commission, 2021). This methodology enabled a comprehensive synthesis, justifying a tailored model for Romania's growth dynamics.

3. Results and discussion

The literature reveals several gaps critical to understanding Romania's growth dynamics:

- Regional Analyses: Few studies apply Solow-Swan-Romer models to Romania's regions (e.g., Nord-Vest vs. Nord-Est), despite disparities in infrastructure, accessibility, and agglomeration (Crescenzi and Giua, 2016; Crucitti et al., 2022).
- Population Dynamics: Limited research explores population growth's interaction with efficiency factors in EU convergence models. Romania's population decline (19.05M in 2023 vs. 21.5M in 2007) reduces labor supply and innovation potential, necessitating models that account for negative growth rates (Prettner and Bloom, 2020).
- Urban Agglomeration: Scarcity of studies on how urban agglomeration mitigates population decline's impact in Romania, particularly through concentrating labor, capital, and services in urban poles like Cluj-Napoca (Glaeser, 2011). Rural regions like Nord-Est face depopulation risks without improved accessibility (Ramajo et al., 2008).
- Transport Infrastructure: While transport infrastructure's role in economic growth is well-documented (Haiduc, Nicoară and Neagu, 2024; Nistor and Popa, 2014; Crucitti et al., 2024; Nițu, Uricaru and Negreponti-Delivanis, 2024), its differential impact across Romania's regions and its interaction with governance and accessibility require further exploration (Crescenzi and Rodriguez-Pose, 2012; Crescenzi et al., 2016; Rodriguez-Pose and Garcilazo, 2015; Tondl and Vuksic, 2003; Pîrvu et al., 2018).
- Institutional Factors: Insufficient focus on governance quality as a mediator of fund impacts, especially in declining populations (Tondl and Vuksic, 2003; Rodriguez-Pose, 2020).
- NGEU Integration: Emerging reflections on NGEU (e.g., Carraro et al. (2022); Paliova and Lisivkova, 2022) lack integration with neoclassical models, particularly for Romania's urban-rural dynamics.
- Efficiency Factors: The roles of accessibility, health/educational services, population growth, and agglomeration in Romania's convergence require deeper analysis, despite evidence of transport's high returns in underdeveloped regions (Albulescu and Goyeau 2013; Hong, Chu and Wang, 2011; Zhang and Fan, 2004).
- Model Adaptations: Existing models rarely account for Romania's low R&D (0.46% of GDP), institutional barriers, negative population growth, and agglomeration effects, necessitating tailored frameworks that integrate these efficiency factors (Rodriguez-Pose and Garcilazo, 2015).

These gaps justify a modified Solow-Swan-Romer model incorporating efficiency factors, population growth, urban agglomeration, and transport infrastructure to analyze Romania's regional growth, as proposed in subsequent research.

Conclusions

The Solow-Swan and Romer models effectively explain Cohesion Policy and NGEU's growth impacts, with transport infrastructure, accessibility, governance, health/educational services, population growth, and urban agglomeration driving convergence in capital-scarce regions like Romania.

NGEU's reform-driven approach enhances these efficiency factors, complementing Cohesion Policy. However, Romania-specific studies, particularly on regional disparities, population decline, agglomeration effects, and transport infrastructure's differential impacts, are scarce, and institutional barriers require model adaptations.

This review justifies a tailored Solow-Swan-Romer model for Romania, integrating efficiency factors to address these gaps, as proposed in subsequent research.

References

Albulescu, C. T. and Goyeau, D., 2013. EU Funds Absorption Rate and the Economic Growth. *Timisoara Journal of Economics and Business*, 6(20), pp.153–170.

Antohi, V.-M., Zlati, M. L., Ionescu, R. V., Neculita, M., Rusu, R., & Constantin, A. (2020). Attracting European Funds in the Romanian Economy and Leverage Points for Securing their Sustainable Management: A Critical Auditing Analysis. *Sustainability*, 12(13), 5458. DOI: 10.3390/su12135458.

Arbia, G., Battisti, M. and Di Vaio, G., 2010. Institutions and Geography: Empirical Test of Spatial Growth Models for European Regions. *Economic Modelling*, 27(1), pp.12–21. https://doi.org/10.1016/j.econmod.2009.07.004.

Augusztin A., Iker. Á., Monisso, A., Szörfi, B., 2025, The growth effect of EU funds – the role of institutional quality, *Working Paper Series, No. 3014*, ECB, https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp3014~757446ef99.en.pdf

Bachtler, J., Mendez, C. and Wishlade, F., 2013. *EU Cohesion Policy and European Integration*. Farnham: Ashgate Publishing.

Bańkowski, K., Bouabdallah, O., Semeano, J. D., Dorrucci, E., Freier, M., Jacquinot, P., Modery, W., Rodríguez-Vives, M., Valenta, V., & Zorell, N. (2022). The Economic Impact of Next Generation EU: A Euro Area Perspective. *ECB Occasional Paper No. 291* https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op291~18b5f6e6a4.en.pdf.

Barro, R. J., & Sala-i-Martin, X. (1992). Convergence. *Journal of Political Economy*, 100(2), 223–251.

Becker, S.O., Egger, P.H., von Ehrlich, M. and Fenge, R., 2010. Going NUTS: The Effect of EU Structural Funds on Regional Performance. *Journal of Public Economics*, 94(9–10), pp.578–590. https://doi.org/10.1016/j.jpubeco.2010.06.006.

Becker, S.O., Egger, P.H. and von Ehrlich, M., 2018. Effects of EU Regional Policy: 1989–2013. *Economic Policy*, 33(94), pp.213–263. https://doi.org/10.1016/j.regsciurbeco.2017.12.001.

Blouri, Y. and von Ehrlich, M., 2020. On the Optimal Design of Place-Based Policies: A Structural Evaluation of EU Regional Transfers. *Journal of International Economics*, 125, p.103319. https://doi.org/10.1016/j.jinteco.2020.103319.

Bostan I., Moroşan, A.-A., Hapenciuc, C.-V., Stanciu, P. and Condratov, I., 2022. Are Structural Funds a Real Solution for Regional Development in the European Union? A Study on the Northeast Region of Romania, *Journal of Risk and Financial Management*, 15(6), p.232. https://doi.org/10.3390/jrfm15060232.

Bradley, J. and Untiedt, G., 2012. Assessing the Macroeconomic Impact of EU Cohesion Policy: What can economic models tell us. *Hermin Working Paper 2-2012*, ISSN: 2194-7708.

Calderon, C., & Serven, L. (2014). Infrastructure, Growth, and Inequality: An Overview. *World Bank Policy Research Working Paper* 7034.

Carraro, C., Cœuré, B., Dhand, O., Eichengreen, B., Mills M., Rey, H., Sapir, A., *A New Era for Europe. How the European Union Can Make the Most of its Pandemic Recovery, Pursue Sustainable Growth, and Promote Global Stability*, Brussels, Publication Office of the European Union

Cappelen, A., Castellacci, F., Fagerberg, J. & Verspagen, B. (2003). The Impact of EU Regional Support on Growth and Convergence in the European Union. *Journal of Common Market Studies*, 41(4), 621–644.

Coppola, G., Destefanis, S., Marinuzzi, G. & Tortorella W. (2023) Regional policies and sec-toral outputs in Italy, *Regional Studies*, 57:11, 2192-2206.

Costache, C.M. and Boloş, M.I., 2024. On European Union Economic Growth: Is Cohesion Policy Still Relevant? *Annals of the University of Oradea*, Economic Science Series, 33(2), p.115.

Crescenzi, R. and Giua, M., 2016. The EU Cohesion Policy in Context: Does a Bottom-Up Approach Work in All Regions? *Environment and Planning C: Government and Policy*, 34(5), pp.745–766. https://doi.org/10.1177/0308518X16658291.

Crescenzi, R. and Rodriguez-Pose, A., 2012. Infrastructure and Regional Growth in the European Union. *Papers in Regional Science*, 91(3), pp.487–513. https://doi.org/10.1111/j.1435-5957.2012.00439.x.

Crescenzi, Riccardo & Di Cataldo, Marco & Rodríguez-Pose, Andrés. (2016). Government Quality and The Economic Returns of Transport Infrastructure Investment in European Regions. *Journal of Regional Science*. 56. 553-582.

Crucitti, F., Lazarou, N.-J., Monfort, P., & Salotti, S. (2022). A Cohesion Policy Analysis for Romania towards the 2021-2027 Programming Period. *JRC Working Papers on Territorial Modelling and Analysis,* No. 06/2022, https://hdl.handle.net/10419/265243.

Crucitti, F., Lazarou, N.J., Monfort, P. and Salotti, S., 2024. The Impact of the 2014–2020 European Structural Funds on Territorial Cohesion. *Regional Studies*, 58(3), pp.456–471. https://doi.org/10.1080/00343404.2023.2243989.

Eden, M. and Kraay, A., 2014. Crowding in and the Returns to Government Investment in Low-Income Countries. *Policy Research working paper; no. WPS 6781* Washington, DC: World Bank Group. http://documents.worldbank.org/curated/en/183961468154154131.

Ederveen, S., de Groot, H.L.F. and Nahuis R., 2006. *Fertile Soil for Structural Funds? A Panel Data Analysis of the Conditional Effectiveness of European Cohesion Policy*. Kyklos, 59(1), pp.17–42. https://doi.org/10.1111/j.1467-6435.2006.00318.x.

Esposti, R., & Bussoletti, S. (2008). Impact of Objective 1 Funds on Regional Growth Convergence in the European Union: A Panel-Data Approach. *Regional Studies*, 42(2), 159–173.

European Commission, 2023. Regional Trends for Growth and Convergence in the European Union, [online] Available at: < https://ec.europa.eu/regional_policy/sources/reports/swd_regional_trends_growth_convergence_en.pdf> [Accessed 20 May 2025].

European Commission, 2021. *Romania's Recovery and Resilience Plan*, [online] Available at: <https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/romanias-recovery-and-resilience-plan_en#documents>[Accessed 20 May 2025].

Eurostat., 2023. *Sustainable Development Goals Indicators*, [online] Available at: <https://ec.europa.eu/eurostat/web/sdi>[Accessed 20 May 2025].

Fidrmuc, J., Hulényi, M., Zajkowska, O. (2019). The Elusive Quest for the Holy Grail of an Impact of EU Funds on Regional Growth. *CESifo Working Papers*, 7989/2019.

Glaeser, E.L., 2011. *Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier* New York: Penguin Press.

Haiduc, A., Nicoară, S. and Neagu, O., 2024. Transport Infrastructure Development and Economic Growth in the European Union. *The Annals of the University of Oradea*. Economic Sciences, TOM XXXIII, 1st Issue, pp.59–74.

Hong, J., Chu, Z. and Wang, Q., 2011. Transport Infrastructure and Regional Economic Growth: Evidence from China. *Transportation*, 38(5), pp.737–752. https://doi.org/10.1007/s11116-011-9349-6.

Mankiw, N.G., Romer, D. and Weil, D.N., 1992. A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics*, 107(2), pp.407–437. https://doi.org/10.2307/2118477.

Matei, G. and Opritescu, E.M., 2017. Methods of Quantifying the Impact of Structural Funds Absorption on Regional Development. *Finante - Provocarile Viitorului*, 1(19), pp.19–27.

Nistor, F. & Popa, C. (2014). The Role of Transportation in Economic Development. *"Mircea cel Batran" Naval Academy Scientific Bulletin*. XVII. 10-12.

Nițu, R., Uricaru, R., and Negreponti-Delivanis, M., 2024. From Roads to Riches: Infrastructure Development as a Method of Driving Growth in Romania National Economy. *Proceedings of the 7th International Conference on Economics and Social Sciences.* Bucharest, ASE, 6(1), pp.890–904.

Paliova, I. & Lisivkova, T. (2022). Assessing the European Funds' impact on economic growth and the New Generation Europe prospects. DOI: 10.2478/9788366675261-006.

Pfeiffer P., Varga J. & in 't Veld, J. (2023). Unleashing Potential: Model-Based Reform Benchmarking for EU Member States. European Economy Discussion Papers, 192, doi:10.2765/548186 (online).

Pîrvu, R., Bădîrcea, R., Manta, A., & Lupăncescu, M. (2018). The Effects of the Cohesion Policy on the Sustainable Development of the Development Regions in Romania. Sustainability, 10(7), 2577. DOI: 10.3390/su10072577.

Prettner, K., and Bloom, D.E., 2020. *Automation and its Macroeconomic Consequences: Theory, Evidence, and Social Impact*. Cambridge: Cambridge Academic Press.

Ramajo, J., Márquez, M.A., Hewings, G.J.D. and Salinas, M.M., 2008. Spatial Heterogeneity and Interregional Spillovers in the European Union: Do Cohesion Policies Encourage Convergence Across Regions? *European Economic Review*, 52(3), pp.551–567. https://doi.org/10.1016/j.euroecorev.2007.05.006.

Rodriguez-Pose, A., & Fratesi, U. (2004). Between Development and Social Policies: The Impact of European Structural Funds in Objective 1 Regions. *Regional Studies*, 38(1), 97–113.

Rodríguez-Pose, Andrés & Garcilazo, Jose. (2015). Quality of Government and the Returns of Investment: Examining the Impact of Cohesion Expenditure in European Regions. *Regional Studies*. 10.1080/00343404.2015.1007933.

Rodriguez-Pose, A., 2020. Institutions and the Fortunes of Territories. *Regional Science Policy & Practice*, 12(3), pp.371–386. https://doi.org/10.1111/rsp3.12277.

Romer, P. M., 1990. Endogenous Technological Change. *Journal of Political Economy*, 98(5), pp.71–102. https://doi.org/10.1086/261725.

Solow, R.M., 1957. A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics*, 70(1), pp.65–94. https://doi.org/10.2307/1884513.

Surubaru, N.-C. (2021). Implementing the Recovery and Resilience Facility in Romania. *Journal of European Integration*, 43(6), 723–739.

Tondl, G. and Vuksic, G., 2003. What makes regions in Eastern Europe catching up? The role of foreign investment, human resources and geography. *ZEI Working Paper, No. B 12-2003*, Rheinische Friedrich-Wilhelms-Universität Bonn, Zentrum für Europäische Integrationsforschung (ZEI), Bonn, https://hdl.handle.net/10419/39510.

Zaman, G. and Georgescu, G., 2014. The absorption of EU Structural and Cohesion Funds in Roma-nia: international comparisons and macroeconomic impact. *Munich Personal RePEc Archive*, https://mpra.ub.uni-muenchen.de/57450/

Zhang, X. and Fan, S., 2004. Infrastructure and Regional Economic Development in Rural China. *China Economic Review*, 15, pp.203–214.

Digital transformation and emerging new technologies challenges

Problems and Solutions: Cybersecurity a Key Point in the Digitalization Stage for the Romanian Public Sector

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Abstract

This article analyses digital challenges and opportunities. Currently, in Romania, the Public Administration is at a crossroads, as it faces ups and downs in terms of digital transformation, especially in terms of cybersecurity but also the effects on employees. There is great potential for simplifying services, reducing bureaucracy, but currently we are faced with outdated IT systems, bureaucratic bottlenecks and an unskilled workforce unprepared for technological modernization. To analyse and find solutions to these problems, this study is based on a combination of existing research and insights from 136 interviews with public sector employees as well as IT experts and decision-makers in Romania. Using NVivo to analyse the data – sorting by themes and word patterns – presented a harsh reality of the current system: Romania's digital infrastructure is underfunded, systems rarely work well together, and cybersecurity issues are a constant concern. Bureaucracy exacerbates the problems, slowing down work even more, and many employees lack the technological skills needed to keep up. However, digitalization has massive potential to turn things around, provided it is accessible to all. This research brings a new vision of the growing complexity of digitalization in the Romanian public sector. Through an analysis of interviews and the use of NVivo, the study identifies non-religious points that influence the success of the transformation and proposes concrete strategies for stabilizing cybersecurity, increasing the skills of public sector employees, and optimizing digital public services. The findings of this study can be used as a guide for public sector leaders in developing policies and programs to develop the digital system and increase cybersecurity. Measures are proposed to increase the amounts allocated for investments in IT infrastructure, conduct employee training courses, stabilize national standards, and encourage public-private collaboration.

Keywords

Digital transformation, employee motivation, public institutions, digital leadership, adaptability, emerging technologies, organizational culture.

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Introduction

This shift toward digital systems is turning public institutions inside out, reshaping workflows, workplace culture, and what keeps employees motivated. Tools like artificial intelligence, automated processes, and cloud-based platforms promise to make operations smoother and more transparent (Westerman, Bonnet, & McAfee, 2019). The increased visibility of employee behaviours through digital tools can further influence workplace dynamics and motivation (Leonardi & Treem, 2020). Picture clerks breezing through tasks instead of wading through endless forms—it's a vision that can lift job satisfaction (Baptista et al., 2020). Picture clerks breezing through tasks instead of wading through endless forms—it's a vision that can lift job satisfaction (Baptista et al., 2020). But the road isn't easy. New tech can spark stress, pushback, or fears about job security (Vial, 2019). Success hinges on leaders who inspire and practical support like user-friendly training. This research dives into how digitalization shapes motivation in Romania's public sector, using interviews and NVivo analysis to capture employees' perspectives. The findings pinpoint what fuels engagement—or kills it—and offer ideas for helping workers embrace tech without feeling lost.

1. Research Methodology

This study uses a qualitative research approach to investigate the challenges and opportunities of digitalization and cybersecurity in public administration in Romania. The methodology is designed to capture in-depth perspectives of public sector stakeholders, combining empirical data collection with systematic data analysis to develop a comprehensive understanding of the issues at hand.

1.1 Data Collection

The data source for this study consists of 136 semi-structured interviews conducted with a diverse group of participants, including public sector employees, IT specialists and decision-makers in Romania. The interviews were conducted to gain an impression of employees' digital transformation, cybersecurity issues and the motivation of people in public administration. Participants were selected through purposive sampling, a qualitative selection that allowed individuals based on their relevance to the research subject. Selection criteria included: *function* (administrative employees, IT specialists, managers), *experience in similar projects* (cybersecurity and digitalization), and *being employed at various public institutions*, such as universities, city halls, and other local authorities. To ensure impartiality, the sample included participants from both urban and rural areas, from central and local institutions, as well as from various regions of Romania (including Bucharest, Oltenia, Moldova, and Muntenia). This distribution allowed for the capture of a broader range of perspectives on digitalization in the context of the institution to which the employees belong. In the selection process, participants were identified through contact and recommendations, followed by an assessment of eligibility according to the aforementioned criteria. The number of 136 interviews was determined based on thematic saturation, at which point recurring themes became evident and additional data no longer brought significant new insights. The interviews were conducted both in person and online, depending on the participants' time and the data collection method, and were fully transcribed to ensure data accuracy.

1.2 Data Analysis

The data collected from the interviews were analysed in NVivo. This was followed by a three-stage thematic coding process:

- **Open Coding:** First, a detailed analysis of the interviews was conducted to find themes and concepts. Each text unit was inductively labelled, resulting in the extraction of 10 primary thematic codes, such as cybersecurity, digital skills, and bureaucracy, as described in Section 3.
- **Axial Coding:** In the second stage, the links between the initial codes were established to form higher-level thematic categories.
- **Selective coding:** The last stage united the themes found in a unified theoretical framework, focusing on the interaction between digitalization, cybersecurity and employee engagement with a focus on cybersecurity.

2. Problems identified in cybersecurity in public administration and possibilities for improvement

Romania has made significant progress in the digitalization of public administration, yet the implementation process remains cumbersome and faces numerous obstacles. Although initiatives such as Ghișeul.ro, the Virtual Private Space (SPV) platform, or the implementation of electronic signatures in certain institutions are important steps in modernizing the digital infrastructure, multiple structural and operational deficiencies persist.

2.1 Outdated information systems and lack of interoperability

One of the main challenges faced by Romania's public administration is the use of outdated IT systems, which limit administrative efficiency and complicate the data integration process between ministries and agencies. The lack of interoperability between various platforms and databases leads to redundant bureaucratic procedures and increases the processing time for citizen requests. According to the Digital Economy and Society Index (DESI), Romania consistently ranked last in the digitalization of public services from 2016 to 2020, a trend that persists in more recent assessments (European Commission, 2023). This situation highlights the need for substantial reforms in the digital transformation of public administration. Low Interoperability – A Major Issue - There are multiple unsynchronized databases. For example, the healthcare system (CNAS) and the population records system do not communicate efficiently, leading to issues in issuing health cards.

2.2 Bureaucracy slows down digitalization

Although certain public services, such as the issuance of birth or marriage certificates, are available online, in many localities, citizens are still required to appear in person to collect documents. This requirement reduces the efficiency of the digitalization process and discourages the use of electronic solutions. The previously mentioned study also highlights that, although a draft law regarding the establishment of a national framework for interoperability in the IT field was launched for public consultation in 2019, it had not been implemented by 2020. This delay reflects the systemic difficulties encountered in adopting and implementing the necessary reforms for the modernization of public administration.

2.3 Deficient cybersecurity

Romania has faced multiple cyberattacks on public institutions, including the website of the Ministry of Defence, highlighting the vulnerabilities of digital infrastructure and the need for significant investments in IT security. The lack of adequate protective measures exposes citizens' data to major risks. In 2022, several government websites were targeted by cyberattacks, demonstrating the fragility of the digital systems used by public administration. Romania's performance in the Global Cybersecurity Index underscores the need for enhanced cybersecurity measures to address these vulnerabilities (International Telecommunication Union [ITU], 2023). These incidents underscored the necessity for robust cybersecurity solutions designed to prevent security breaches and unauthorized access to sensitive information. According to an article published by NOD Academy, although the process of digitizing public services has seen significant acceleration in the last two years, major challenges persist regarding the strengthening of technological infrastructure and the implementation of effective data protection mechanisms. The global rise in cyber threats, as highlighted in the Global Cybersecurity Outlook 2023, emphasizes the urgency for Romania to adopt advanced cybersecurity solutions (World Economic Forum, 2023). Ensuring adequate cybersecurity is an essential component for success. To better understand the risks and possible solutions, I conducted a qualitative study based on 136 interviews with representatives of public institutions, IT specialists, and decision-makers. The analysis carried out in NVivo highlighted the growing concern for data protection, the urgent need for investments, and the importance of national standards in information security. Additionally, the analysis of the frequency of words used by respondents revealed that the most mentioned terms were *'cybersecurity*,' *'security*,' *'data*,' '*institutions*,' and *'protocols*.' This finding confirms the importance of these aspects in the debate on cybersecurity and underscores the need for coherent and well-implemented measures to protect the digital infrastructure of public administration.

Figure no. 1. The analysis of the frequency of words used by respondents in the context of cybersecurity

The analysis of the interviews highlighted four major issues in the cybersecurity of public administration:

Table no. 1. Challenges and solutions in the field of IT security: An analysis of respondents' perceptions

Category	Identified Aspects	Percentage of Respondents (%)
Challenges	Insufficient investment in security	82%
	Shortage of qualified personnel	76%
	Unclear legislation and poor enforcement	54%
	Lack of advanced protective measures	35%
Proposed Solutions	Increasing investments in IT infrastructure	88%
	Organizing regular training sessions	76%
	Establishing strict national standards	67%
	Collaborating with the private sector	64%

Investment deficiencies in cybersecurity pose a major threat to the IT infrastructures of public administration, an aspect highlighted by data obtained from a qualitative study based on 136 interviews with representatives of public institutions, IT specialists, and decision-makers. The analysis of these interviews, conducted in NVivo, revealed three main themes: the growing concern for data protection, the urgent need for investments, and the importance of national standards in information security.

Specifically, the data coding was conducted according to the following thematic categories:

- Perception of cybersecurity (*n=112 respondents* mentioned concerns about cyberattacks and their impact on institutions);
- Factors hindering investments (*n=97 respondents* reported administrative and financial barriers to fund allocation);
- The necessity of a national strategy (*n=89 respondents* emphasized the importance of regulations that mandate a minimum budget for cybersecurity protection).

3. The analytical process of thematic coding using NVivo

The qualitative analysis of the data obtained through interviews conducted as part of the study on cybersecurity and the digitalization of public administration was based on a rigorous process of thematic coding, carried out in three distinct stages: open coding, axial coding, and selective coding. This methodological approach allowed for the extraction and structuring of significant data categories, ensuring not only a systematic classification of the identified aspects but also their integration into a coherent analytical framework.

3.1 Open Coding – Initial Identification of Relevant Categories

The initial stage of thematic coding involved a detailed fragmentation of the interview corpus, with each textual unit being analysed and classified according to the emerging themes. The coding process was conducted in an inductive manner, through the systematic labelling of participants responses and the identification of recurring thematic nodes. In this stage, 10 main codes were extracted and defined, reflecting the central issues of digitalization and cybersecurity in the public sector:

Table no. 2. Challenges and opportunities of digitalization in the public sector: Analysis based on respondents' perceptions.

No.	Thematic Code	Percentage of Respondents	Causes
1	Cybersecurity	82%	Lack of a coherent strategy for protecting digital infrastructures.
2	Impact of digitalization	72%	Structural and functional transformations in public administration.
3	Digital Skills	64%	Lack of staff training, an obstacle to optimizing digital services.
4	Benefits of digitalization	61%	Reducing bureaucracy, streamlining processes, better access to services.

5	Technical Challenges	58%	Low interoperability, difficulties in integrating digital infrastructures.
6	Legislation and digitalization	57%	Legislative gaps in regulating cybersecurity.
7	Project Financing	53%	Difficulties in obtaining and managing funds.
8	Bureaucracy and digitalization	49%	Procedural inefficiencies, complexity of public procurement.
9	Accessibility of Services	46%	Discrepancies in the use of digital technologies by different social groups.
10	Resistance to Change	41%	Manifested at the decision-making level and among administrative staff.

This stage provided a solid empirical foundation for developing a system of categories that allows for an in-depth interpretation of the data.

3.2 Axial Coding – Establishing Relationships Between Identified Categories and Grouping Them into Main Themes

Axial coding involved establishing relationships between the initial codes and grouping them into higher thematic structures that reflect the interdependencies and causal mechanisms among the identified factors. In this stage, network diagrams and interconnection matrices in NVivo were used, facilitating the analysis of correlations between the essential dimensions of digitalization and cybersecurity. To identify connections between themes, Matrix Coding Query was employed, an advanced relational analysis method that allows for examining the frequency of co-occurrences between codes, thereby indicating the degree of interdependence among the thematic variables identified during the coding process.

The results obtained from the matrix co-occurrence query highlighted four central dimensions in the process of digitizing public administration:

- Financing and implementation of projects (A);
- Legislation and digitalization (B);
- Technical challenges (C);
- Resistance to change (D).

Table no. 3. Relationships between the central dimensions of digitalization in public administration: Results of the matrix co-occurrence analysis

	Financing and implementation of projects	Legislation and digitalization	Technical challenges	Resistance to change
Financing and implementation of projects	272	0	136	136
Legislation and digitalization	0	159	0	0
Technical challenges	136	0	408	272
Resistance to change	136	0	272	408

For each of these, the **frequencies of co-occurrence** were analysed, providing **quantitative indicators** of the **intensity of the relationships** between the thematic concepts.

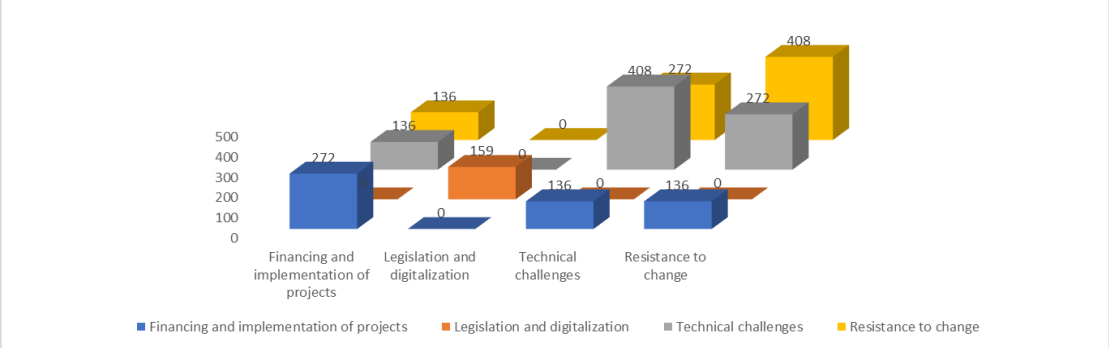

Figure no. 2. 3D representation of the relationships between the central dimensions of digitalization in public administration.

3.2.1. Relationship of themes between "Project financing and implementation" and other categories

- The most important relationship was identified between "Project financing and implementation" and "Technical challenges" (136 co-occurrences), and thus financial problems represent an important factor in their technical occurrence encountered in digitalization processes;
- An identical correlation (136 co-occurrences) is identified between "Project financing and implementation" and "Resistance to change", given that insufficient financial resources lead to reluctance towards digitalization, both at the structural and individual levels;
- The absence of a direct correlation between "Financing" and "Legislation and digitalization" (0 co-occurrences) shows that interview participants did not consider that regulatory aspects affect the possibility of accessing funds for the implementation of IT projects.

3.2.2 Legislation and digitalization – a domain seen as autonomous, without major interdependencies

This category registers a frequency of 159; However, it does not present co-occurrences with all the dimensions analyzed. This result shows that legislation is perceived as an independent element, which are not direct companies with financial, technical or resistance to change aspects.

3.2.3 Technical challenges – the dimension with the greatest impact on the digitalization process

- "Technical challenges" is the code with the highest total frequency of co-occurrence (408), indicating its central role in the NVivo analysis;
- The most important connections are with "Resistance to change" (272 co-occurrences), suggesting that technological difficulties are among the main factors hindering digital solutions;
- The interdependence with "Project financing and implementation" (136 co-occurrences) confirms that financial investments are an important factor in reducing technological difficulties.

3.2.4 Resistance to change – a dimension closely linked to technical challenges and financial resources

- "Resistance to change" shows the highest frequency of co-occurrence (408) with "Technical challenges", which shows that infrastructural deficiencies and the complexity of implementing IT solutions represent the main obstacles to digitalization;
- "Project financing and implementation" is also an associated factor of "resistance to change" (136 co-occurrences), confirming the impact of financial resources on the acceptance of digital transformation.

The relational analysis allowed the consolidation of three central themes:

1. Barriers and challenges in the digitalization of public administration
   - Associated Codes: bureaucracy and digitalization, digital skills of employees, resistance to change, financing and implementation of projects;
   - This theme reflects the systemic factors that hinder the effective implementation of digital technologies, including institutional deficiencies, competence gaps, and administrative obstacles.
2. Cybersecurity and IT infrastructure
   - Associated Codes: cybersecurity, technical challenges, legislation and digitalization;
   - This theme highlights the vulnerabilities of digital infrastructures, caused by underfunding, the lack of clear regulations, and difficulties in integrating modern technologies.
3. Benefits of digitalization and impact on citizens
   - Associated Codes: impact of digitalization, benefits of digitalization, accessibility of digital services for citizens;
   - This dimension emphasizes the transformative potential of digitalization, as well as the existing disparities in access to technology and digital public services.

Through this stage, a robust conceptual architecture was consolidated, capable of explaining the investigated phenomena within a coherent analytical framework.

3.3 Selective Coding – Integrating Major Themes into a Coherent Analysis

The final stage of the analysis involved organizing the main themes and integrating them into a coherent theoretical framework, which would explain the link between digitalization and cybersecurity in the context of public authorities. The analysis revealed that the digitalization of public administration is closely linked

to cybersecurity, administrative reforms and the development of digital skills of staff. Thus, a successful digital transformation requires a comprehensive approach, combining the use of new technologies with a well-regulated system prepared to face the current challenges.

3.3.1 Key Emerging Findings

The lack of a clear cybersecurity strategy increases the risk to IT systems. According to a study, 82% of respondents say that the lack of investment in cybersecurity leaves IT infrastructures vulnerable to major attacks. Moving from traditional methods of information protection to a more developed cybersecurity system is crucial to face current threats (Von Solms & Van Niekerk, 2013). Lack of funding and a lack of national regulations deepen these problems, preventing institutions from taking effective protective measures. In addition, dispersed responsibilities between institutions and the absence of a necessary framework for managing cyber incidents reduce the effectiveness of security systems. Although threats are becoming increasingly diverse and problematic, few public institutions use advanced technologies, such as artificial intelligence or behavioural analysis, to identify and prevent attacks. However, the adoption of these solutions varies widely, and the lack of expertise remains a major cause of strengthening cybersecurity.

Relational classification:

- *Associative Relationships:* Financing and implementation of projects ↔ Degree of digitalization;
- *One-way Relationships:* The lack of a coherent cybersecurity strategy → Increases → Vulnerabilities of IT Infrastructures;
- *Symmetrical Relationships:* Cybersecurity ↔ Citizens' trust in digitalization.

2. Bureaucracy and lack of employee skills slow down the adoption of new technologies

- 64% of respondents say that insufficient training of employees to use digital systems is a major problem in the transition to digitalization.
- 49% believe that rigid administrative procedures significantly block the implementation of new technologies, leading to delays and inefficiency in decision-making.
- Resistance to change and lack of compatibility between IT systems used by public institutions exacerbate the problems of the digitalization process.

To solve these problems, national training programs have been launched for public servants to help them adapt more quickly to new technologies. However, the impact of these programs is limited due to the lack of a strategy for developing digital skills and the frequent departure of already trained specialists from public administration.

Relational classification:

- *Associative relationships:* Bureaucracy and digitalization ↔ Legislation and digitalization;
- *One-way relationships:* Resistance to change → slows down → digitalization of public institutions;
- *Symmetrical relationships:* Digital skills of employees ↔ Productivity;

3. Digitalization brings substantial benefits, yet accessibility and digital equity remain major issues

- 72% of respondents acknowledged that digitalization has led to the optimization of administrative processes and increased institutional transparency;
- However, 46% indicated the existence of significant difficulties in accessing digital services, especially for vulnerable groups (the elderly, rural populations, individuals with disabilities);
- Disparities in digital infrastructure and low levels of digital literacy are factors that perpetuate inequalities in the use of digital technologies.

In an attempt to improve digital inclusion, digital platforms with optimized interfaces for users with limited skills and digital assistance services have been developed. However, inequalities persist, and effective access to digital services is conditioned by factors such as the level of digital education and the availability of IT infrastructure in disadvantaged areas.

Relational classification:

- *Associative relationships:* Cybersecurity ↔ Accessibility of digital services for citizens;

- *One-way relationships:* Technical challenges → Affects → Accessibility of digital services for citizens;
- *Symmetrical relationships:* Bureaucracy and digitalization ↔ Financing and implementation of projects.

The analysis shows that the digitalization of administration cannot succeed without a comprehensive approach that combines cybersecurity, administrative reforms, and developing digital skills.

Conclusions

The results of this empirical investigation reveal that the process of digital transformation of public administration in Romania is conditioned by a multitude of interdependent systemic factors, whose complexity requires a multidimensional approach and integrated public policies. To optimize the positive impact of digitalization and mitigate associated risks, the implementation of essential strategic measures is imperative: To make digitalization click, Romania needs a cybersecurity strategy that's ironclad, rooted in "security-by-design" and "privacy-by-default" principles to keep systems safe. That means investing heavily in top-tier tools—think cutting-edge intrusion detection, rapid incident response, and encryption that's tough to crack. Clear, strict laws are just as vital, laying out who's accountable and setting high bars for data protection. Regular security checkups ensure defences stay sharp against new threats. Beyond that, systems need to talk to each other seamlessly, which calls for standardizing data formats and using smart solutions like enterprise service buses or microservices. Automation through tools like BPM or AI can slash processing times and paperwork, while "lean management" ideas help cut through bureaucratic clutter for a nimbler administration. Most crucially, employees need to get tech-savvy through ongoing training in areas like cybersecurity, data analysis, or even basic coding. Creating dedicated training hubs and partnering with Romanian universities can spark innovation and build skills. Ultimately, transforming Romania's public administration into a digital success story demands bold strategies and tight collaboration across institutions. Done right, it could deliver a system that's fast, secure, and fair, offering better services to every citizen.

References

Baptista, J., Stein, M.-K., Klein, S., Watson-Manheim, M.B. and Lee, J., 2020. Digital work and organisational transformation: Emergent Digital/Human work configurations in modern organisations. *The Journal of Strategic Information Systems*, [online] 29(2), p.101618. https://doi.org/10.1016/j.jsis.2020.101618.

European Commission, 2023. *Digital Economy and Society Index (DESI) 2023*. [online] Available at: < https://digital-strategy.ec.europa.eu/en/policies/desi > [Accessed 13 March 2025].

International Telecommunication Union (ITU), 2023. *Global Cybersecurity Index 2023*. [online] Available at: < https://www.itu.int/en/ITU-D/Cybersecurity/Pages/Global-Cybersecurity-Index.aspx > [Accessed 17 March 2025].

Leonardi, P.M. and Treem, J.W., 2020. Behavioral Visibility: A new paradigm for organization studies in the age of digitization, digitalization, and datafication. *Organization Studies*, [online] 41(12), pp.1601–1625. https://doi.org/10.1177/0170840620970728.

NOD Academy, 2022**.** *Challenges of cybersecurity in the digitalization of public administration. NOD Academy Blog,* [online] Available at: < https://www.nodacademy.ro/blog/securitate-cibernetica-digitalizare > [Accessed 17 March 2025].

Smart Cities, 2020. *Digital economy and society Index (DESI) – Romania in the European context. Smart Cities Conference*, [online] Available at: < https://digital-strategy.ec.europa.eu/en/policies/desi > [Accessed 13 March 2025].

Vial, G., 2019. Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*, [online] 28(2), pp.118–144. https://doi.org/10.1016/j.jsis.2019.01.003.

Von Solms, R. and Van Niekerk, J., 2013. From information security to cyber security. *Computers & Security*, [online] 38, pp.97–102. https://doi.org/10.1016/j.cose.2013.04.004.

Westerman, G., Bonnet, D. and McAfee, A., 2019. *Leading Digital: Turning technology into business transformation. Harvard* Business Press.

World Economic Forum, 2023. *Global Cybersecurity Outlook 2023.* [online] Available at: < >https://www.weforum.org/reports/global-cybersecurity-outlook-2023/ > [Accessed 17 March 2025

Specific Skills in Modern Online Negotiations: A Word Cloud and Content Analysis

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Abstract

Technology plays a key role in improving negotiation outcomes, one of the nowadays key aspects in the negotiation process being the ability to communicate effectively in the online environment. Negotiating in the digital age requires adapting traditional techniques to the new challenges and opportunities offered by technology. The research investigates the skills that Romanian companies' representatives consider relevant in conducting online negotiations, while providing a solid basis for understanding and developing essential competencies in the context of online negotiations. An unstructured interview guide was developed, which was randomly applied to representatives of various Romanian companies that conducted online business negotiations during the recent health pandemic. By means of keyword occurrence frequency different word clouds were computed, as well as the Chi-Square analysis of critical skills that contribute to effective negotiation, in order to provide a basis for developing individual competencies in online business negotiations. In the analysis of negotiation skills, the frequency with which certain skills are mentioned and their impact in the context of online negotiation was examined. Skills such as effective communication, active listening and empathy were identified as essential for success in online negotiation, reflecting the importance of authentic interaction and mutual understanding. The novelty of this research lies in the fact that it addresses an issue that has hardly been analysed in international literature: the specific skills that entrepreneurs must possess in performing, managing and/or conducting successful online business negotiations. The use of digital tools and advanced technology can help increase efficiency and accuracy in the negotiation process. The use of artificial intelligence and other advanced technologies is expected to become increasingly widespread and contribute to improving negotiation outcomes.

Keywords

Negotiation, skills, word cloud, interview, Romania, online business negotiations, qualitative analysis.

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Introduction

In contemporary society, characterized by increasingly frequent turbulence, conflicts and restrictions, respectively by periods of uncertainty and movement restrictions (see the recent global health pandemic), conducting business negotiations under appropriate conditions is becoming increasingly important, as it allows companies/parties involved to continue their activities and, above all, to ensure access, firstly to the resources and raw materials necessary for the development of value-creating processes, and secondly to the different markets.

Regardless of the partner with whom one negotiates (supplier of raw materials, distributor of finished products, the one who finances the business or other interested parties), business negotiation is based on

certain characteristics and limitations, while entailing various advantages. Among the benefits of face-to-face negotiation, we mention the following: it ensures the possibility of resolving conflicts and finding common solutions, being beneficial to all parties involved, to any problem of an economic nature, and not only (Churchman, 2019). Physical face-to-face negotiations also have the chance to generate new ideas, increasing interest in various aspects that were not considered before the negotiation began (Glade et al., 2025), as it also improves communication between all parties involved (Adinda, Barkah and Novel, 2022). Such negotiations prevent the risk of conflict escalation if diplomacy is used effectively and beneficially for all parties (Akindoyin, 2024) and it builds and preserve good relationships while giving room for creativity and innovation, even if it is time consuming (Gonzalez, 2021). Classical negotiations are a key of value creation which involves multiple issues (Trötschel et al., 2022) as it helps all involved parties to improve their skills and knowledge, such as communication, persuasion, problem-solving, critical thinking, emotional intelligence, etc. and to maximize profitability and build respect between negotiators (Wu, Wang and Li., 2024).

Negotiation is a business activity that can be conducted only through communication. The communication process is one of the key success factors of negotiation. To be beneficial for each party involved, participants in business negotiations must have good communication skills in order to increase the effectiveness of professional skills while establishing business contacts (Maksymets and Adamovych, 2021). In today's technologically advanced society, the communication skills used in negotiation must be adapted to the requirements of the negotiation process in the online environment. Digital negotiations have become an effective way to achieve favourable results in the contemporary business world (Plekhanov, Franke and Netland, 2023). The ability to master the art of digital negotiation is imperative to succeed in an ever-changing environment. This change brought with it a number of new advantages and opportunities. One of the greatest benefits brought by digitalization is global accessibility, because it allows the use of advanced tools such as artificial intelligence (AI) to improve the negotiation process (Javaid et al., 2024). One of the major advantages of using AI in digital negotiations is its ability to process and analyse large amounts of information in a very short time. This allows negotiators to make informed decisions and respond quickly to negotiation dynamics. AI can also help identify and avoid common negotiation mistakes, such as giving in to pressure or making decisions based on emotions (Papagiannidis et al., 2023). Another advantage is that there are a number of digital tools that can be used to support effective digital negotiations. One essential tool is data analytics software which allows negotiators to analyse and interpret data relevant to negotiations, providing them with valuable information and insights in real time. There are also specialized digital tools for simulation and modelling of negotiations, which can help prepare and train negotiators for different scenarios (Georgiadou, Angelopoulos and Drake, 2020).

Although at first glance there seem to be no significant differences between classic, traditional, face-to-face negotiations versus online negotiations, it is clear that online negotiation has particularities compared to traditional negotiation, particularities that come precisely from the way communication takes place, respectively from the used communication instrument: the computer (Lipp and Mohnen, 2024). Conducting online negotiations requires certain specific skills, competencies that do not only refer to communication skills in the online environment, but also to broad knowledge in the IT environment (Eklund and Isotalus, 2024).

Aware of the lack of good practices in conducting online business negotiations, the authors set out to investigate the skills that Romanian companies' representatives consider relevant in conducting online negotiations. Therefore, this research aims at highlighting by means of keyword frequency occurrence, word clouds, and Chi-Square analysis critical skills that contribute to effective negotiation and to provide a basis for developing individual competencies in online business negotiations. To implement the research scope, an unstructured interview guide was developed, which was randomly applied to representatives of various Romanian companies that conducted online business negotiations during the recent health pandemic. 34 representatives of Romanian companies participated in the interview, responses being electronically and/or audio recorded and afterwards transcribed.

The collected data was analysed using Python, with specialized libraries such as NLTK for natural language processing and Word Cloud for data visualization. Text processing included tokenization, removal of stop words, and data normalization by converting the text to a uniform format (lowercase). Keyword frequencies were analysed to identify main themes, and word clouds were generated to visualize these themes. In addition, Chi-Square analysis was used to highlight relationships and patterns between the identified critical skills. This combination of qualitative methodologies and Python-based analysis allowed for the highlighting of essential skills such as effective communication, active listening, and empathy, providing a solid foundation for developing the necessary online businesses.

The novelty of this research lies in the fact that it addresses an issue that has hardly been analysed in international literature: the specific skills that entrepreneurs must possess in performing, managing and/or conducting successful online business negotiations. The starting point in this research is the reality that negotiating in the digital age requires adapting traditional techniques to the new challenges and opportunities offered by technology. The reminder of the paper is structured as follows. The introduction section is followed by the literature review. The third part of the paper consist in the research methodology followed by the discussion and conclusions section.

1. Literature review

The world we live in today is continuously subject to numerous transformations in all fields of activity. With the evolution of technology, with the increase in digitalization but also with the increasing trend of population's demand regarding the quality of the goods and services, the business environment has also undergone changes. In this context, managers strive to adapt to new requirements and consequently adjust their business strategies so that they best correspond to the current economic situation. The negotiation process in business has evolved and continues to evolve, adapting to new commercial practices. Negotiation is an essential skill in business and everyday life (Clay-Williams et al., 2018). Whether it is closing a business partnership or the purchasing of a product, the success of an entire business activity can depend on the ability to reach a favourable agreement. This is just one of the reasons why modern negotiation are adopting more and more data-driven strategies as a result of the changes in the way negotiations are conducted, the enormous amount of data used nowadays in the business sector being the key to a powerful negotiation (Dash and Agarwal, 2016).

Managers need a lot of negotiation skills to be able to identify the best practices and negotiation tools. But they cannot forget that negotiation is driven by statistics and communication. Furthermore, modern technology allows the access of a large amount of data in a short time, especially with the help of the online environment (Yu, Bekerian and Osback, 2024). In this way, it is found that an effective negotiation requires much more than simply presenting the requirements and expectations of the people involved in this process. A successful negotiation involves preparation, a clear understanding of the context and the use of advanced techniques (Adinda, Barkah and Novel, 2022). That is why it is necessary for negotiators to know not only the people they are going to negotiate with, but to identify the key variables of the negotiation process (price, time, deadlines, etc.), the used advanced negotiation techniques (for example, Best Alternative to a Negotiated Agreement - BATNA, Questioning Technique - SPIN, Anchoring Technique, etc.). Therefore, not only data driven negotiation was born, but, furthermore, the practice of negotiation has also expanded into the online environment, giving birth to the modern online negotiation. The benefits of data-driven negotiation in the opinion of Dash and Agarwal (2016) are: a better planning, an improvement of the position of the negotiator, an improved communication, transparency, resource efficiency, enabling the establishment of long-lasting partnerships.

Digital negotiations not only come with advantages but also have their own challenges. One of the biggest challenges is the loss of direct human contact and non-verbal communication (Vuchkovski et al., 2023). In traditional negotiations, non-verbal communication, such as facial expressions and body language, play an important role in understanding and interpreting messages. In the online environment this aspect is significantly reduced (Bobkina, Romero and Ortiz, 2023). Another important aspect is the use of data and analytics to make informed decisions and evaluate performance during negotiations. This data-driven approach can help identify weaknesses and opportunities for improvement and increase the chances of success in negotiations (Dash and Agarwal, 2016). A good negotiation approach is based on creating value for both parties (win-win). Instead of treating negotiation as a win-lose confrontation, effective negotiation should aim for a win-win outcome. This way, long-lasting relationships can be built, based on trust and collaboration.

2. Research methodology

To investigate the skills needed to conduct online negotiations, a qualitative approach was adopted, based on the analysis of semi-structured interviews. Purposive sampling allowed the selection of 36 representatives from Romanian companies that actively participated in online negotiations during the COVID-19 pandemic, ensuring the relevance and recency of their experiences. The interviews were conducted based on a semi-structured guide, which included questions about communication strategies, challenges encountered and critical skills needed for success. All interviews were recorded (with consent), transcribed in full and anonymized to protect the confidentiality of the participants. A combination of

qualitative methodologies and natural language processing (NLP) techniques were used to identify relevant competencies in online negotiations. Purposive sampling allowed the selection of 36 representatives of Romanian companies that actively participated in online negotiations during the COVID-19 pandemic, and their responses were collected through semi-structured interviews. The interviews were fully transcribed, anonymized, and thematically analysed according to the framework proposed by Braun and Clarke (2006). (1) familiarization with the data, (2) generation of initial codes, (3) identification of themes, (4) revision of them, (5) definition and naming of themes, and (6) writing the final report.

Manual coding of the data allowed the identification of emerging themes, and triangulation of the results was achieved using keyword frequency visualization (word clouds) and statistical analysis. The responses of 36 participants were pre-processed using the NLTK library in Python, including tokenization, stop word removal, and text normalization. The frequencies of the words were analysed to identify the main themes and then visualized as a word cloud generated with the Word Cloud library (Stanca, Dabija and Câmpian, 2023; Moldovan et al., 2024; Stanca, Câmpian and Dabija, 2025). The analysis highlighted the importance of skills such as effective communication, active listening and empathy, providing a solid and replicable foundation for understanding and developing critical skills in online negotiations. Statistical tests (Chi-Square) provided additional insights into how these skills cluster and manifest in practice, highlighting the diversity of strategies and approaches used by negotiators. This detailed analysis aims to highlight the critical skills that contribute to effective negotiation and to provide a basis for developing individual competencies in online negotiation.

The results of the analysis revealed the importance of skills such as effective communication, active listening and empathy, highlighting the role of authentic interactions and mutual understanding in digital negotiations. By applying a rigorous and replicable qualitative methodology, this study provides a solid basis for understanding and developing essential competencies in the context of online negotiations. In the analysis of negotiation skills, the frequency with which certain skills are mentioned and their impact in the context of online negotiation was examined. Skills such as effective communication, active listening and empathy were identified as essential for success in online negotiation, reflecting the importance of authentic interaction and mutual understanding.

3. Results and discussion

3.1. Descriptive analysis of results

The word distribution shows that most responses received are short, with a significant peak around 0-25 words. 12 responses fall into this category, indicating that many respondents provide concise responses. As the number of words increases, the frequency of responses decreases, with longer responses, over 100 words, being even rarer. The average length of the responses is 39.50 words, and the median length is 21.0 words. Most responses do not contain positive words, indicating a tendency towards neutrality or negativity. As the number of positive words increases, their frequency decreases significantly. Only a few responses include more than two positive words, suggesting that positive expression is seldom in the dataset analysed. This distribution may reflect the overall tone of the communication, emphasizing the importance of context and the emotions conveyed.

3.2. Word cloud analysis

The words “you” (3.07%) and “skills” (2.84%) appear most frequently, indicating a focus on personal involvement and specific skills in the context of negotiation. The presence of the words “important” (2.36%) and “negotiation” (2.25%) suggests an emphasis on identifying skills crucial for success in online business negotiation. The terms “communication” (1.89%) and “ability” (1.77%) emphasize their importance as essential skills, being considered fundamental for a successful negotiator in the virtual environment.

The terms “listening” (1.54%) and “active” (1.06%) highlight the importance of active listening in the online negotiation process, while “understanding” (1.06%) and “empathy” (0.83%) emphasize the need for deeper understanding and emotional intelligence. Phrases such as “ability to” (15 occurrences) and “the ability to” (13 occurrences) suggest a focus on the individual’s capabilities and potential to conduct online negotiations. The expressions “active listening” (8 occurrences) and “in negotiation” (7 occurrences) emphasize specific skills and the context in which they are applied. The phrases “I think” (6 occurrences) and “important to” (5 occurrences) reflect personal opinions and the relevance of these skills in negotiations. These terms are gathered in the word cloud in Figure no. 1.

Figure no. 1. Word cloud of negotiation skills

The word cloud (figure no. 1) visually highlights the words "important", "negotiation", "skills", "communication" and "ability" as prominent, reinforcing the emphasis placed in the text on these essential aspects. The presence of terms such as "understanding", "empathy", "active listening" and "adaptability" aligns with the data analysed, underlining the perceived importance of these skills in the context of online negotiations.

The analysis highlights a strong focus on communication and active listening skills, as essential components of effective online negotiation. The emphasis on personal skills and deep understanding highlights the nuanced nature of successful online negotiation tactics. Overall, the data highlights the diversity of skills required for effective negotiation, with communication and active listening at the forefront, as aspects considered fundamental to reaching a favourable agreement and successfully implementing an online negotiation.

3.3. Identifying online negotiation skills

The most frequently mentioned negotiation skills are effective communication (90%) and active listening (75%), crucial aspects in the online negotiation process, but also identifying solutions to emerging problems. "*Effective Communication: Clear and concise communication is vital for conveying your own interests and proposals. This includes not only verbal communication, but also non-verbal cues and written communication skills*" (Interviewee 22). "*Active Listening: The ability to listen attentively to the other party's concerns, interests, and perspectives is crucial. Active listening demonstrates respect and helps identify potential areas of agreement*" (Interviewee 11). Of course, there are other important skills for the success of online negotiation, including empathy (60%) and persuasion (70%), because this is how the interlocutor's influence can be understood in the online negotiation process: "*Emphatic communication: It is very important to know how to communicate to the supplier you are talking to exactly what you need, to leave no room for interpretation, and to make sure that you get what you need, and not more expensive and high-performance things for example that you don't necessarily need*" (Interviewee 7). "*Persuasion: It's important to know how to talk to suppliers in a way that works to your advantage and get them to understand exactly what your requirements are*" (Interviewee 18). "*Ability to synthesize: Suppliers often do their job, and try to sell you more than you need, so it's very important to be able to extract from the information they present what exactly you need and are looking for and then analyse whether or not what they offer is right for you*" (Interviewee 22).

Other important skills in online negotiation are the ability to solve problems/challenges that arise (50%) and adaptability/flexibility to the online negotiation context (55%), which emphasizes the need to resolve obstacles and remain flexible in the face of changes of any kind: "*Problem-Solving Behaviour: Negotiation often involves finding creative solutions to complex issues. Strong problem-solving skills enable you to identify mutually beneficial options and overcome obstacles*" (Interviewee 17). "*Flexibility/Adaptability: Flexibility is essential in negotiation because situations can change rapidly. Being open to adapting your strategies based on the situation can be the difference between success and failure*" (Interviewee 3).

Respondents believe that the skills on which the success of negotiation may depend include the depth of knowledge of the subjects investigated (49%), respectively the adequate understanding and previous

knowledge of the opponents/interlocutors (42%): "*Subject Matter Expertise: Knowledge of the subject matter is crucial because it allows you to speak with authority and credibility. When negotiating, people are more likely to trust you if you demonstrate a deep understanding of the topic discussed*". (Interviewee 9) "*Knowing Your Audience: Understanding the needs, preferences, and motivations of the people you are negotiating with is fundamental to achieving successful outcomes. In my opinion, when you know your audience, you can speak their language and address their specific concerns*". The success of online negotiation may also depend on the charisma of the interlocutors (28%): "*I find charisma to facilitate extremely well the way a negotiation goes*". (Interviewee 2).

Last but not least, aspects such as: "*Emotional self-control, structuring ideas within the speech, using non-verbal and para-verbal language to convey the intended message*" were mentioned (Interviewee 8); "*offering targeted feedback & continuous improvement of personal weaknesses*" (Interviewee 5); the ability to analyse the interlocutor's experience "*identifying the experience and temperament of the negotiators*" (Interviewee 7); "*to have the creativity to handle unforeseen situations and scenarios, and ultimately bring them to the side that wants to win the discussion*" (Interviewee 15); "*Patience, courage, a good listener, calm*" (Interviewee 19); "*Patience. You have to be patient with the other parties, so you can find out exactly what they are seeking from you, and vice versa*" (Interviewee 22).

Chi-Square tests show that active listening (p-value: 0.0498) and empathy (p-value: 0.0275) have a statistically significant impact in the context of online negotiations, suggesting that these skills are more frequently encountered in a negotiation. They are followed by identifying solutions to challenges arising in the negotiation (p-value: 0.0122) and flexibility in identifying a suitable solution (p-value: 0.0334). The correlation between the age of the interlocutors/participants in the negotiations and the number of skills mentioned (coefficient 0.32) is not significant, indicating a weak link between them.

Technology plays a key role in improving negotiation outcomes. One of the nowadays key aspects in the negotiation process is the ability to communicate effectively in the online environment. The use of digital tools and advanced technology can help increase efficiency and accuracy in the negotiation process. As technology continues to advance, the future of negotiation in the digital age looks promising. The use of artificial intelligence and other advanced technologies is expected to become increasingly widespread and contribute to improving negotiation outcomes. It is also anticipated that new digital tools and collaboration platforms will be developed and used to support the negotiation process.

To overcome the challenges emerged in the modern negotiation process, it is important to pay attention not only to the use of new techniques such as artificial intelligence or word cloud, but special attention must also be paid to the tone and style of the messages. These must be clear and concise, but also to convey emotions and intentions through words. It must be used a clear and concise language, avoid ambiguity, and ensure that all parties understand the messages being conveyed. Furthermore, it is also useful to use video technology to facilitate communication and create a sense of closeness in digital negotiations, while paying attention to time management and priorities in digital negotiations.

Since communication mainly takes place through written messages, it is important to respond promptly and set clear deadlines for each stage of the negotiations. By establishing common goals and identifying solutions that benefit both parties, partners can maximize their collaboration opportunities and achieve positive long-term results.

Conclusions

Mastering the art of digital negotiation is essential to gain a winning edge in today's business world. The use of technology and digital tools can increase efficiency and accuracy in the negotiation process and lead to better results. However, it is important to pay attention not only to improve the skills of the participants involved in the negotiation process, but also to adapt the traditional negotiation techniques to the online environment, in order to overcome the specific challenges of digital negotiations.

Advanced negotiation techniques are not just about exchanging offers and counteroffers but involve detailed preparation and a detailed understanding of the negotiating partner, as well as the variables that can influence the outcome. Knowing the profile of the person you are going to negotiate with, managing price, time and delivery deadlines while creating value for both parties are essential components of a successful negotiation.

By understanding and using technology correctly in negotiation, new opportunities can be opened, and success can be achieved in the ever-evolving digital environment.

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References

Adinda, R., Barkah, C.S. and Novel, N.J.A., 2022. The importance of communication process in negotiation. *Jurnal Ekonomi, Bisnis & Entrepreneurship*, 16(2), pp.132-139. https://doi.org/10.55208/jebe.v16i2.260.

Akindoyin, D.I., 2024. International relations in the 21st Century: The role of track-two diplomacy in conflict resolution. *Perspective Politice,* 17(1-2), pp.5-18. https://doi.org/10.25019/perspol/24.17.1.

Bobkina, J., Romero, E.D. and Ortiz, M.J.G., 2023. Kinesic communication in traditional and digital contexts: An exploratory study of ESP undergraduate students. *System,* 115, 103034. https://doi.org/10.1016/j.system.2023.103034.

Braun, V. and Clarke, V., 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), pp.77-101.

Churchman, D., 2019. Negotiation. In: *The Palgrave Encyclopedia of Peace and Conflict Studies*. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-11795-5_60-1.

Clay-Williams, R., Johnson, A., Lane, P., Li, Z., Camilleri, L., Winata, T. and Klug, M., 2018. Collaboration in a competitive healthcare system: negotiation 101 for clinicians. *Journal of Health Organization and Management,* 32(2), pp.263-278. https://doi.org/10.1108/JHOM-12-2017-0333.

Dash, B. and Agarwal, A., 2016. *Modern-day negotiation skills: A data-driven approach to business,* [online] Available at: <https://www.researchgate.net/publication/373871335_Modern-day_Negotiation_Skills_A_Data-driven_Approach_to_Business> [Accessed 16 March 2025].

Eklund, M. and Isotalus, P., 2024. Having it both ways: learning communication skills in face-to-face and online environments. *Frontiers in Education,* 9, 1270164. https://doi.org/10.3389/feduc.2024.1270164.

Georgiadou, E., Angelopoulos, S. and Drake, H., 2020. Big data analytics and international negotiations: Sentiment analysis of Brexit negotiating outcomes. *International Journal of Information Management,* 51, 102048. https://doi.org/10.1016/j.ijinfomgt.2019.102048.

Glade, C., Kesting, P., Smolinski, R. and Kanbach, D.K., 2025. Start-up funding negotiations with venture capitalists: understanding the behaviors and strategies of experienced entrepreneurs. *International Journal of Entrepreneurial Behavior & Research*, 31(4), pp.1062-1081. https://doi.org/10.1108/IJEBR-06-2024-0615.

Gonzalez, N.L., 2021. The impact of culture on business negotiations. *Honors Projects*. 839. [online] Available at: <https://scholarworks.gvsu.edu/honorsprojects/839> [Accessed 16 March 2025].

Javaid, M., Haleem, A., Singh, R.P. and Sinha, A.K., 2024. Digital economy to improve the culture of industry 4.0: A study on features, implementation and challenges. *Green Technologies and Sustainability,* 2(2), 100083. https://doi.org/10.1016/j.grets.2024.100083.

Lipp, W. and Mohnen, A., 2024. Communication media in electronic negotiations: how the individual x medium fit influences negotiation behaviors and outcomes. *Frontiers in Communication,* 9, 1402820. https://doi.org/10.3389/fcomm.2024.1402820.

Maksymets, O. and Adamovych, A., 2021. Negotiations as an integral part of business communication. *Humanities Science Current Issues,* 2(36), pp.124-128. https://doi.org/10.24919/2308-4863/36-2-19.

Moldovan, M.-G., Dabija, D.-C., Stanca, L. and Pocol, C.B., 2024. A qualitative study on the consumer behaviour related to food waste: Romanian perspectives through word cloud and sentiment analysis. *Sustainability*, 16(10), 4193. https://doi.org/10.3390/su16104193.

Papagiannidis, E., Mikalef, P., Conboy, K. and Van de Wetering, R., 2023. Uncovering the dark side of AI-based decision-making: A case study in a B2B context. *Industrial Marketing Management,* 115, pp.253-265. https://doi.org/10.1016/j.indmarman.2023.10.003.

Plekhanov, D., Franke, H. and Netland, T.H., 2023. Digital transformation: A review and research agenda. *European Management Journal,* 41(6), pp.821-844. https://doi.org/10.1016/j.emj.2022.09.007.

Stanca, L., Câmpian, V. and Dabija, D.C. 2025. Adaptation and Resilience in Retail: Exploring Consumer Clusters in the New Normal. *Journal of Retailing and Consumer Services*, 82, 104112, https://doi.org/10.1016/j.jretconser.2024.104112.

Stanca, L., Dabija, D.C. and Câmpian, V. 2023. Qualitative Analysis of Customer Behavior in the Retail Industry during the COVID-19 Pandemic: A wordcloud and sentiment analysis approach. *Journal of Retailing and Consumer Services*, 103543. https://doi.org/10.1016/j.jretconser.2023.103543.

Trötschel, R., van Treek, M., Heydenbluth, C., Zhang, K. and Majer, J.M., 2022. From claiming to creating value: The Psychology of Negotiations on Common Resource Dilemmas. *Sustainability*, 14(9), 5257. https://doi.org/10.3390/su14095257.

Wu, J., Wang, W. and Li, Y., 2024. Emotional agents enabled bilateral negotiation: Persuasion strategies generated by agents' affect infusion and preference. *Expert Systems with Applications,* 252(Part A), 124202. https://doi.org/10.1016/j.eswa.2024.124202.

Vuchkovski, D., Zalaznik, M., Mitręga, M. and Pfajfar, G., 2023. A look at the future of work: The digital transformation of teams from conventional to virtual. *Journal of Business Research,* 163, 113912. https://doi.org/10.1016/j.jbusres.2023.113912.

Yu, J., Bekerian, D.A. and Osback, C., 2024. Navigating the digital landscape: Challenges and barriers to effective information use on the internet. *Encyclopedia*, 4(4), pp.1665-1680. https://doi.org/10.3390/encyclopedia4040109.

Towards Understanding the Crossroad between Sustainability and Open Innovation: A Systematic Bibliometric Analysis

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Abstract

This study presents a bibliometric analysis of academic literature at the intersection of sustainability and open innovation, covering a dataset of 248 publications indexed in the Web of Science between 2007 and 2025. The objective was to identify the intellectual structure of the field, key contributors, and thematic trajectories by applying the PRISMA framework and utilising the Bibliometrix tools. The results reveal a growing scholarly interest in how open innovation – through external collaboration, knowledge sharing, and stakeholder participation –can support sustainable development. The study identifies four main research themes: performance, quality, alliances, and participation. Performance and quality clusters emerge as central to understanding how open innovation impacts economic and sustainable outcomes. The alliances cluster highlights the strategic role of interorganisational collaboration in advancing sustainability practices, while the participation theme underscores the importance of stakeholder engagement and inclusivity in innovation processes. These findings suggest that open innovation acts as a key enabler of sustainability-orientated innovation by enhancing knowledge flows and expanding organisational learning capacities. The paper contributes to a more structured understanding of the field of sustainability and open innovation and provides a foundation for future research aimed at exploring underdeveloped areas such as digital transformation, innovation driven by social networks, and regional comparative studies.

Keywords

Sustainability, open innovation, bibliometric analysis, stakeholder engagement.

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Introduction

The growing complexity of global sustainability challenges has accelerated the convergence of open innovation and sustainability as complementary strategies for organisational transformation. Open innovation - through the integration of external knowledge, stakeholder collaboration and knowledge co-creation—enables firms to address environmental and social imperatives while maintaining competitive advantage (Bigliardi and Filippelli, 2022).

Recent studies highlight that sustainability-orientated innovation is increasingly based on open innovation practices such as digitalisation, external stakeholder engagement, and value chain collaboration, which support the development of sustainable products, services, and business models (Kennedy, Whiteman and van den Ende, 2017; Camilleri et al., 2023). This integration reflects a shift from incremental innovation toward more systemic, radical, and collaborative approaches aimed at achieving long-term sustainable development goals.

The aim of this study is to conduct a systematic review of the existing literature at the intersection of sustainability and open innovation employing bibliometric analysis as the main methodological approach. This

method enables the identification of the dominant trends, influential contributors, and thematic clusters that characterise the intellectual structure of the field. Considering the increasing relevance of sustainability as a driver for accelerating open innovation, the study is guided by the following research questions.

- **RQ1:** What is the current state of academic research addressing the relationship between sustainability and open innovation?
- **RQ2:** What future research directions can be derived from the bibliometric insights obtained?
- **RQ3:** What bibliometric patterns and developments can be observed in the scholarly discourse on sustainability and open innovation over the past decade?

To this end, the remainder of the paper was organised as follows. Firstly, a short literature review is presented regarding the relationship between sustainability and open innovation, then the materials and methods are clearly introduced. Second, the descriptive results are presented, complemented by the literature clustering and by in-depth cluster analysis. The final section examines the conclusion of the systematic literature review and proposed further research trajectories.

1. Review of the literature

Sustainability is understood as an integrative approach that aims at the balance between economic performance, environmental protection, and social responsibility, known as the triple bottom line (Schaltegger, Beckmann and Hansen, 2013; Bigliardi and Filippelli, 2022). It implies, at the organisational level, the ability of firms to meet the current needs of stakeholders without compromising the ability of future generations to meet their own needs (Dyllick and Hockerts, 2002). Corporate sustainability is thus linked to the creation of value not only for shareholders, but also for society and the environment. Open innovation is defined as a deliberate process of managing knowledge flows across organisational boundaries to accelerate internal innovation and expand its external use (Chesbrough and Appleyard, 2007). This involves cooperation with external stakeholders – customers, universities, NGOs, startups – to co-create innovative products, services, or business models (Camilleri et al., 2023).

Sustainability and open innovation are increasingly closely interconnected, as the integration of sustainability objectives requires access to knowledge, technologies, and capabilities from outside the organisation (Bigliardi and Filippelli, 2022). Open innovation is considered an essential catalyst for sustainable innovation (SOI), facilitating both the development of radical solutions to social and environmental problems (Kennedy, Whiteman and van den Ende, 2017) and the building of competitive advantages. At the same time, digitalisation and organizational transformation are identified as factors supporting this process of interdependence (Imran et al, 2021). The relationship between sustainability and open innovation is complementary and increasingly interdependent. Open innovation is considered a strategic catalyst for achieving sustainable goals, allowing firms to integrate external resources, respond more effectively to global challenges and create value for all stakeholders (Smart et al., 2019; Akbari et al., 2020). Srisathan, Ketkaew and Naruetharadhol (2020) demonstrate that sustainability acts as a key mediator in transforming innovation-orientated organisational culture into concrete performance within open innovation processes.

Recent research highlights the increasingly strategic role of open innovation as a catalyst for embedding sustainability in organizational practices, processes, and value creation mechanisms. Open innovation enables firms to transcend organisational boundaries by integrating external knowledge and fostering stakeholder collaboration, both of which are essential for addressing complex sustainability challenges (do Prado, Carius and Godoy, 2025). In this context, sustainability is no longer seen as a peripheral concern, but as a central driver of innovation, particularly when combined with open innovation dynamics that encourage ecoefficiency, circularity, and shared value creation. Moreover, Du, Leten and Vanhaverbeke (2016) demonstrate that sustainability orientation significantly enhances the performance of new product development, and this relationship is strengthened through open innovation (SMOI). Such platforms allow firms to co-create with external actors, integrate environmental and social concerns into product development, and respond more effectively to stakeholder expectations. Similarly, Pichlak and Szromek (2021) show that organisations adopting open innovation strategies are more likely to generate radical ecoinnovations, particularly when these strategies are supported by knowledge inflows from supply chain partners and market-driven intelligence.

Lopes et al. (2017) further emphasise that open innovation, when aligned with effective knowledge management, contributes not only to the development of sustainable innovations, but also to a broader transformation of organisational culture. This synergy fosters a more adaptive, learning-orientated environment in which sustainability goals can be pursued systematically and strategically. Thus, the integration of open

innovation with sustainability practices represents a shift from reactive environmental compliance to pro-active, innovation-led sustainability.

2. Research methodology

This study aims to conduct a comprehensive systematic review of the scholarly literature investigating the nexus between sustainability and open innovation. To ensure methodological rigour and transparency in the identification and selection of relevant studies, a bibliometric analysis was performed according to the PRISMA guidelines (Figure no. 1). The data underpinning this analysis were extracted from the Web of Science database, a leading repository of peer-reviewed academic research.

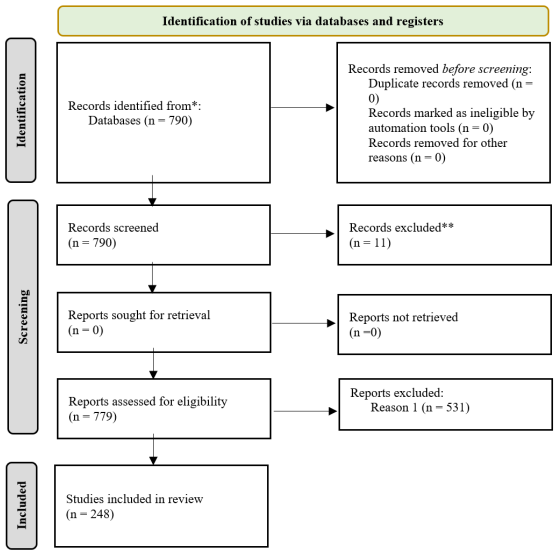

Figure no. 1. Systematic literature review procedure according to the PRISMA guidelines

To effectively manage the initial dataset, a comprehensive search was conducted using the keywords *"sustainable"* and "open innovation", which yielded a total of 790 documents. In the first screening phase, articles not written in English were excluded, resulting in the removal of 11 documents and reducing the dataset to 779 articles. Subsequently, to refine the relevance of the corpus in alignment with the research focus, a disciplinary filter was applied based on the Web of Science Categories, restricting the selection to publications categorised under Business, Management, Economics or Business Finance. This step further narrowed the dataset to 248 documents, which constituted the final set used for bibliometric analysis.

Table no. 1. General information about the extracted records

Description	Results
Timespan	2007:2025
Sources (Journals, Books, etc)	118
Documents	248
Authors	696
Single-authored docs	25
Article	185
Proceedings paper	35
Others	28

The bibliometric analysis encompasses various dimensions, including citation counts, geographic dispersion of contributing authors and institutions, institutional productivity, publication venues, and keywords assigned by authors. This approach enables a comprehensive investigation of the existing literature, offering a detailed assessment of relevant bibliographic indicators (Vătămenescu et al., 2024; Becheș and Anghel, 2025). Table 1 offers a detailed bibliometric profile spanning the period 2007–2025. The dataset comprises

248 scholarly contributions published across 118 distinct sources, encompassing peer-reviewed journals, books, and other academic outlets indexed in the Web of Science. The corpus reflects the scholarly activity of 696 individual authors, with 25 documents being single-authored, indicating a strong prevalence of collaborative research practices. In terms of publication typology, journal articles constitute the predominant category (185), followed by proceedings papers (35), while the remaining 28 publications are distributed across diverse formats, including book chapters, editorials, early access items, and hybrid contributions. This heterogeneity in dissemination channels highlights both the intellectual depth and the interdisciplinary breadth of the field, particularly within the thematic intersections of sustainability and open innovation.

3. Results and discussion

3.1. The impact of the papers on sustainability and open innovation

The data presented in Figure no. 2 indicate a progressively increasing academic interest in the intersection of sustainability and open innovation during the period 2007–2025. Following a period of limited scholarly output between 2007 and 2011, a gradual upward trend in publications emerged in 2012. In 2018, a significant increase was observed with 30 publications, marking the onset of a more dynamic phase in the research field. This trajectory continued to strengthen, culminating in 2024 with 41 articles, the highest annual output recorded. Although a slight decline is observed in 2025, with 18 publications, it is important to note that data for this year were collected in early April. In general, the trend reflects a consistent and intensifying scholarly engagement with the topic.

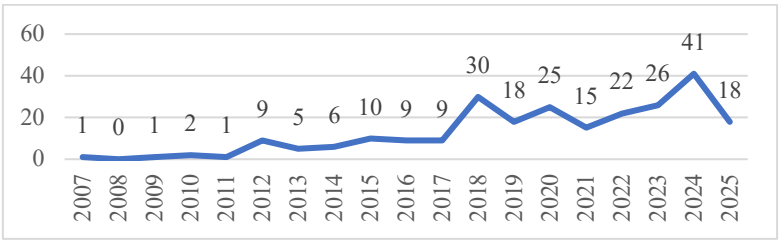

Figure no. 2. Quantifying articles on sustainability and open innovation topics

Table no. 2. Top sources on the topic of sustainability and open innovation

Sources	Articles	Type of publication
Open Innovation 2.0	18	Book
Business Strategy and the Environment	11	Journal
European Journal of Innovation Management	10	Journal
IEEE Transactions on Engineering Management	10	Journal
Technological Forecasting and Social Change	9	Journal
Business Ethics the Environment & Responsibility	7	Journal
RISUS-Journal on Innovation and Sustainability	7	Journal
Entrepreneurship and Sustainability Issues	6	Journal

Table no. 2 offers a comprehensive view of the key sources contributing to the field of sustainability and open innovation, illustrating the varied types of publications involved. In particular, Open Innovation 2.0 is the leading source with 18 articles, primarily in the form of a book, signifying its significant influence in this area. Among the journals, Business Strategy and the Environment stands out with 11 articles, followed closely by the European Journal of Innovation Management and IEEE Transactions on Engineering Management, both with 10 articles. Other journals, such as Technological Forecasting and Social Change, Business Ethics, the Environment & Responsibility, RISUS-Journal on Innovation and Sustainability, and Entrepreneurship and Sustainability Issues, also contribute valuable insights, although with fewer articles (ranging from 6 to 9). This distribution highlights the importance of academic journals in advancing research on sustainability and open innovation, with certain publications playing a particularly prominent role in shaping the discourse. Furthermore, the combination of article types, including both books and journals, indicates the multifaceted nature of the research landscape, reflecting the broad scope of scholarship in this domain.

Table no. 3. Most cited articles on sustainability and open innovation topics

Paper	Total Citations	Average citation per Year
Hesbrough and Appleyard (2007) in California Management Review	681	35,84
Lee et al. (2014) in Technological Forecasting and Social Change, 89, 80-99.	491	40,92
Raute et al. (2019) in the Journal of Innovation & Knowledge	234	33,43
Watson et al. (2018) in the Journal of Product Innovation Management	215	26,88
Markham and Lee (2013), in Journal of product innovation management	158	12,15

An analysis of citation data reveals the significant academic influence of key papers in the field of innovation and knowledge and is presented in Table no. 3. The most widely cited work is Hesbrough and Appleyard (2007) in California Management Review, which has accumulated 681 citations, yielding an average of 35.84 citations per year. Following closely, Lee et al. (2014) in Technological Forecasting and Social Change garnered 491 citations, with an average of 40.92 citations per year. Other notable studies include Raute et al. (2019) in the Journal of Innovation & Knowledge (234 citations, 33.43 per year), Watson et al. (2018) in the Journal of Product Innovation Management (215 citations, 26.88 per year), and Markham and Lee (2013) in the Journal of Product Innovation Management (158 citations, 12.15 per year). These data highlight the sustained academic relevance and impact of these works within the scholarly community.

3.2. A comprehensive examination of clustering in the academic literature on the topic of sustainability and open innovation

The relationship between sustainability and open innovation can be interpreted through the prism of the "grand challenges", "alliances" and "impact" clusters, which highlight the essential dimensions of this interaction and are presented in Table no. 4. Within the "grand challenges" cluster, sustainability is positioned as a strategic response to complex global problems, which require innovative and collaborative solutions. The "alliances" group suggests that open innovation functions as an operational mechanism through which organisations develop partnerships to integrate sustainable practices into their processes. The results of these efforts are reflected in the "impact" cluster, where tangible effects on economic, social and environmental performance are analysed.

Table no. 4. Papers on topics of interest

Cluster	Centrality	Density	Centrality level	Density Level	Theme frequency	Main theme
Performance	20.491	55.64	10	4	736	Basic
Quality	1.717	68.981	8	10	28	Motor
Social media	0.25	67.361	4	8	10	Niche
Market orientation	0	62.5	1,5	6	4	Niche
Impact	11.677	54.551	9	3	332	Basic
Participation	1.083	68.364	7	9	22	Motor
Logic	0	50	1,5	1,5	2	Emerging
Grand challenges	0.292	59.375	5	5	10	Emerging
Human-resource management	0.111	50	3	1,5	5	Emerging
Alliances	0.361	63.889	6	7	7	Motor

Based on the centrality and density analysis in Table no. 4 and Figure no. 3, the identified themes are classified according to their strategic positioning in the conceptual network between sustainability and open innovation. The clusters "Performance" and "Impact" are classified as Basic themes, with high centrality and frequency, which gives them a central role in understanding the relationship between innovation, management and increasing organizational performance. They reflect the dominant concerns of organisations in terms of efficiency, innovation and sustainability, being essential for consolidating competitive advantage. In contrast, clusters such as "Quality", "Participation" and "Alliances" are classified as motor themes, with high density, indicating advanced internal development and the potential to guide future research directions, especially in terms of strategic collaborations (alliances) in the context of open innovation. The "Social Media" and "Market Orientation" clusters appear as niche topics, relevant in

specific domains and well defined internally, but with low connectivity to the central themes. Finally, the "Grand Challenges", "Human Resource Management" and "Logic" clusters are identified as emerging or declining themes, with low centrality and density, suggesting development potential or declining interest within the analysed literature. Thus, the analysis highlights how the key dimensions of sustainability and open innovation are reflected differently through these clusters, depending on their maturity, relevance, and connectivity in the network.

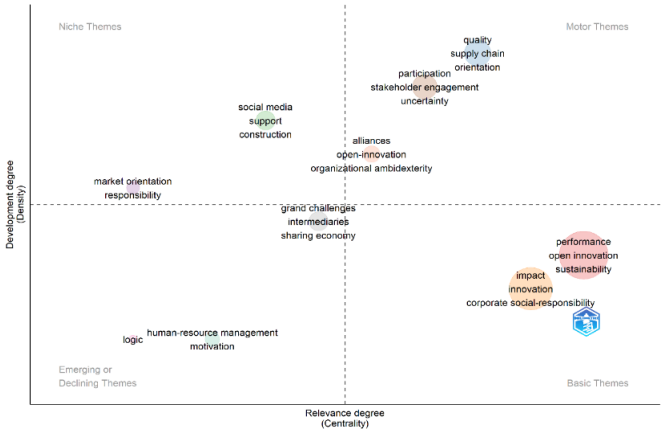

Figure no. 3. Thematic evolution on sustainability and open innovation topics

To examine the impact of sustainability on open innovation, the clusters identified as motor themes: quality, participation, and alliances—have been integrated into a unified thematic framework. This consolidation reflects their collective contribution to advancing sustainable innovation through high levels of internal development, organisational involvement, and inter-organizational collaboration, all of which are essential components in the dynamics of open innovation. In Table no. 5 are presented the main papers which illustrate this relationship.

Table no. 5. Most relevant studies from motor theme

Authors	Type of work	Assigned cluster	Research method
Srisathan, Ketkaew and Naruetharadhol (2020)	Article	Quality	Survey
Smart et al. (2019)	Article	Participation	Systematic review
Akbari et al. (2020)	Article	Quality	Bibliometric analysis
Diriker, Porter and Tuertscher (2023)	Article	Participation	Inductive and deductive analysis

Recent literature highlights the multifaceted nature of open innovation and its interplay with sustainability, organisational dynamics, and socio-political contexts. Srisathan, Ketkaew and Naruetharadhol (2020) demonstrate that organisational culture alone does not directly enhance open innovation performance in SMEs; instead, sustainability frameworks mediate this relationship, acting as strategic enablers of innovation outcomes. In a broader societal context, Smart et al. (2019) argue that the convergence of Open Science and Open Innovation - anchored in Mertonian scientific norms - can drive inclusive and socially responsible innovation, yet remains vulnerable to exploitation in the absence of ethical constraints, especially in the post-truth era. Although Akbari et al. (2020) do not explicitly address open innovation, their bibliometric analysis reveals a growing academic focus on sustainable technology, knowledge collaboration, and innovation systems, aligned with open innovation principles. Diriker, Porter and Tuertscher (2023) contribute a process model based on 'punctuated openness', illustrating how alternating phases of openness and closure enhance co-creation and adaptability in complex, multi-actor innovation initiatives.

The studies in Table no. 6 reflect diverse methods for exploring the link between sustainability and open innovation: Rauter et al. (2019) and Watson et al. (2018) use empirical approaches, while Lee et al. (2014) and Schaltegger, Beckmann and Hansen (2013) offer conceptual insights—together providing a balanced view of how open innovation supports sustainability in theory and practice.

Table no. 6. Most relevant studies from the Basic theme

Authors	Type of work	Assigned cluster	Research method
Rauter et al. (2019)	Article	Impact	Cross-sectional quantitative study
Lee et al. (2014)	Article	Performance	Systematic review
Watson et al. (2018)	Article	Impact	Comparative case studies

Rauter et al. (2018) empirically demonstrate that engaging a broader spectrum of external stakeholders, including NGOs and intermediaries, in open innovation processes significantly improves both economic and sustainability innovation performance, challenging the assumption of an inherent trade-off between these objectives. Complementing this, Watson et al. (2018) develop a hierarchical capability-based framework that emphasizes the role of dynamic capabilities, such as value framing and systematized learning, in enabling effective stakeholder engagement for environmental innovation within open innovation settings. Lee et al. (2014), through comparative case studies of Seoul and San Francisco, further illustrate how successful smart city initiatives rely on adaptive public–private collaborations and open innovation platforms shaped by cultural and institutional contexts.

Conclusions

Open innovation can support sustainability and social impact, but its effectiveness depends on organizational culture, ethical values, and adaptive, collaborative strategies. When aligned with sustainability frameworks and inclusive stakeholder engagement, it becomes a key tool for addressing complex challenges. This study contributes to the literature by mapping the intersection of sustainability and open innovation through a bibliometric analysis of 248 Web of Science articles (2007–2025), following PRISMA guidelines. It identifies major research trends, key contributors, and four main thematic clusters—grand challenges, alliances, impact, and participation—offering a clearer understanding of how these concepts evolve together in academic and practical contexts.

Although this study provides a comprehensive overview of the literature on sustainability and open innovation, certain limitations open avenues for further research. The analysis is restricted to English-language publications indexed in Web of Science, potentially omitting relevant studies from other databases or languages. Including additional sources such as Scopus or Google Scholar could improve the scope and generalisability of findings. Additionally, the roles of digital transformation, social media, and stakeholder involvement in sustainable open innovation remain underexplored. Comparative empirical research across industries or regions may offer deeper insights into how open innovation can effectively support sustainability goals.

References

Akbari, M., Khodayari, M., Danesh, M., Davari, A. and Padash, H., 2020. A bibliometric study of sustainable technology research. *Cogent Business and Management*, 7(1), 1751906. https://doi.org/10.1080/23311975.2020.1751906.

Becheș, P.D. and Anghel, F.G., 2025, Corporate governance and performance. Insights from a Bibliometric perspective for an emerging country, *CECCAR Business Review*, No 2, pp.59-77, http://dx.doi.org/10.37945/cbr.2025.02.07.

Bigliardi, B. and Filippelli, S., 2022. Sustainability and open innovation: Main themes and research trajectories. *Sustainability*, 14(11), 6763. https://doi.org/10.3390/su14116763**.**

Camilleri, M.A., Troise, C., Strazzullo, S. and Bresciani, S., 2023. Creating shared value through open innovation approaches: Opportunities and challenges for corporate sustainability. *Business Strategy and the Environment*, 32(7), pp.4485–4502. https://doi.org/10.1002/bse.3377.

Chesbrough, H. W. and Appleyard, M. M. 2007. Open Innovation and Strategy. *California Management Review,* 50(1), pp.57–76. https://doi.org/10.2307/4116641.

Chesbrough, H.W. and Appleyard, M.M., 2007. Open innovation and strategy. *California Management Review*, 50(1), pp.57-76. http://doi.org/10.2307/41166416.

Diriker, D., Porter, A.J. and Tuertscher, P., 2023. Orchestrating open innovation through punctuated openness: A process model of open organizing for tackling wicked multi-stakeholder problems. *Organization Studies*, 44(1), pp.135-157. https://doi.org/10.1177/01708406221094174.

do Prado, G.F., Carius, R. and Godoy, L.P., 2025. Sustainable and innovative: How can open innovation enhance sustainability practices? *Journal of Cleaner Production*, 139738. https://doi.org/10.1016/j.jclepro.2023.139738.

Du, J., Leten, B. and Vanhaverbeke, W., 2016. Sustainability, social media–driven open innovation, and new product development performance. *Journal of Product Innovation Management,* 33(S1), pp.55–71. https://doi.org/10.1111/jpim.12265.

Dyllick, T. and Hockerts, K. 2002. Beyond the business case for corporate sustainability. *Business strategy and the environment*, *11*(2), pp.130-141. https://doi.org/10.1002/bse.323

Imran, F., Shahzad, K., Butt, A. and Kantola, J. 2021. Digital transformation of industrial organizations: Toward an integrated framework. Journal of change management, 21(4), pp.451-479. https://doi.org/10.1080/14697017.2021.1929406.

Kennedy, S., Whiteman, G. and van den Ende, J., 2017. Radical innovation for sustainability: The power of strategy and open innovation. *Long Range Planning*, 50(6), pp.712–725. https://doi.org/10.1016/j.lrp.2016.05.004.

Lee, J. H., Hancock, M. G. and Hu, M. C. 2014. Towards an effective framework for building smart cities: Lessons from Seoul and San Francisco. *Technological Forecasting and Social Change*, 89, pp.80-99. https://doi.org/10.1016/j.techfore.2013.08.033.

Lopes, C.M., Scavarda, A., Hofmeister, L.F., Thomé, A.M.T. and Vaccaro, G.L.R., 2017. An analysis of the interplay between organizational sustainability, knowledge management, and open innovation. *Journal of Cleaner Production,* 142, pp.476–488. https://doi.org/10.1016/j.jclepro.2016.10.083.

Markham, S.K. and Lee, H. 2013. Product Development and management association's 2012 comparative performance assessment study. *Journal of Product Innovation Management*, 30(3), pp.408-429. http://doi.org/10.1111/jpim.12025.

Pichlak, M. and Szromek, A.R., 2021. Eco-innovation, sustainability and business model innovation by open innovation dynamics. *Journal of Open Innovation: Technology, Market, and Complexity, 7*(2), 149. https://doi.org/10.3390/joitmc7020149.

Rauter, R., Globocnik, D., Perl-Vorbach, E. and Baumgartner, R. J., 2019. Open innovation and its effects on economic and sustainability innovation performance. *Journal of Innovation and Knowledge*, 4(4), pp.226-233. http://doi.org/10.1016/j.jik.2018.03.004.

Rauter, R., Globocnik, D., Perl-Vorbach, E. and Baumgartner, R. J. 2019. Open innovation and its effects on economic and sustainability innovation performance. *Journal of Innovation & Knowledge*, 4(4), pp.226-233. https://doi.org/10.1016/j.jik.2018.03.004.

Smart, P., Holmes, S., Lettice, F., Pitts, F.H., Zwiegelaar, J.B., Schwartz, G. and Evans, S., 2019. Open Science and Open Innovation in a socio-political context: Knowledge production for societal impact in an age of post-truth populism. *RandD Management*, 49(3), pp.279-297. https://doi.org/10.1111/radm.12377.

Srisathan, W.A., Ketkaew, C. and Naruetharadhol, P., 2020. The intervention of organizational sustainability in the effect of organizational culture on open innovation performance: A case of thai and chinese SMEs. *Cogent Business and Management*, 7(1), 1717408. https://doi.org/10.1080/23311975.2020.1717408.

Vătămănescu, E.M., Dominici, G., Ciuciuc, V.E., Vițelar, A. and Anghel, F.G., 2024. Connecting smart mobility and car sharing using a systematic literature review. An outlook using Bibliometrix. *Journal of Cleaner Production*, 144333. https://doi.org/10.1016/j.jclepro.2024.144333.

Watson, R., Wilson, H. N., Smart, P. and Macdonald, E. K. 2018. Harnessing difference: A capability-based framework for stakeholder engagement in environmental innovation. *Journal of Product Innovation Management*, 35(2), pp.254-279. https://doi.org/10.1111/jpim.12394.

Leveraging Web-scraping for Tourism Data Analysis: A Case Study on Romania

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Abstract

In the digitalization era, the availability and accessibility of data have experienced a significant increase, opening up new opportunities for the analysis of the tourism sector—an area where the primary source of data for performance evaluation has traditionally been official statistics. This paper aims to investigate the potential of using an alternative data source, namely web scraping, by emphasizing the additional insights and advantages that this method can offer in comparison to conventional statistical data. The information was collected through web scraping from an online tourism booking platform, using a specially developed program written in the Python programming language. This data is employed to conduct an in-depth analysis both at the national level and from a territorial perspective, examining the types and quality of Romania's tourism supply. Thus, the analysis focuses on the number and types of accommodation establishments, the average price per room for a one-night stay during the peak summer season, as well as on the reviews provided by tourists for the accommodation units. Based on the results of this analysis, a set of recommendations is formulated to support the enhancement of Romania's tourism supply. Authorities in less developed tourist areas can boost investment through incentives and promote diverse, authentic accommodations and tourism types, while improving visibility and modernizing existing facilities.

Keywords

Web-scraping, Tourism, Python, Tourism supply, Accommodation establishment.

DOI: 10.24818/BASIQ/2025/11/020

Introduction

Tourism is the largest global industry, generating billions of dollars in revenue and creating millions of jobs annually (UNWTO, 2024). In 2005, Buhalis and O'Connor stated that Information and Communication Technology (ICT) had globally transformed tourism, reshaping its structure and introducing a wide range of opportunities and challenges within the tourism industry. In the digitalization era, the availability and accessibility of data have significantly increased, offering new opportunities for analyzing the tourism sector. The primary source of data for evaluating tourism performance has traditionally been official statistics, which provide indicators such as the number of tourist arrivals, length of stay, and tourist expenditures. However, these data have certain limitations in terms of update frequency, granularity and accuracy. Nowadays, data is becoming increasingly valuable in a highly competitive world, where companies strive to derive insights through data-driven models to gain an advantage. According to Carrigan, Green and Rahman-Davies (2021), each person on the planet generates approximately 1.7 MB of data per second. As an alternative to direct data collection, Big Data techniques have emerged.

This paper aims to explore the use of an alternative data source, specifically web scraping, in order to highlight the additional benefits this method offers compared to official statistics. Web scraping involves

the automatic extraction of data from various websites, allowing for the collection of large volumes of information in real time. Zhao (2017) defines web scraping as a method of extracting data from the World Wide Web (WWW) and storing it in a file or database for subsequent analysis, emphasizing its efficiency as a data collection technique, particularly given the vast amount of information generated online. An important aspect of the tourism sector that is not captured by official statistics is the quality of the tourism offer. Through web scraping, it is possible to extract tourist reviews, ratings, and comments from various online platforms, thereby gaining a clearer understanding of the quality of tourism services and customer satisfaction. By analyzing tourist feedback, it becomes possible to identify the strengths and weaknesses of various destinations and tourism services, as well as to gather insights on customer satisfaction levels, accommodation quality, cleanliness, staff hospitality, the diversity and quality of activities offered, and any challenges encountered. The use of this alternative data source brings significant benefits to stakeholders in the tourism sector. Public authorities can use such information to develop more effective strategies and make informed decisions. Tourism industry operators—such as hotels, restaurants, and travel agencies—can use the data to improve their services and better respond to tourist needs and expectations. In addition, researchers and analysts can benefit from an extensive and detailed database for conducting complex studies and analyses of the tourism sector.

Therefore, the objectives of this study are: (a) to use the web scraping technique as an alternative source of data, highlighting its advantages over official statistics and enabling the calculation of various tourism industry indicators; and (b) to use the information obtained through web scraping to analyze, both at national and territorial (county) levels, the type and quality of Romania's tourism supply. In order to achieve these objectives, a web scraping program was developed using the Python programming language, designed to extract various types of information from an online booking website.

This study is structured as follows: it begins with an introduction, followed by a review of the main findings from the relevant literature, emphasizing the importance of using alternative data sources in the tourism industry obtained through modern, intelligent methods such as web scraping (Section 1). Section 2 presents the dataset used in the analysis, as well as the main data processing methods, Section 3 details and discusses the main research findings, while the last part of the study provides the conclusions drawn from these results.

1. Technology and innovation in the tourism industry. A review of the literature on the use of Web Scraping in tourism

An overview of the development of research over the past two decades in information technology and tourism is presented by Xiang (2018), who distinguishes two distinct eras that reflect the way technology has transformed society and the economy:

- The Digitization Era (1997–2006) was characterized by the emergence and growth of the Internet as a commercial tool. During this time, numerous technical terms such as website, browser, email, laptop, desktop, mobile phone, and e-commerce became part of common vocabulary.
- The Acceleration Era (2007–2016) marked the proliferation of technologies such as Wi-Fi, search engines, tablets, sensors, as well as the emergence of machine learning and artificial intelligence. Users' access to online information, the spread of social networks, and other collaborative tools redefined the Internet from a publishing platform to one of participation and social interaction.

Today, tourists have access to a wide array of gadgets, which they use to generate and contribute vast amounts of data. These include web analytics from tourism platforms, app log data from hotel services, call center histories, traffic volume at destinations, tourism service sales records, search engine query volumes, social media tagging, location and GPS data, media files, and more. All of these can serve as potential indicators for tourists' preferences, motivations, planning behaviors, and actual travel experiences (Pan, 2015). An alternative data source employed in this study is a data mining technique applied to websites—web scraping. Data mining refers to the process of extracting useful information from large datasets, uncovering hidden relationships and patterns within the data (Adeniyi et al., 2016). Web scraping provides a significant advantage, being both cost-effective and efficient. It reduces the need to purchase data from external sources, allowing companies to extract and analyze valuable information from the massive volume of data available online. These processed data can be used to anticipate future tourist behaviors and to develop strategies based on past experiences.

Numerous studies highlight the use of web scraping as an alternative source in the tourism industry to identify non-traditional indicators, different from those found in official statistics—such as indicators measuring customer satisfaction, service quality, and experiential aspects based on tourist reviews and

comments from various travel websites. Web scraping can also reveal destination search trends on booking platforms, provide real-time average price indicators, and track price fluctuations based on time of year or specific events. Barcaroli (2015) published a study outlining three potential scenarios for using Big Data in official statistics, in response to growing societal demands for broader and higher-quality information: a) using Big Data for data collection without altering traditional survey methodologies (e.g., web scraping and text mining); b) combining Big Data with statistical surveys to achieve faster and more accurate estimates; c) fully replacing traditional surveys with Big Data. O'Reilly (2007) utilized web scraping to define relevant tourism indicators that allow companies to obtain valuable insights. Data were extracted from TripAdvisor to collect user-generated content related to the city of Minas Gerais, Brazil. The study revealed patterns in tourist behavior in the area and validated the findings by comparing them with observable tourism trends in the region. Choong & Tunku (2019) developed an automated web scraping tool for the Malaysian tourism sector, using the Python programming language in combination with Selenium and BeautifulSoup. They concluded that there is an abundance of tourism-related data published online that remains underutilized and not leveraged to its full potential. A 2020 study by Adhinugroho et al. describes the "Development of Online Travel Web Scraping for Tourism Statistics in Indonesia", using web scraping techniques on online travel agency websites such as Agoda and Pegipegi. They generated numerous graphs and tables, ultimately concluding that the data extracted closely matched official statistics. The study emphasized that web scraping is a highly effective and powerful technique capable of yielding valuable results.

2. Data and methodology

A web scraping program is typically implemented in two main steps: the first involves creating an HTTP request, which can take the form of a URL containing a GET query in order to obtain resources from a website. In the second step, the request is received and processed, the requested information is retrieved from the website, and then sent back to the web scraping program (Zhao, 2017). In this study, a web scraping program was developed in accordance with these two fundamental steps. In the first part, the HTTP request was executed using Selenium, which automatically launched a temporary browser session to access the online booking website. In the second part, the relevant information was extracted and analyzed. For further analysis, the data were exported to a .csv file using the Python programming language and the PyCharm integrated development environment (IDE). Several Python libraries and packages were used in the development of the program. The main library was Selenium, for browser automation. To build and control the browser, the selenium.webdriver module was used. For automatic browser configuration and management (specifically Google Chrome), the package webdriver_manager.chrome was employed. For data extraction from web pages, selenium.webdriver.common.by was utilized, which allows element selection by different methods such as By.ID, By.CLASS_NAME, and By.XPATH. During the scraping process, a waiting mechanism was needed to ensure that elements were fully loaded or visible before extraction. For this purpose, selenium.webdriver.support.expected_conditions was applied. Once the data were extracted, the **Pandas** library was used to organize the data into a table format and to export it as a .csv file. For the data extraction phase, the selected platform was Agoda, an online booking website that is part of Booking Holdings Inc., the global leader in online travel and related services. The information retrieved referred to accommodation units based on the following search criteria: one night of stay, two adults, one room. The extracted elements included: Name of the accommodation unit, type of accommodation, price, address, available facilities, overall rating, ratings for cleanliness, amenities, location, comfort, services, and value for money, number of reviews. To facilitate a better understanding of the web scraping program, the application steps were illustrated in the diagram shown in Figure no. 1. The program begins on the Main Page, where the destination and period are entered. It then proceeds to the Accommodation Listings Page, where each accommodation type is selected in turn. The program checks whether there is a next accommodation type available. If yes, it loads the Filtered Listings Page, where it verifies whether any units match the filters. If matching units are found, the program opens a new page—the Accommodation Unit Page—for each listing, from which the relevant data are extracted. If no matching units remain, the program checks for the existence of a next page. If a next page is available, the extraction process repeats until no further pages are found. Then, the program proceeds to the next accommodation type. The process ends when no further accommodation types are available (Figure no.1). Following the execution of the web scraping program for the counties of Romania, information was obtained for 7,109 available accommodation units for the period of July 1st – July 2nd, 2024, for 2 persons. The database required additional processing for data cleaning, such as removing duplicate data, handling missing values, eliminating outliers, standardizing filters, as well as text cleaning by removing special characters and unnecessary spaces. After the data cleaning process, 6,888 observations remained, with accommodation units containing missing values being eliminated. The main variables considered are: County; Type of accommodation (11 types of accommodation units are present in the database, namely, apartment,

guesthouse/bed and breakfast, hotel, hostel, private villa, camping, motel, complex, mansion, farm stay, inn); Price of the accommodation unit – expressed in RON; Address of the accommodation unit; Facilities offered; Overall rating; Rating score; Number of reviews; Rating for cleanliness, facilities, location, comfort, services, and value for money.

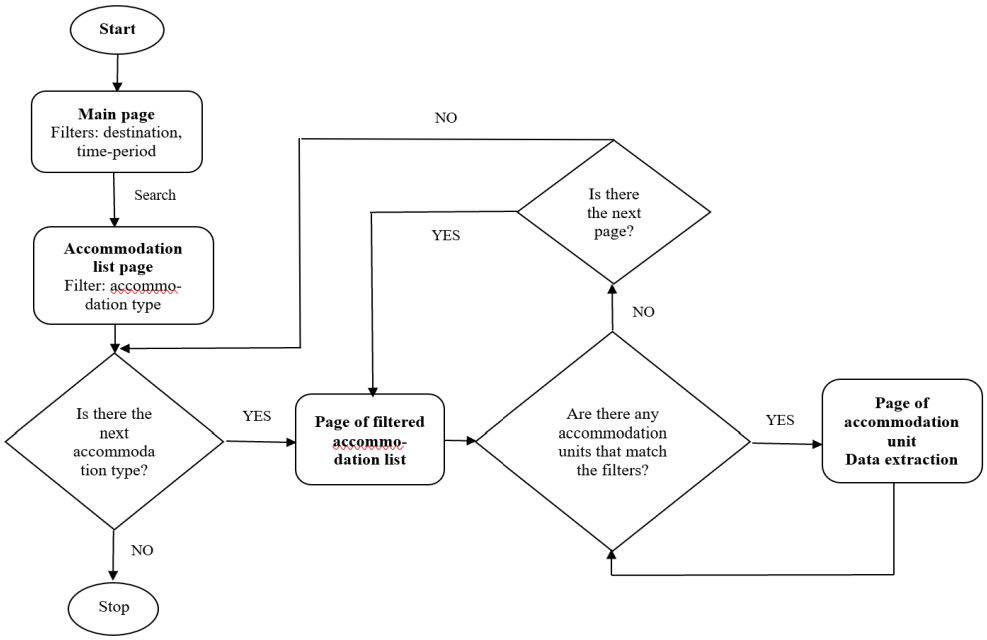

Figure no. 1. The logical diagram of the web scraping program
Source: Created by the authors, based on the program in PyCharm

3. Analysis of the data obtained through web scraping

Most of the accommodation units in the database are apartments, representing 53.38% of the total. This type of accommodation offers tourists flexibility and privacy. Guesthouses, specifically Bed & Breakfast, make up 25.28% of the total, providing a personalized atmosphere in a family setting. Hotels account for 20.09% of the total accommodation units, serving as an option for both leisure and business tourism and providing comfort and full services. Other types of accommodation, such as hostels, private villas, campsites, caravan sites, motels, resorts, and farm stay have a very low presence. Figure no. 2 illustrates the average price based on the type of accommodation, highlighting significant differences between the accommodation options. The most affordable options are hostels and motels, with average prices of 187.04 lei and 192.92 lei, respectively, offering basic conditions at low costs. Guesthouses and campsites have average prices of 303.42 lei and 290 lei, being accessible for tourists seeking an authentic experience at affordable prices.

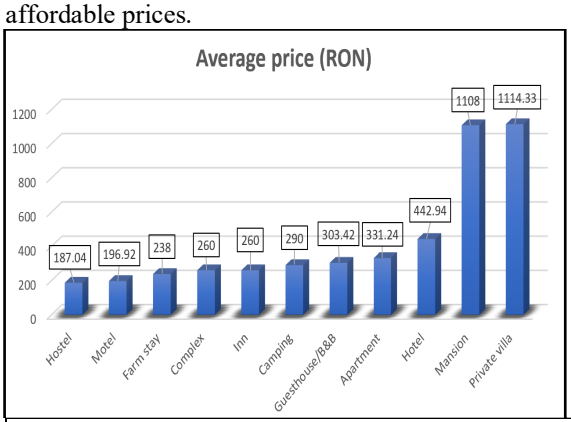

Figure no. 2. Average price (RON) by accommodation type

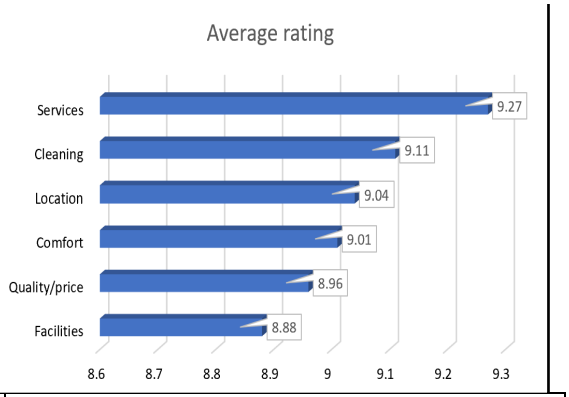

Figure no. 3. The average rating by rating criteria

Source: Created by the authors

The types of accommodation that reflect exclusivity are private villas and mansions, with very high average prices, exceeding 1,100 lei. Hotels and apartments also represent high-end options, with average prices of 443.94 lei and 331.24 lei, respectively (Figure no. 2). Figure no. 3 shows the aspects most appreciated by tourists regarding the quality of the tourism offer. The highest average rating is 9.27, given for various services such as safety, accessibility, and staff attitude. Cleanliness is also highly appreciated, with an average rating of 9.11, suggesting that the accommodations maintain high hygiene standards. Location and comfort have close average ratings of 9.04 and 9.01, respectively, while the lowest average rating of 8.88 is given for facilities, indicating room for improvement. Tourists consider the prices reasonable in relation to the quality offered, with an average rating of 8.96. The facilities provided by the accommodations are also very important. The most commonly encountered ones are parking, Wi-Fi, air conditioning, and pet acceptance. Tourists place great importance on the comfort and accessibility of services, so most accommodations include family rooms, private bathrooms, laundry services, smoking areas, and security.

For a better understanding of the data obtained through web scraping, the GeoDa program was used to represent the spatial distribution of the total number of accommodation units for each county, the number of reviews, the share of the most popular types of accommodation, as well as the average price. Two types of maps were used: Natural Breaks Map and Standard Deviation Map.

The number of accommodation establishments for each county in Romania is shown in Figure no. 4. It is observed that 10 counties – including Vaslui, Botosani, Olt, Ialomita, and Calarasi (with the lightest shade) – have the lowest number of accommodation units (less than 38 accommodation units). With a slightly darker shade, 11 counties are colored, which have between 38 and 112 accommodation establishments, such as Satu Mare, Neamt, Bacau, Covasna, Galati, Mehedinti, Buzau, and Tulcea. In the counties of Gorj, Dolj, Valcea, Arges, Arad, and Hunedoara, there are between 112 and 191 accommodation establishments. These counties are dispersed in various parts of the country, indicating regions where the promotion of tourism development can be improved. The counties of Sibiu, Brasov, Prahova, Cluj, Timis, and Constanta have a high number of accommodation establishments, ranging from 555 to 836, indicating a developed tourist infrastructure. The Municipality of Bucharest, with over 836 accommodation establishments, represents an outlier due to its complexity, reflecting the size, large population, and high density, compared to other counties (Figure no. 4).

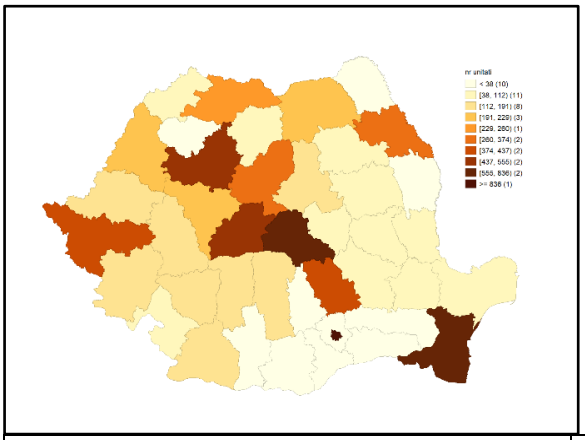

Figure no. 4. Number of accommodation establishments, by counties

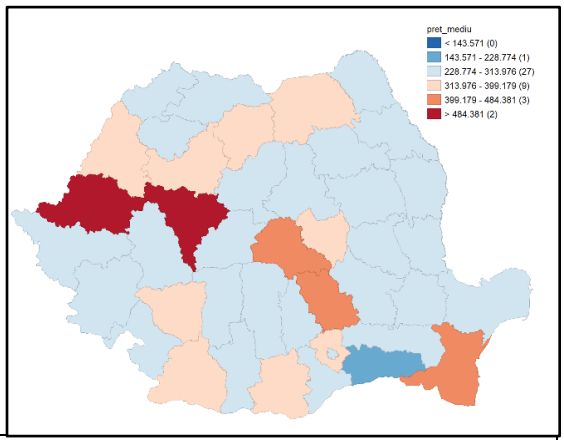

Figure no. 5. Average accommodation price, by counties

Source: Created by the authors in GeoDa

Price of accommodation establishments: In Figure no. 5, a standard deviation map of the average price for each county is represented, with the overall average being 313.97 lei. It is observed that Calarași County has an average price below the general average, at one standard deviation. The counties of Bihor, Cluj, Suceava, Gorj, Dolj, Ilfov, and Teleorman have average prices between 313.97 lei and 399.17 lei, more than one standard deviation above the national average. Three counties, namely Brasov, Prahova, and Constanta, are at two standard deviations from the mean, with prices ranging between 399.17 lei and 484 lei. The counties of Timis and Alba are considered outliers, as they are more than two standard deviations above the average (Figure no. 5).

Type of accommodation establishments: The three maps shown in Figure no. 6 illustrate the share of hotels, guesthouses, and apartments in the total accommodation establishments in each county. It is observed that in the counties of Gorj, Caras-Severin, Sibiu, and Vaslui, the share of hotels is below 10%, the share of guesthouses is over 50% in three of the four counties, while in Sibiu County, apartments

dominate with more than 60%. In Botosani County, hotels are predominant with over 53%, followed by guesthouses at 30%, and apartments represent the smallest share. In the southeastern part of the country, the share of hotels is over 40%, while the counties with the highest shares of apartments are Timis, Arad, Brasov, and Galati. Thus, it is observed that hotels are more concentrated in counties with tourist attractions or large urban centers, guesthouses prevail in rural counties, and apartments are more commonly found in counties with a high population density (Figure no. 6).

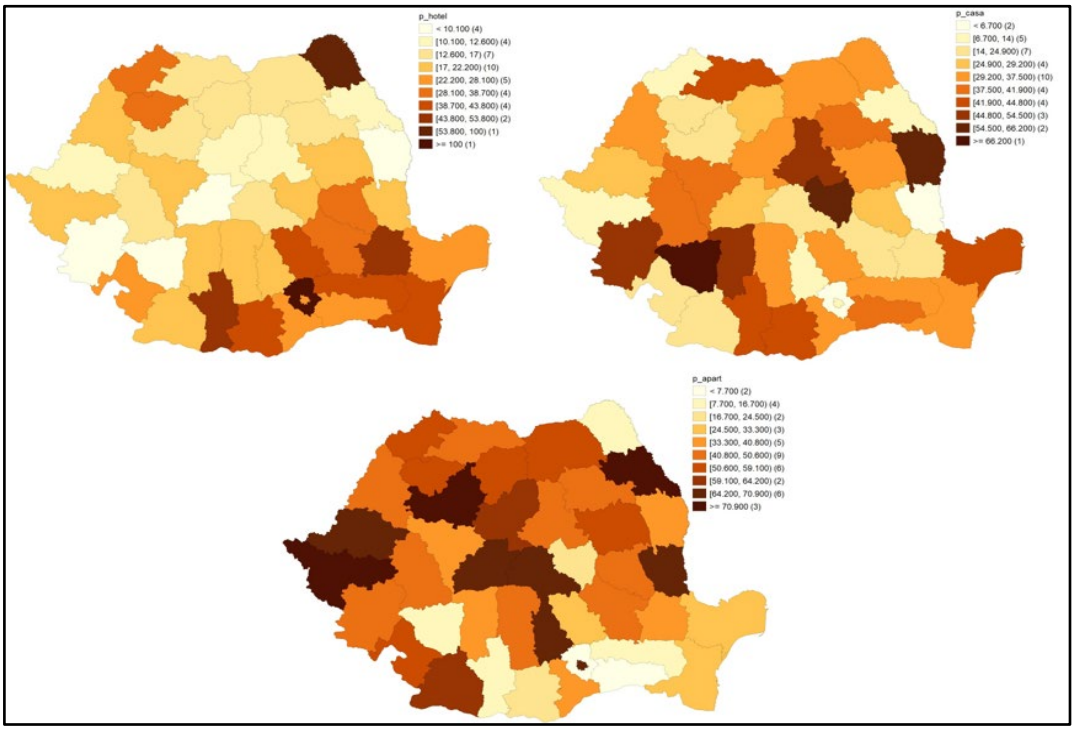

Figure no. 6. The share of hotels, guesthouses and apartments in the total accommodation establishments in each county

Source: Created by the authors in GeoDa

Reviews of accommodation establishments: To better understand the areas where tourists interact the most with online booking sites, as well as the most popular tourist regions, a map has been created to represent the number of reviews in each county. Thus, counties with a large number of reviews include Cluj, Timis, Sibiu, Brasov, Prahova, and Constanta, indicating intense tourist activity and good quality of accommodation services, as it is reasonable to expect that tourists are more likely to leave reviews in places where they had significant experiences. The map also shows 17 counties with fewer than 9,547 reviews, including Botosani, Salaj, Vaslui, Covasna, Vrancea, Buzau, Olt, Mehedinti, and Ialomita. These counties may indicate a lack of tourism infrastructure or insufficient visibility and promotion (Figure no. 7).

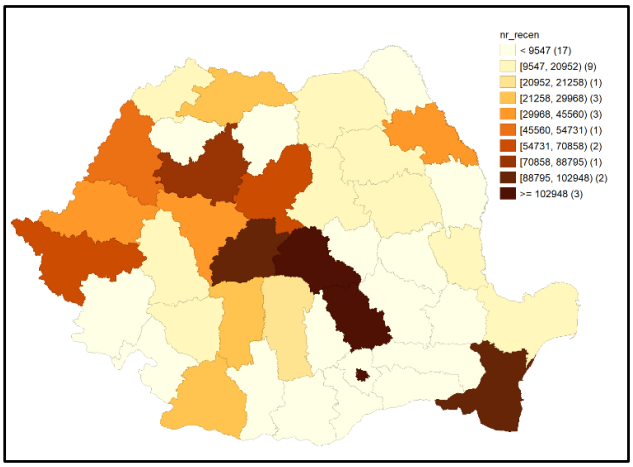

Figure no. 7. The number of reviews, by counties

Source: Created by the authors in GeoDa

Conclusions

This paper highlights how web scraping can serve as an alternative data source for the tourism industry, becoming a valuable and up-to-date resource that complements and, in some cases, enhances the information provided by official statistics.

From the analysis conducted on the data obtained through web scraping, regarding the tourism offer in Romania, it resulted that apartments represent more than half (53.38%) of the total accommodation units analyzed, indicating a clear preference for flexible, modern, and intimate lodging, especially among tourists who desire independence during their stay. The accommodation offer is diverse in terms of prices: hostels and motels are the most affordable (under 200 RON/night), preferred by budget-conscious travelers, while at the other end of the spectrum, private villas and mansions exceed 1,100 RON/night, indicating premium, exclusive options. The ratings given by tourists to accommodation establishments reflect high overall satisfaction, with tourists particularly appreciating safety, cleanliness, and the attitude of the staff (associated with scores above 9), and less so the facilities (scores around 8.8). This suggests an investment opportunity for improving equipment and facilities offered. Additionally, tourists most frequently seek facilities adapted to modern needs, such as Wi-Fi, air conditioning, parking, and pet-friendly options. Regarding the analysis of the tourism offer at the territorial level, the counties of Sibiu, Brasov, Prahova, Cluj, Timis, Constanta, as well as the Municipality of Bucharest, present the highest number of accommodation establishments, and these are also the areas where tourists have provided the most reviews for the accommodation establishments, as well as the areas with the highest average price for accommodation services (Brasov, Prahova, and Constanta). In these counties, tourists interact the most with online booking sites, constituting the most popular tourist destinations. Seven counties in the south of Romania and two in Moldova have a very low number of accommodation establishments (under 38), and in these areas, tourists have left a lower number of reviews.

The analyses conducted highlight that data obtained through web scraping can provide unique perspectives on the quality of tourism offers and consumer preferences. This information is crucial for public authorities, tourism operators, and researchers, aiding in informed decision-making and the development of effective strategies to increase the competitiveness and attractiveness of tourist destinations in Romania. Thus, in counties with a low number of accommodation establishments, local authorities can stimulate investment by offering fiscal incentives, grants, or support programs for the development of guesthouses, bed-and-breakfasts, or campsites. They can also promote rural tourism, eco-tourism, and cultural tourism projects to attract investment and capitalize on local heritage. Furthermore, the lower rating given to the facilities of accommodation units indicates the need for modernization, for which co-financing or favorable credit programs can be launched for upgrading accommodation spaces. Apartments dominate the market, but authorities can encourage the development of alternative units (glamping, traditional cottages, agritourism, etc.) to offer authentic experiences and attract various tourist segments. Areas with few reviews can be integrated into digital promotion campaigns, collaborations with tourism influencers, actively listed on booking platforms, or can have local events, festivals, and thematic routes developed to increase visibility and attractiveness. This study can be expanded by using web scraping on other online booking platforms to gain an even more comprehensive view of the tourism sector. Additionally, integrating other data sources, such as social media and reviews on travel platforms, would be useful for analyzing tourist perceptions in real-time. In conclusion, using web scraping to collect and analyze data from the tourism sector provides a detailed and up-to-date picture of the market, complementing and enhancing official statistics.

References

Adeniyi, D.A., Wei, Z. and Yongquan, Y., 2016. Automated web usage data mining and recommendation system using K-Nearest Neighbor (KNN) classification method. *Applied Computing and Informatics*, 12(1), pp. 90–108. https://doi.org/10.1016/j.aci.2014.10.001

Adhinugroho, Y., Putra, A. P., Luqman, M., Ermawan, G. Y., Takdir, Mariyah, S. and Pramana, S., 2020. Development of online travel web scraping for tourism statistics in indonesia. *Information Research*, 25(4), paper 885. https://doi.org/10.47989/irpaper885

Barcaroli, G., 2015. Use of Big Data in official statistics. Conference Paper, https://www.researchgate.net/publication/281244223

Buhalis, D. and O'Connor, P., 2005. Information communication technology revolutionizing tourism. *Tourism Recreation Research*, 30(3), pp. 7–16. https://doi.org/10.1080/02508281.2005.11081482

Carrigan, C., Green, M. W. and Rahman-Davies, A., 2021. The revolution will not be supervised: Consent and open secrets in data science. *Big Data & Society*, 8(2). https://doi.org/10.1177/20539517211035673

Choong, W. J., 2019. An automated web scraping tool for Malaysia tourism. Diss, UTAR. http://eprints.utar.edu.my/3493/

O'reilly, S., 2007. Nominative Fair Use and Internet Aggregators: Copyright and Trademark Challenges Posed by Bots, Web Crawlers and Screen-Scraping Technologies, *Loyola Consumer Law Review,* 19(3)*, Article 4.* http://lawecommons.luc.edu/lclr/vol19/iss3/4

Pan, B., 2015. E-Tourism. In: J. Jafari, H.Xiao, ed. 2015. *Encyclopedia of Tourism*. New York: Springer.

The World Tourism Organization (UNWTO), 2024. *World Tourism Barometer*, [online] Available at: <www.unwto.org/market-intelligence> [Accessed 7 February 2024].

Xiang, Z., 2018. From digitization to the age of acceleration: On information technology and tourism. *Tourism Management Perspectives*, 25, pp.147–150. https://doi.org/10.1016/j.tmp.2017.11.023

Zhao, B., 2017. Web Scraping. In: Schintler, L., McNeely, C., ed. 2017. *Encyclopedia of Big Data*. Springer, Cham, pp. 1-3. https://doi.org/10.1007/978-3-319-32001-4_483-1

Virtual and Augmented Reality: Analysis of Business Implementation in Retail

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Abstract

Online shopping and the overall use of the internet is changing rapidly, despite the fact that the internet is around for four decades. With the constant increase of users, and therefore also the increase of various interactions with it, such as online shopping, enterprises are forced to explore new, innovative ways to implement in their business model in order to maintain their competitiveness and attract new customers and maintain their current ones. Such technologies are augmented reality and virtual reality. This paper tries to shed some light on the topic of augmented reality and virtual reality and their implementation in different business models as well as their effect and challenges that were faced. This study shows that AR and VR technologies can be implemented by various business models, with different client segments, and have a positive outcome, from the business perspective. Companies tend to be to some extent reluctant in implementing such technologies, because it emphasizes a significant investment for them. Also, because those technologies are still pretty new and unexplored, the reluctance of companies in implementing them tends to be greater. There are so-called "early adopters" as shown in the paper below, and these cases seem to have had a success in adopting such technologies and leveraging their potential in maintain or improving their market position.

Keywords

Virtual reality, augmented reality, retail, impact, experience

DOI: 10.24818/BASIQ/2025/11/024

Introduction

In the last decade we saw a huge, relatively steady, increase in the number of published papers related to augmented and virtual reality (Dragomir et al., 2025). This means that more and more researchers find those 2 topics interesting and it shows that there are specific ways that users can leverage the capabilities in achieving specific needs. Both VR and AR technologies have capabilities to streamline different processes from the business perspective and improve the well-being of enterprises, but this doesn't restrict itself only to the business domain. Education, healthcare, architecture, manufacturing and many more branches can benefit from the implementation of such technologies. However, it is true that some technologies are more easily implemented in one domain than the other. For example, there are more aspects to be considered when trying to implement VR and AR technologies in the education or healthcare system, due to their more specific requirements, lower margin of error and overall user acceptance, which plays a much more important role here, than in the retail domain. Also, there is the topic of which of those two technologies should be implemented. In retail for instance, studies have shown that AR tends to be more attractive since it shows a higher practical value than VR (Boletsis, 2020). It has been shown that such technologies have the ability to generate shopping experiences that are unique compared to the traditional, physical ways of retailing (Berberović et al., 2022). Therefore, companies can implement such technologies to increase their revenue, especially for their own brands, as it can be seen from supermarkets in the retail (Dragomir et al., 2024). Beyond the advantages, these technologies also have some considerable disadvantages for their implementation, such as the specific

requirement of a tailor-made hardware and software and in some cases also mobility problems (Kumari et al., 2019), since in some cases, data transfer is realized via cables in order to generate a more realistic image, or to reduce lag and processing times.

1. Literature review

The current retail market began to shift from regular purchasing activity to a more interactive industry, where the customer is more engaged in the overall shopping experience (Pitke et al., 2023). This is possible through various implementations of AR and VR solutions in the purchasing process. But first, we first need to define the notions of augmented and virtual reality because these 2 terms might get easily used in the wrong context. Therefore, AR or augmented reality refers to leveraging specific virtual elements in the real world, while VR or virtual reality goes beyond and also develops a new reality (Kim et al., 2023). It can be imagined that AR works like an applied filter on an element that exists in the real world. The main difference with VR is that it also builds this element, therefore, nothing that is shown in VR needs to exist in the real world. There are also many deviations and subsidiary forms from those two main technologies that emerged, one of the most spread being the use of so-called MAR or "mobile augmented reality" apps (Dacko ,2017) that refer to augmented reality applications that are used on portable devices such as phones or laptops. It is also shown that some AR solutions seem to be more favored by customers than others (Xue et al., 2022). This is the case between AR apps and magic mirrors, due to the fact that AR apps can be used with the personal phone, but magic mirrors are more limited and people can feel uncomfortable when using them knowing that there are other people waiting in line to do so (Xue et al., 2022).

Companies can leverage the use of AR and VR in their processes and their products and generate brand awareness, promote loyalty, and streamline the purchasing process. For instance, studies have shown that end users show a higher valuation for the companies that offer them such AR or VR capabilities (Dacko, 2017). It has also been shown that such implementation can have a positive impact on the revenue of companies by raising them in the short run (Hilken et al., 2022; Tiutiu et al., 2025). Individual users can benefit from these technologies by visualizing different objects in different environments, as is the case with IKEA and its application. Studies have shown that users of such technologies perceive those features as enjoyable and useful because they don't need to use their mental imagery skills to visualize their product in their desired environment (Iranmanesh, 2024). Therefore, the mental imagery process is positively influenced by such developments (Hilken et al., 2022). This leads to a more streamlined shopping experience and they are more prone to becoming actual customers of IKEA. This intention is also supported by IKEAs so-called "Democratic Design" which focuses on five key elements such as aesthetics, practicality, durability, eco-friendliness and affordability that targets a very broad audience, not a specific client segment (Zhang et al., 2024). On the other side there is also a significant risk that refers to the uncertain outcome of such VR implementation. Despite the fact that such technologies improve the shopping experience, they can be considered as some kind of tools for attracting customers' attention, rather than using them specifically for their initial planned purpose. This is in accordance with the findings from another study that shows that 51% of researched papers out of 129 analysed, were focused on retail in the domain of marketing (Ambika et al., 2023)

Customer acceptance and position regarding these type of technologies are also a key factor to be taken into consideration when deciding to implement specific VR and AR pilot projects, since such projects require a substantial financial backing from the specific enterprise. Studies have shown that consumers tend to have an overall positive view regarding the adoption of such technologies since they try to compensate the lack of interaction with the product that exists on regular online shopping websites (Bonetti et al., 2018). In the near future these types of technologies can become critical factors for enterprises to establish customer engagement (Pitke et al., 2023).

Many articles focus on key aspects that are relatively common to the traditional environments of the retail industry, such as customer emotions, or purchase decisions (Xi and Hamari, 2021). There seems not that many new elements that AR and VR could bring to the table when comparing them to the existing ones, however, they try to maximize the efficiency of the existing ones, such as the ones mentioned earlier. This is uncommon because such technologies are still in the emerging phase, and due to the fact that they are very new and not that much good understood, researchers and companies need to evolve and develop based on a current existing baseline (Xi and Hamari, 2021). It is shown that the use of AR enables the customers to become co-designers or co-creators of the shop or product itself (Caboni et al., 2019). Companies can collect specific data from the customer interaction with AR or VR solutions and analyze them to adapt to the customers' needs and imrove the purchasing decision making process. This can mean

the reshaping of the actual store (Caboni et al., 2019) or replacing the products in a different location where customer traffic is more dense, or where customers tend to purchase that specific product more. This can be then further refined to implement different cross-selling techniques to further boost the revenue of companies.

2. Research Methodology

For this paper, we chose to implement a slightly different approach, including some ideas that were found out by the artificial intelligence using a specific natural language model developed by OpenAI, namely ChatGPT. First, we used more prompts to fine tune our searching methodology and determine if this approach would be valid and useful for our research. Our first prompt that we used was: "give me concrete examples of companies that implemented VR and AR techniques in their products with some useful scientific links referring to it. The companies should be active in the domain of retail". After many iterations of searching and adapting the prompt by modifying specific words to see different results from the program such as exchanging words with synonyms, adding new words or even eliminating some, we identified some interesting topics and specific examples of implementation with regards to AR and VR in big companies. Such topics were related to companies like Nike with their AR implementation that enables users to scan different products and get information regarding those products, IKEA with IKEA Place, Machine-A which is a concept store that partnered with the Institute of Digital Design to create an AR shopping experience, Sephora with its Magic Mirror implementation, Dermalogica with Natalia, a virtual human that helps to train professionals regarding specific product usage. Other companies such as Zara, Lowe's and L'Oreal were also mentioned. After that we filtered them accordingly to their authenticity and validity by analyzing the scientific papers published on Web of Science and the overall information from available from the internet. Topics that were found little to no information regarding the actual implementation, were let aside in favor of those that were found to provide information regarding the implementation of them. Therefore the validation of those implementation was conducted based on the available information from the online field, more specifically number of articles, and number of websites that provided useful information. Following that, we built upon those topics by discussing the method of implementing those technologies either in the shopping experiences or in the end-product itself, as well as the benefits and drawbacks that were or might have been encountered.

For the analysis we focused mainly on AR, and AR based, implementations since these are the easiest to develop and to implement from the ones mentioned earlier. The two most frequently seen types of AR implementations are AR (augmented reality) itself and MAR (mobile augmented reality). Therefore we analyzed the implementation of AR and MAR in different situations and industries, namely in retail with focus on IKEA, in gaming with Pokémon Go and in fashion with Sephora.

3. Results

One of the first, also successful, AR and VR implementations in retail found was the launching of the IKEA Place application (IKEA, 2017). This application lets the user visualize specific IKEA products, mainly furniture products, in their desired environment. The users simply need a device, such as a smartphone with relatively basic technical specifications, an active internet connection, and they can use the application with ease from everywhere. One big downside regarding this whole topic with Ikea is their initial accessibility. Due to the fact that this app was developed with Apples ARKit, this app was only available on IOS devices (IKEA, 2017). In this case although the overall implementation was successful and users enjoyed the use of it, the Android users felt forgotten. This situation was resolved by incorporating this feature into the current IKEA app through the function of IKEA Kreativ feature and also on its website, where users can freely roam in different virtual spaces, creating environments with Ikea products for free. For the mobile app, where IKEA Kreativ is available, users can scan with the phone camera their place or desired environment, then the app processes the taken images and gives the possibility to move forward with the desktop version or with the app itself. After that, it plots automatically the scanned environment, and the user is capable of searching and adjusting the products of IKEA according to his or her personal taste, without the need of an IKEA consultant. The user is also capable of altering the existing objects in the scanned environment, making place for possible new IKEA products. After the removal of objects, the system automatically fills the blank space, according to its surroundings, in order to maintain the accuracy of the environment.

IKEA adopted a lean business model by maximizing the value generated by their products while also reducing the waste generated in their manufacturing process (Li et al., 2012). This is one of the reasons

why IKEA works with its suppliers, to implement new, possible innovative, ways to manufacture furniture without impacting its overall production process (Li et al., 2012). It is also the reason why IKEA implemented a VP or Virtual Prototyping method in the development of specific products (Li et al., 2011). By using such approach, they minimize the possible errors that can appear during the assembly of the products, since the products are made from prefabricated parts (Li et al., 2011).

Some lean aspects can also be seen in their stores. For example, they don't have many employees helping in one area of products like kitchen furniture and products, or living room, or bedroom and its adjacent products, therefore, meaning that they try to minimize their cost with personnel. This concept also emphasizes on the necessity of the customer to select its product from the warehouse after going through their showroom and building it themselves. Consequently, IKEA adopted the so-called DIY or "Do it yourself" methodology.

Another successful implementation of AR technology is the launch of the Pokémon Go application, a mobile location-based game (LBGs), that lets users apply specific online characters, Pokémons, into the real world and chase them in order to collect them (Meschtscherjakov, 2017). The adoption of this app was astonishing between the children, because soon after the launch, everyone was playing it. This whole situation had some positive and negative effects on various key aspects. On the one hand, there was a sudden and huge increase in the Pokémon franchise, which was slowly forgotten and remembered as something from the past. On the other hand, due to the fact that children were so absorbed by this application, there were some serious cases where children were injured because they didn't pay enough attention to their real environment (Gibbs, 2016). To be considered is also the fact that kids were spending more time outside, but on their phone, which is sort of counterintuitive to the scope of being outside and playing in the real life, with real friends. One positive consequence of this situation is the fact that it increased the exercise of the users, since users needed now to actively go and chase Pokémons, some of them going the extra mile of achieving an average distance of 383 km during 2 weeks of playtime (Meschtscherjakov, 2017). Also interesting to note is the fact that Pokémon Go implemented one goal that was easily adapted to the preferences of each end user. The end goal, as their Motto "Gotta Catch'Em All" suggests, is to catch all Pokémons from the Pokedex (Meschtscherjakov, 2017), however, some users derived from this goal and focused only on the process of collecting Pokémons, not necessarily filling their Pokedex. Other users focused more on evolving their existing Pokémons. The primarily reason why this app was such a success is the fact that the users found it fun,

From these 2 implementations, it can be traced the fact that such technologies can be adapted to various target groups. IKEA targets young adults on the lookout for designing possibly their first home, as well as adults that are in the search of redesigning their home. On the other hand, Pokémon Go, targets the younger audience, mainly children and teenagers who are relatively tech-savvy and spend a significant amount of their time playing video games.

Another example of AR integration and adoption can also be seen in the make-up industry, since big brands such as Sephora adopted an augmented reality mirror in order to facilitate their customers to visualize how their products would look, as if the user would have applied those specific products. This technology is based on live-time scanning of the users' face and applying different filters in order to show the result a specific product will have if it were truly applied.

Some key elements of this pilot program were identified and discussed by experts in the domain. Among the pros, the experts debated that such a program will definitely enhance customer engagement, since they offer a new interaction experience for the customer, it will reduce the return rate of the products because the users have a better chance of understanding how the products will look on their skin (ProvenReality, 2024). Talking about the topic of return rate of cosmetics, it needs to be mentioned, that make-up in general is a product that is in most cases nonrefundable if the product itself was opened. The biggest reason behind that is the fact that the product becomes in direct contact with the skin and if the product were to be returned, there may be different bacteria on the remaining product without having a way to remove it. Therefore, the product becomes unusable to other potential customers. The Sephora AR mirror tries to mitigate this situation by applying that visual filter with the product on the scanned face of the person. Among the cons of implementing such a technology, experts say that the current technical limitations are pretty limited and do not show a 100% accurate effect, but this will be drastically improved in the coming years with the advancements made in those technologies (ProvenReality, 2024). Also, aspects such as privacy concerns, the overall dependency of an internet connection and the limited physical sensation have a strong impact on the acceptance of such programs (ProvenReality, 2024).

Conclusions

This paper focuses only on analyzing AR and VR implementation and further develop the current understanding of AR and VR technologies. Due to the nature of the paper, it is limited to represent and interpret the data already available on the internet. However, some interesting facts can be concluded from this, mainly that AR and VR can be implemented in various industries and branches, each potentially having similar or different outcomes. This shows the versatility these 2 types of technologies and further grounds the idea that AR and VR can have a positive impact on the performing enterprise, if implemented in their business models. It is recommended for researchers and companies to understand and further research the impact that such technologies can provide, since they show a significant potential to revolutionize the current retail market by bringing a new, innovative element to the table and facilitating a more user-oriented interactivity and experience.

One approach that can be taken in a future study is the empirical analysis of such interactive technologies, since at the time of writing there is still some gaps in the research field around this subject. Focus groups can also be studied in order to generate some models that can be used to predict future trends and also improvement direction for these technologies, in order to make them more attractive.

References

Ambika, A., Shin, H. and Jain, V., 2025. Immersive technologies and consumer behavior: A systematic review of two decades of research. *Australian Journal of Management*, [online] 50(1), pp.55–79. https://doi.org/10.1177/03128962231181429.

Berberović, D., Alić, A. and Činjarević, M., 2022. Virtual Reality in Marketing: Consumer and Retail Perspectives. In: I. Karabegović, A. Kovačević and S. Mandžuka, eds. *New Technologies, Development and Application V*. [online] Cham: Springer International Publishing. pp.1093–1102. https://doi.org/10.1007/978-3-031-05230-9_129.

Boletsis, C. and Karahasanovic, A., 2020. Immersive Technologies in Retail: Practices of Augmented and Virtual Reality: In: *Proceedings of the 4th International Conference on Computer-Human Interaction Research and Applications*. [online] Budapest, Hungary: SCITEPRESS - Science and Technology Publications. pp.281–290. https://doi.org/10.5220/0010181702810290.

Bonetti, F., Warnaby, G. and Quinn, L., 2018. Augmented Reality and Virtual Reality in Physical and Online Retailing: A Review, Synthesis and Research Agenda. In: T. Jung and M.C. Tom Dieck, eds. *Augmented Reality and Virtual Reality*. [online] Cham: Springer International Publishing. pp.119–132. https://doi.org/10.1007/978-3-319-64027-3_9.

Caboni, F. and Hagberg, J., 2019. Augmented reality in retailing: a review of features, applications and value. *International Journal of Retail & Distribution Management*, [online] 47(11), pp.1125–1140. https://doi.org/10.1108/IJRDM-12-2018-0263.

Dragomir, H., Pelau, C. and Gati, M, 2025. Augmented and Virtual Reality in Retail: A Bibliometric Analysis. *Proceedings of the 19th International Conference on Business Excellence*. (in press).

Dragomir, H., Rosca, V.I. and Pop, S., 2024. Perceived Quality and Satisfaction Regarding Private Labels in Romanian Retail. *Proceedings of the International Conference on Business Excellence*, [online] 18(1), pp.2274–2282. https://doi.org/10.2478/picbe-2024-0191.

Gibbs, S., 2016. Pokémon Go players urged not to venture into Fukushima disaster zone. *The Guardian*. [online] Available at: <https://www.theguardian.com/technology/2016/jul/26/pokemon-go-players-fukushima-disaster-zone-nuclear> [Accessed 4 March 2025].

Hilken, T., Chylinski, M., Keeling, D.I., Heller, J., De Ruyter, K. and Mahr, D., 2022. How to strategically choose or combine augmented and virtual reality for improved online experiential retailing. *Psychology & Marketing*, [online] 39(3), pp.495–507. https://doi.org/10.1002/mar.21600.

IKEA, 2017.*Launch of new IKEA Place app – IKEA Global*. [online] IKEA. Available at: <https://www.ikea.com/global/en/newsroom/innovation/ikea-launches-ikea-place-a-new-app-that-allows-people-to-virtually-place-furniture-in-their-home-170912/> [Accessed 15 April 2025].

Iranmanesh, M., Senali, M.G., Foroughi, B., Ghobakhloo, M., Asadi, S. and Babaee Tirkolaee, E., 2024. Effect of augmented reality applications on attitude and behaviours of customers: cognitive and affective perspectives. *Asia-Pacific Journal of Business Administration*, [online] 16(5), pp.1067–1092. https://doi.org/10.1108/APJBA-07-2023-0292.

Kim, J.-H., Kim, M., Park, M. and Yoo, J., 2023. Immersive interactive technologies and virtual shopping experiences: Differences in consumer perceptions between augmented reality (AR) and virtual reality (VR). *Telematics and Informatics*, [online] 77, p.101936. https://doi.org/10.1016/j.tele.2022.101936.

Kumari, S. and Polke, N., 2019. Implementation Issues of Augmented Reality and Virtual Reality: A Survey. In: J. Hemanth, X. Fernando, P. Lafata and Z. Baig, eds. *International Conference on Intelligent Data Communication Technologies and Internet of Things (ICICI) 2018*. [online] Cham: Springer International Publishing. pp.853–861. https://doi.org/10.1007/978-3-030-03146-6_97.

Li, H., Guo, H.L., Li, Y. and Skitmore, M., 2012. From IKEA Model to the Lean Construction Concept: A Solution to Implementation. *International Journal of Construction Management*, [online] 12(4), pp.47–63. https://doi.org/10.1080/15623599.2012.10773200.

Li, H., Guo, H.L., Skitmore, M., Huang, T., Chan, K.Y.N. and Chan, G., 2011. Rethinking prefabricated construction management using the VP-based IKEA model in Hong Kong. *Construction Management and Economics*, [online] 29(3), pp.233–245. https://doi.org/10.1080/01446193.2010.545994.

Meschtscherjakov, A., Trösterer, S., Lupp, A. and Tscheligi, M., 2017. Pokémon WALK: Persuasive Effects of Pokémon GO Game-Design Elements. In: P.W. De Vries, H. Oinas-Kukkonen, L. Siemons, N. Beerlage-de Jong and L. Van Gemert-Pijnen, eds. *Persuasive Technology: Development and Implementation of Personalized Technologies to Change Attitudes and Behaviors*. [online] Cham: Springer International Publishing. pp.241–252. https://doi.org/10.1007/978-3-319-55134-0_19.

Xi, N. and Hamari, J., 2021. Shopping in virtual reality: A literature review and future agenda. *Journal of Business Research*, [online] 134, pp.37–58. https://doi.org/10.1016/j.jbusres.2021.04.075.

Pitke, M., Joshi, V., Kumar Baral, S. and Dwyer, R.J., 2023. 6 Retailing and e-commerce riding on technology: augmented reality and virtual reality. In: R. Goel, S.K. Baral, T. Mishra and V. Jain, eds. *Augmented and Virtual Reality in Industry 5.0*. [online] De Gruyter. pp.127–146. https://doi.org/10.1515/9783110790146-006.

ProvenReality, 2024. Exploring Sephora's Augmented Reality Mirror: Expert Opinion - Proven Reality. Available at: <https://provenreality.com/sephora-augmented-reality-mirror/> [Accessed 16 April 2025].

Dacko, S.G., 2017. Enabling smart retail settings via mobile augmented reality shopping apps. *Technological Forecasting and Social Change*, [online] 124, pp.243–256. https://doi.org/10.1016/j.techfore.2016.09.032.

Tiutiu, M., Nemțeanu, S., Dabija, D.-C. and Pelau, C., 2025. The impact of online customer service and store features on consumer experience and willingness to revisit their preferred online store. *Humanities and Social Sciences Communications*, [online] 12(1), p.78. https://doi.org/10.1057/s41599-025-04383-0.

Xue, L., Parker, C.J. and Hart, C.A., 2023. How augmented reality can enhance fashion retail: a UX design perspective. *International Journal of Retail & Distribution Management*, [online] 51(1), pp.59–80. https://doi.org/10.1108/IJRDM-09-2021-0435.

Zhang, J., Su, J., Zeng, Y. and Zhang, C., 2024. The Application and Development of Design Management at IKEA: A Case Study Based on The Concept of Democratic Design. *International Journal of Global Economics and Management*, [online] 4(2), pp.65–70. https://doi.org/10.62051/ijgem.v4n2.09.

Entrepreneurship and Digitalization. A Review of the Highly Cited Literature in the Research Area of Business Economics

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Abstract

The paper explores the relationship between entrepreneurship and digitalization, as outlined by the scientific literature, aiming to analyse the highly cited papers in the area, indexed in the Web of Science (WoS) database. The paper is based on desk research, focusing on both quantitative and qualitative approaches. Using WoS generated reports, the quantitative analysis of the highly cited papers in the area of "entrepreneurship and digitalization" outlines the most relevant authors (Parida Vinit, Nambisan Satish and Wincent Joakim), the most prolific years of publication (2021 and 2020), the most important academic institutions (Lulea University of Technology and University of Vaasa), countries (the United States of America) and publishing houses (Elsevier). The qualitative analysis puts forward key research topics, that can be classified into four main categories, each with its specific themes: digitalization's impact on the business environment; digital entrepreneurship and digital ecosystems; new business models in the digital era; SMEs in the context of digitalization. This also outlines the employed research methods in the reviewed highly cited papers – the most common referring to quantitative, qualitative, mixed, and secondary data analysis – as well as the main entities that were subject to investigation, among which, very frequent were SMEs, start-ups and large companies. Approaching literature review-related studies on "entrepreneurship and digitalization" in a novel way, by tackling only highly cited papers in WoS, the paper sets guidelines for future research.

Keywords

Entrepreneurship, digitalization, literature review, highly cited paper.

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Introduction

A major disruptive force, digitalization has influenced the development of entrepreneurial endeavours during the last decades. The concepts of entrepreneurship and digitalization have become interdependent, forming an ever-evolving symbiotic relationship that redefines the way people organize their businesses, develop innovative ideas and put them into practice. This connection is not only a necessity, but also a chance for entrepreneurs to reinvent business models and reach new levels of success (Mammadov et al., 2024). Digitalization brings important opportunities for businesses, such as simplifying business operations, or increasing efficiency and competitiveness, by providing entrepreneurs with a range of modern tools to help them manage their businesses more efficiently (Caputo et al., 2021). Furthermore, the phenomenon of digitalization is transforming entrepreneurial ecosystems, especially through the development of innovation and competitiveness, thus becoming an essential factor in economic growth and playing a crucial role in addressing global challenges and strengthening resilience in various sectors (Trotsenburg, 2024). In addition, digitalization supports sustainability, allowing companies to adopt

"green", environmentally friendly strategies, while also becoming much more socially responsible (da Silva Guimarães, Fernandes and Ramadani, 2023; Grosu, 2024); digital solutions play a vital role in addressing climate change and accelerating the transition to a green and sustainable economy (Amicarelli et al., 2021; Paraschiv et al., 2024; Habib et al., 2025; López-Cózar-Navarro, Priede-Bergamini and Cuello-de-Oro-Celestino, 2025).

Digitalization is a pivotal factor in terms of global progress, offering a multitude of significant advantages and opportunities for economic and sustainable development (World Economic Forum, 2023). At European Union's (EU's) level, digital transformation is one of its key priorities, this being committed to strengthen its digital capacity. Through its Digital Strategy, EU aims at guiding and controlling its digital transformation to bring significant benefits to both citizens and businesses, while making Europe a climate-neutral continent by 2050 (European Commission, Directorate-General for Communication, n.d.).

As research and innovation are important drivers for reaching such goals, the present paper aims at studying the influential articles in the area of "entrepreneurship and digitalization", mainly, to draw some guidelines for both academia and practitioners related to the most explored research trajectories. In a more specific regard, the paper focuses on analysing, from both quantitative and qualitative perspectives, the highly cited papers indexed in the Web of Science (WoS) database, tackling aspects like: main topics addressed, main research methods employed, main investigated subjects, highly cited papers' evolution over the years, the most prolific authors, the most representative academic institutions and universities, as well as their associated countries and geographical regions, and the most active publishers. Thus, the paper further briefly depicts a review of the scientific literature, followed by the emphasis of the main methodological aspects specific to the carried-out research, and the outline of its main results. The paper ends with a series of final considerations.

1. Review of the scientific literature

The relationship between entrepreneurship and digitalization is a complex, dynamic and multifaceted one, reflecting a deep interaction between technology and innovation in the business environment. This connection brings to the fore key themes such as digital innovation, entrepreneurial ecosystems and long-term digitalisation transitions, which define how businesses adapt and evolve in the digital age (Zaheer, 2019). A key dimension of entrepreneurship in the context of digitalisation is the integration of emerging technologies, which not only change traditional business models, but also contribute to the creation of new markets and innovation opportunities (Nadkarni and Prügl, 2021). In addition, the same authors point out that digital transformation is influenced by several factors, including the rapid pace of change, organizational culture, and transformational leadership, which play an important role in the adoption and deployment of new technologies.

Digital entrepreneurship and the connection between the two concepts have become an increasingly important topic of interest in the literature, having a significant impact on economic development and innovation. Recent studies show that this sector is constantly evolving, having an increasingly clear and broad identity within scientific research (Zaheer, 2019). However, there is still a lack of solid theoretical foundations in this area, which indicates the need to develop more robust and in-depth conceptual frameworks (Paul, Alhassan and Binsaif, 2023). Furthermore, according to Zaheer (2019), the area of "entrepreneurship and digitalization" should not only be analysed from a technological perspective, but also through the prism of the parties involved, such as entrepreneurs, investors and innovation ecosystems, and the employed research methods should be diversified, focusing on longitudinal studies, mixed methods and quantitative research, to obtain a better overview of the phenomenon. At the same time, Zaheer (2019) recommends a deeper integration of interdisciplinary perspectives, combining sectors such as technological disruption and corporate entrepreneurship, to develop more realistic and practical business models. Furthermore, theoretical models on the transition from traditional to digital entrepreneurship provide an important starting point for future research and their applicability in the real business environment is essential to be tested and validated (Paul, Alhassan and Binsaif, 2023).

There is a vast, still burgeoning, literature in the area of "entrepreneurship and digitalization", emphasising different research directions; just to name some of the directions identified in the studies published in 2023, "digitalization of businesses in the post-pandemic world, digital women entrepreneurship, digitalization in small and medium sized enterprises (SMEs), sustainable digital businesses, business models in digitalised economies, business digitalisation strategies, innovation and creativity in the process of digitalization, impact of digitalisation on business performance" (Francu et al., 2025). The analysis of the literature is an essential element in any type of scientific study; by examining previous works in detail, researchers can identify the main directions to explore, select the appropriate research methods for the study, and build a

robust theoretical framework for investigating the chosen themes. Literature review studies are common in the broad area of "entrepreneurship and digitalization" (Zaheer, 2019; Nadkarni and Prügl, 2021; Berman et al., 2023; Blanco-González-Tejero et al., 2023; Calderon-Monge and Ribeiro-Soriano, 2023; Paul, Alhassan and Binsaif, 2023; Sitaridis and Kitsios, 2024; Francu et al., 2025). However, the one put forward in the present study is different as it is focusing only on highly cited papers, mainly to identify to most studied research trajectories in the area of "entrepreneurship and digitalization" over the years, as further outlined in the next section of the paper.

2. Research methodology

The present explores the relationship between entrepreneurship and digitalization, as outlined by the scientific literature, aiming to analyse the highly cited papers in the area, indexed in WoS. In a more specific regard, the paper focuses on the quantitative analysis of the identification data of the highly cited papers aiming to identify the most relevant authors, the most prolific years of publication, the most important academic institutions, countries (with associated geographical regions) and publishing houses. At the same time, the paper also focuses on the qualitative analysis of the highly cited papers in the area of "entrepreneurship and digitalization" targeting the identification of key research topics, methods and subjects.

The paper is based on desk research carried out on February 26, 2025 consisting in searching the WoS database for all scientific articles published in the area of "entrepreneurship and digitalization". WoS was chosen for research due to its importance and major relevance for academic publishing. The searched keywords were "digital*" AND "entrepreneur*", and the employed filtering criteria referred to: "Document types – article", "Highly cited papers" and "Research areas – Business Economics". Criterion "Document types – article" was chosen as articles, usually, provide a more rigorous and documented analysis, especially when compared to book reviews, editorials, or conference papers. The main purpose of filtering the articles with the most citations was to identify the works that have a significant impact in the studied area. These articles have an essential role in the literature and offer deep and highly influential perspectives on the relationship between entrepreneurship and digitalization. The choice of the criterion "Research areas – Business Economics" was motivated by the need to follow the research areas that directly address issues related to economics and business. This filter ensured that the selected articles are consistent with the entrepreneurial and economic context, providing pertinent information for research.

The generated dataset was composed of 112 articles. This was analysed considering both quantitative and qualitative perspectives. In what regards the quantitative side, reports generated by WoS were used to provide a broad perspective on the authors who stood out for their particular interest in exploring the connection between entrepreneurship and digitalisation, highlighting their significant contributions in this field. In addition, the evolution of the number of highly cited scientific articles published over the years was analysed, along with the academic institutions and universities that were involved in research in this area, as well as the countries and geographical regions that played an important role in the development of this field of study. At the same time, the publishing houses that actively promoted research in the context of entrepreneurship and digitalization were also analysed. From a qualitative perspective, content analysis on the abstracts of the 112 scientific articles was accomplished to establish the main themes addressed, the research methods used, and the categories of subjects investigated.

3. Results and discussion

3.1. Quantitative analysis

Regarding the evolution by year of the highly cited papers, figure no. 1 outlines that most of them (24, respectively 21.4%) were published in 2021 and in 2020 (17, respectively 15.17%). This finding might be associated with the COVID-19 pandemic, which has accelerated the digitalization process globally and stimulated research in areas such as digital entrepreneurship, innovation or digital transformation in entrepreneurship.

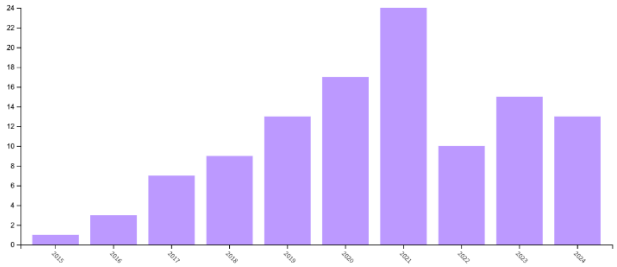

Figure no. 1. Highly cited papers in the area of "entrepreneurship and digitalization", by year
Source: generated by WoS report

In terms of the most representative authors in the investigated area, Parida V. (Professor Parida Vinit from Lulea University of Technology) is, by far, the most cited author (13 articles). Other prolific researchers in the area of entrepreneurship and digitalization, are Nambisan S. (Professor Nambisan Satish, from Case Western Reserve University) and Wincent J. (Professor Wincent Joakim, from Hanken School of Economics), each with 8 articles. (Figure no. 2)

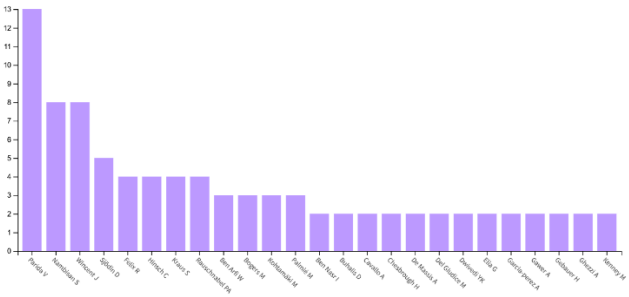

Figure no. 2. Most representative authors in the area of "entrepreneurship and digitalization"
Source: generated by WoS report

In line with the most representative authors, the investigation further focused on analysing the universities and academic institutions that have contributed significantly to the research area related to entrepreneurship and digitalization. Thus, it was revealed that 14 articles (12.5%) were affiliated to Lulea University of Technology, which might be considered a centre of excellence in the "entrepreneurship and digitalization" research area. This was closely followed by the University of Vaasa, with 11 articles (9.8%) and the Hanken School of Economics and the University of St. Gallen, both with 7 articles each (6.2%).

Regarding the countries that published most of the highly cited papers in the area of "entrepreneurship and digitalization" figure no. 3 illustrates the dominant position of the United States of America (USA), with 37 articles (33.03%). England ranks second with 27 articles (24.10%), closely followed by Italy and China (Peoples R China) with 23, respectively 22 articles, representing 20.5% and 19.6% of the total. In addition, the distribution of contributions by geographical regions outlines the presence of countries from all continents. The dominant presence of America and Europe in the research specific to the "entrepreneurship and digitalization" area underlines the fact that these regions are the most dynamic and influential. This position can be attributed to substantial investment in research and development, as well as to the presence of world-renowned academic institutions in these continents. On the other hand, the increase in contributions from China and India, representing Asia, reflects these countries' efforts to strengthen themselves as global players in the field of research and innovation, especially in sectors such as technology and entrepreneurship. This trend underlines the rapid transformation of these economies into centres of academic and technological excellence.

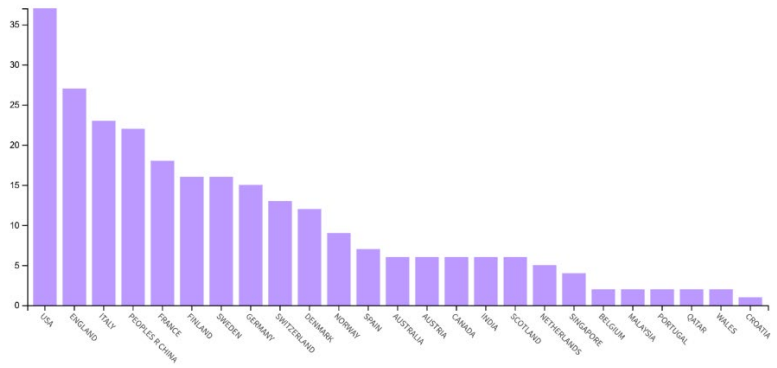

Figure no. 3. Highly cited research in the area of "entrepreneurship and digitalization", by country
Source: figure generated by WoS report

In terms of the publishers that published most of the highly cited papers, Elsevier is, by far, the most representative, with 76 articles (67.8%), followed, at a more than considerable distance, by Wiley, with 13 articles (11.6%).

3.2. Qualitative analysis

Topics covered

A wide range of topics related to digitalization, innovation, and the evolution of business models in the context of digitalization were explored in the reviewed articles. The explored studies looked at how digitalization influences different industries and economic sectors, changing not only consumer behaviour, but also entrepreneurial strategies and companies' structure and business models. However, a classification could be made of the main topics explored in the investigated literature, considering four main categories: digitalization's impact on the business environment, digital entrepreneurship and digital ecosystems, new business models in the digital era, and SMEs in the context of digitalization. The last category was also found as a representative research category in the studies published in 2023 on topics in the area of "entrepreneurship and digitalization" (Francu et al., 2025).

The impact of digitalization on the business environment was frequently explored in the highly cited papers in the area of "entrepreneurship and digitalization". Digitalization is seen by entrepreneurs as an essential factor and is becoming indispensable for increasing economic competitiveness, improving operational efficiency and reducing costs. By adopting digital solutions, companies can access new markets and customers, automate processes and improve the customer experience. In addition, the research also highlights the challenges associated with the impact of digitalisation on businesses, such as high deployment costs, digital skills shortages and cybersecurity risks. Even more, an interesting approach in the digital orientation of firms in the studied literature is its connection to sustainability, environmental performance, or "green" activity.

Moreover, digital entrepreneurship and digital ecosystems have become fundamental for business development in the contemporary era characterized by digital evolution and change. Digital ecosystems are represented by complex networks of firms, customers, suppliers and partners who interact through online platforms. Thus, studies show how important the operational relationship between different platforms is, how companies create and maintain their competitive advantage, and innovation strategies within these ecosystems.

The evolution, both economically and technologically, has led to the emergence of new business models, which emphasize flexibility, adaptability, digitalization, and innovation. Digital transformation has led to the emergence of completely new business models based on technology and interconnectivity. Changing business models in the digital age is another common theme in the works explored. Digital transformation has become a strategic imperative for companies across all industries, having a profound impact on the way businesses are managed and developed. Therefore, the adoption of digital services and processes has become a necessity for businesses, regardless of their size. For traditional companies, the transition to digitalization involves not only significant financial investments, but also a profound cultural change. The highly cited studies examine how traditional firms are shifting their strategies to integrate digital solutions, such as the use of artificial intelligence (AI), process automation, or the implementation of the Internet of Things (IoT). At the same time, digital transformation also comes with a series of challenges and risks for

companies, such as resistance to change, high costs with the implementation of digital solutions and the need to adapt quickly to the environment.

SMEs development in the context of digitalization was also identified among the most addressed topics in the analysed dataset. While digitalisation offers a wealth of opportunities for SMEs, they also face many challenges, which can slow down their digitalisation process or even lead to failure. The studies highlight how SMEs manage to adopt effective digital strategies, with significant advantages such as access to international markets, increasing the list of potential customers and automating processes to reduce operational costs. In addition, the highly cited papers also highlight the role of governments and public policies in the digital transformation of SMEs. Thus, in order to support them in the digitalization process, governments and international institutions are developing policies and financing programs aimed at modernizing the technological infrastructure. Training initiatives, especially for employees, are also promoted to develop the digital skills needed in the new economic context. Even more, the environmental orientation of SMEs in connection to their digital adaptation is tackled in the investigated literature.

Research methods

Quantitative, qualitative and mixed research methods were widely used in the analysed dataset. For example, questionnaire-based surveys were very common in the analysed dataset. They were used to collect primary data directly from end users and were applied, in particular, in research related to the acceptance and adoption of digitalisation and emerging technologies. In addition to quantitative research methods, qualitative studies, such as interviews and focus groups, were used to obtain a set of detailed and varied perspectives on decision-making processes in companies in relation to digitalization and on perceptions of digital transformation and new technologies.

Case studies were also found in the analysed dataset. This form of research has manifested itself through comparative analyses between organizations to understand the innovation of business models and the success of economic ecosystems.

Besides field research, usually, in the form of interviews, focus groups, or questionnaire-based surveys, desk research was also identified in the studied articles. The most common type was related to the analysis of secondary data. The use of large economic databases, such as those provided by the Organisation for Economic Co-operation and Development (OECD), allow for complex comparative analyses, being especially employed in longitudinal studies, which investigate the evolution of the phenomenon over an extended period.

In terms of data analysis methods, Structural Equation Modelling (SEM) was frequently encountered in the analysed dataset, usually in studies approaching the factors that influence the adoption of emerging technologies in companies, such as IoT. Other employed methods refer to fixed-effect models, Driscoll-Kraay standard error regressions, and other types of regressions.

Investigated subjects

The analysis of the selected scientific articles highlighted a wide range of categories of investigated subjects, among which, the most common were: large companies, SMEs, start-ups – with their associated categories of entrepreneurs, or employees – as well as consumers, and students – mainly investigated in relationship with their entrepreneurial intentions. The degree of diversification of the categories of subjects is high, which underlines that digitalization is gradually becoming a factor of major importance not only for businesses at the beginning of their journey, in the process of creating identity, but also for well-established companies, with long tradition on the market, that need to adapt to current trends to ensure their competitive advantage.

Conclusions

Digitalization is not only a driver of technological innovation, but also a key driver of economic transformation, providing entrepreneurs and businesses with new opportunities to grow, scale, and adapt to rapid changes in the environment. It profoundly influences business models, changing the way companies conduct their activities, how they create and add value. However, despite the significant progress made in the digitalisation of businesses, there are still significant challenges, including a lack of digital skills, cybersecurity risks and adaptation difficulties among traditional businesses, especially for SMEs.

Research is aiming to address this societal, practical problem and many studies in the literature are tackling various issues related to SMEs and their digitalization process, as it can be observed from the present paper, too. Based on desk research, this focused on reviewing the highly cited literature (in WoS) in the area of

"entrepreneurship and digitalization" mainly to identify to most studied research trajectories. A dataset composed of 112 articles was analysed, focusing on quantitative and qualitative approaches.

The quantitative analysis revealed that 2021 and 2020 were the years when most of the highly cited papers in the area of "entrepreneurship and digitalization" were published. Professor Parida Vinit from Lulea University of Technology is one of the most representative authors in the analysed area, along with professors Nambisan Satish, from Case Western Reserve University and Wincent Joakim, from Hanken School of Economics. They authored/co-authored many of the highly cited papers included in the analysed dataset. In the same line, important universities to whom authors signing highly cited papers in the area of "entrepreneurship and digitalization" are affiliated refer to Lulea University of Technology, University of Vaasa, Hanken School of Economics, and University of St. Gallen. In terms of countries to whom the authors that published most of the highly cited papers in the area of "entrepreneurship and digitalization" belong, the USA is, by far, the most representative. Furthermore, the quantitative analysis revealed Elsevier as the publisher that supports most of the journals in which the analysed highly cited papers were published.

The qualitative analysis focused on identifying the topics approached in the studied literature, the employed research methods and the nature of investigated subjects. In what regards the topics covered in the highly cited literature belonging to WoS, four main categories could be identified: digitalization's impact on the business environment, digital entrepreneurship and digital ecosystems, new business models in the digital era, and SMEs in the context of digitalization. Digitalization's impact on the business environment, was usually approached in relationship to both its benefits and opportunities, as well as its challenges and threats, but also in relationship to sustainability, environmental performance, or "green" activity. Studies on digital entrepreneurship and digital ecosystems were mainly tackling the relationship between partners, competitive advantage, or innovation strategies. In terms of business models, the transition to new models, focusing on how traditional firms are shifting their strategies to integrate digital solutions, such as the use of AI, process automation, or the implementation of IoT was highly explored in the analysed dataset. Also, the challenges and risks associated to this transition were also explored. Studies on SMEs in the context of digitalization included in the analysed dataset were, usually, exploring their adoption of effective digital strategies, the role of governments and public policies in the digital transformation of SMEs, or the environmental orientation of SMEs in connection to their digital adaptation. In what regards research methods employed, both desk and field research were encountered. Quantitative (usually, questionnaire-based surveys), qualitative (usually, interviews and focus groups) and mixed research methods were the most representative for the field research, while secondary data analysis (usually, provided by renowned institutions) was very common for desk research. In what concerns the investigated subjects, one of the most studied categories referred to: large companies, SMEs, start-ups – with their associated categories of entrepreneurs, or employees - as well as consumers, and students.

The paper sets ideas for further research opportunities that might help to better understand the impact of digitalization in the entrepreneurial environment. Although much research looks at the impact of digitalization on businesses in the short term, there is a significant need for studies examining the effect of this process in the long term, including the impact on firms' sustainability, innovation, and market competitiveness. An important topic that needs to be explored in more detail is the influence of cultural, social and economic factors on the adoption of digital technologies among entrepreneurs in different fields of activity, but also in different geographical regions or countries, with different degrees of development. These aspects can play a key role in the success or failure of the implementation of digital solutions. Moreover, given that many SMEs do not have the resources to rapidly adopt new technologies and remain relevant in the market in this regard, future research should focus on ways in which they can implement the digitalisation process without compromising operational efficiency or financial situation.

References

Amicarelli, V., Lagioia, G., Patruno, A., Grosu, R.M., Bux, C., 2021. Enhancing the Sustainability of the Aviation Industry: Airlines' Commitment to "Green" Practices. *Amfiteatru Economic*, [e-journal] 23 (Special Issue No. 15), pp.934-947. DOI: 10.24818/EA/2021/S15/934.

Berman, T., Stuckler, D., Schallmo, D. and Kraus, S., 2023. Drivers and success factors of digital entrepreneurship: A systematic literature review and future research agenda. *Journal of Small Business Management*, [e-journal] 62(5), pp.2453-2481. DOI: 10.1080/00472778.2023.2238791.

Blanco-González-Tejero, C., Ribeiro-Navarrete, B., Cano-Marin, E. and McDowell, W.C., 2023. A systematic literature review on the role of artificial intelligence in entrepreneurial activity. *International Journal on Semantic Web and Information Systems*, [e-journal] 19(1), pp.1-16. DOI: 10.4018/IJSWIS.318448.

Calderon-Monge, E. and Ribeiro-Soriano, D., 2024. The role of digitalization in business and management: a systematic literature review. *Review of Managerial Science*, [e-journal] 18, pp.449–491. https://doi.org/10.1007/s11846-023-00647-8.

Caputo, A., Pizzi, S., Pellegrini, M.M. and Dabić, M., 2021. Digitalization and business models: where are we going? A science map of the field. *Journal of Business Research*, [e-journal] 123, pp.489-501. https://doi.org/10.1016/j.jbusres.2020.09.053.

da Silva Guimarães, J., Fernandes, C. and Ramadani, V., 2023. The Relationship between Entrepreneurial Ecosystems and Digital Transformation. *FIIB Business Review*, [e-journal] 14(1). https://doi.org/10.1177/23197145231173850

European Commission, Directorate-General for Communication, n.d.. *A Europe fit for the digital age. Empowering people with a new generation of technologies.* [online] Available at: <https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age_en> [Accessed 25 April 2025].

Francu, C.C., Grosu R.M., Coman, I.F. and Sava, S., 2025. Exploring the nexus of entrepreneurship and digitalization: a review of the state-of-the-art literature. In: Society for Business Excellence, *The 19th International Conference on Business Excellence. Leading Change in Disruptive Times*. Bucharest, Romania, 20-22 March 2025. S.l.: Sciendo, De Gruyter Brill Group.

Grosu, R.M., 2024. "Green" practices in the food retail sector: evidence from the Romanian market. *British Food Journal*, [e-journal] 126(1), pp.173-190. https://doi.org/10.1108/BFJ-12-2022-1119.

Habib, A., Khan, M.A., Chuluunbaatar, E. and Oláh, J., 2025. Does Mandatory CSR Reporting Help Combat Climate Risk in the Presence of Green Finance and Green Innovation? *Amfiteatru Economic*, [e-journal] 27(68), pp.163-179. https://doi.org/10.24818/EA/2025/68/163.

López-Cózar-Navarro, C., Priede-Bergamini, T. and Cuello-de-Oro-Celestino, D., 2025. Industry 4.0 and Environmental Protection: The Catalyst Role of Public Financial Support. *Amfiteatru Economic*, [e-journal] 27(68), pp.111-127. https://doi.org/10.24818/EA/2025/68/111.

Mammadov, H., Ruiz-Gándara, A., González-Abril, L. and Romero, I., 2024. Adoption of Artificial Intelligence in Small and Medium-Sized Enterprises in Spain: The Role of Competences and Skills. *Amfiteatru Economic*, [e-journal] 26(67), pp.848-866. https://doi.org/10.24818/EA/2024/67/848.

Nadkarni, S. and Prügl, R., 2021. Digital transformation: a review, synthesis and opportunities for future research. *Management Review Quarterly*, [e-journal] 71, pp.233–341. https://doi.org/10.1007/s11301-020-00185-7.

Paraschiv, D.M., Muhammad, A., Petrariu, I.R., Gheorghe, M., Dieaconescu, R.I., Istudor, M., 2024. Shaping Europe's Digital and Sustainable Future: Analysis of the Digital Economy and Society Index in the Pre- and Post-Pandemic Period. *Amfiteatru Economic*, [e-journal] 26(Special Issue No. 18), pp.1012-1030. https://doi.org/10.24818/EA/2024/S18/1012.

Paul, J., Alhassan, I. and Binsaif, N., 2023. Digital entrepreneurship research: A systematic review. *Journal of Business Research*, [e-journal], 156, article no. 113507. https://doi.org/10.1016/j.jbusres.2022.113507.

Sitaridis, I. and Kitsios, F., 2024. Digital entrepreneurship and entrepreneurship education: a review of the literature. *International Journal of Entrepreneurial Behavior and Research*, [e-journal] 30(2-3), pp.277-304. DOI:10.1108/IJEBR-01-2023-0053.

Trotsenburg, A.V., 2024. The digital era for all. *World Bank Blogs,* [blog] 29 February. Available at: <https://blogs.worldbank.org/en/voices/digital-era-all> [Accessed 27 March 2025].

World Economic Forum, 2023. *5 ways digitalization can help build global resilience in 2023.* [online] Available at: <https://www.weforum.org/stories/2023/01/5-ways-digitalization-can-help-build-global-resilience-davos2023/> [Accessed 2 March 2025].

Zaheer, H., 2019. Digital entrepreneurship: An interdisciplinary structured literature review and research agenda. *Technological Forecasting and Social Change*, [e-journal] 148, article no. 119735. https://doi.org/10.1016/j.techfore.2019.119735.

The Role of Artificial Intelligence in Transforming Innovation Management

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Abstract

Artificial intelligence (AI) has rapidly emerged as one of the most important and widely discussed topics in today's world, playing a crucial role in reshaping the global business landscape. Its growing relevance highlights the transformative impact AI has on organizations, particularly in the way innovation management is designed and executed. The main objective of this study is to analyze the impact of artificial intelligence on modern businesses by gathering information from a variety of sources, including academic articles, survey results, case studies and official data published by European Union institutions. Our key findings reveal that AI adoption and application vary significantly depending on the size of enterprises, with larger organizations generally leading in integration compared to smaller firms. Additionally, the extent of AI implementation differs across regions, with certain areas showing greater technological advancement and readiness than others. Overall, AI solutions offer significant benefits, including enhanced productivity, improved operational flexibility, greater sustainability, workforce augmentation and support for long-term strategic objectives. This study uses document analysis to compare the impact of artificial intelligence at the national and business levels, drawing on articles, surveys, case studies, and official data from EU institutions.

Keywords

Artificial intelligence, machine learning, innovation, modern businesses

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Introduction

Artificial intelligence has undergone remarkable transformation since its inception in 1956, when John McCarthy first introduced the term. Initially rooted in theoretical and methodological studies, AI has since evolved into an interdisciplinary field, influencing a wide range of research domains. While scholars debate the precise definition of AI, its fundamental trait remains its ability to simulate human cognition and problem-solving (Lee, et al., 2019).

Continuous advancements in AI technology allow businesses across industries to harness its potential more and more. From deep learning and data analysis to external data integration, AI is driving innovation and reshaping the way enterprises operate in the modern digital landscape (Corrado, et al., 2021).

As artificial intelligence increasingly permeates industries and societies, driving digital transformation around the globe, governments and organizations acknowledge the necessity of leveraging its capabilities for improved efficiency, competitiveness and sustainable development. The influence of AI is rapidly expanding within business enterprises, affecting various areas such as investments, marketing, customer relations, supply chain management, new product development and many others (Vecchiarini and Somià, 2023). AI offers businesses the opportunity to assess performance, analyze work patterns and enhance skills. As a crucial element of modern business, it drives innovation, creativity and competitive advantage.

By integrating such practices, organizations can reap significant benefits and the advancement of this technology will transform global society (Kumar, 2023).

Artificial Intelligence is gradually shaping innovation management and policy, transforming how firms operate and develop with significant market, economic and societal implications (Agrawal, et al., 2019). It encompasses IT methods that enable machines to perform human-like cognitive functions such as learning, reasoning and interaction (Baruffaldi, et al., 2020).

While AI has been in development for decades, its rapid adoption in recent years is driven by digitalization (Haenlein et al., 2019). The interconnectedness of products, services and machines, along with the growing volume of digital data, has unlocked new opportunities for data-driven applications and operational efficiency. AI enables businesses to harness these vast data sources effectively. Advances in deep learning and automated machine learning techniques are revolutionizing industries, from optimizing multi-machine systems and enhancing industrial research to reshaping markets, supply chains and production processes (Nolan, 2020).

Despite its transformative potential, AI adoption comes with several challenges (Brock and Wangenheim, 2019). Its implementation often requires adapting existing IT systems, leading to compatibility issues. The effectiveness of this technology also depends on the availability and quality of data, as well as employees' technical skills.

Like other emerging technologies in their early stages, AI faces uncertainty regarding technological feasibility and market acceptance. Users may be skeptical about AI-driven decisions and hesitant to fully integrate its processes. Additionally, legal and regulatory concerns, including data protection and security, pose further obstacles. As a result, leveraging AI does not automatically guarantee increased or more successful innovation.

1. Review of the scientific literature

Artificial Intelligence is typically defined as systems created to imitate human thinking processes in order to solve problems or make decisions. J.H. Fetzer noted that AI is a system that mimics functions comparable to human intelligence and that contemporary definitions have evolved due to advancements in technology (Fetzer, 1990). As proposed by Haenlein et al. (2019), it can be defined as self-powered computational systems capable of making decisions based on data analysis and logical reasoning. This concept builds on Luckin's definition of AI (Luckin and Holmes, 2016), which emphasizes the use of machine learning, big data and predictive analytics to manage operations, enhance customer experience and generate value.

A review of existing literature reveals two key findings: (1) Research on AI's impact on digital enterprise innovation remains scarce and (2) The mechanisms and boundary conditions that shape this influence are not yet well-defined. As AI continues to evolve, understanding how to harness its capabilities to drive innovation in digital enterprises presents both a crucial research challenge and a valuable opportunity for future exploration.

A digital enterprise is defined as a firm that is deeply engaged in the digital economy, either by utilizing a substantial proportion of digital resources or by generating a significant portion of its revenue through digital products and services (Giustiziero, et al., 2023). By leveraging information and communication technologies, these firms can swiftly reallocate resources to develop products or services that align with market demands and customer needs. Leveraging the inherent nature of digital enterprises, AI directly accelerates the innovation cycle and enhances innovation outcomes. In ideation and knowledge acquisition, AI provides access to diverse industry knowledge, overcoming initial constraints, lowering innovation costs and enabling knowledge restructuring. It also strengthens knowledge transfer and integration across supply chains, fostering cross-industry innovation (Deperi, et al., 2022).

AI is transforming business model innovation through data-driven approaches (Rammer, et al., 2022). By enabling enterprises to reconfigure operations and develop new products and services, it promotes continuous development in business models (Reim et al., 2020). Enhancing data collection and infrastructure, AI accelerates product design and functional testing, creating a self-reinforcing cycle of innovation (Lee et al., 2019).

Therefore, the innovative impact of AI on firms can be classified into three key areas:

1. Products, services and business models: AI paves the way for data-driven business models that leverage real-time insights into customer behaviour, product usage and market conditions, leading to the creation of new products and services. For example, AI can be integrated as a software component to enhance product

performance or add extra service features as seen in autonomous driving. Additionally, AI improves product and service marketing by identifying user patterns and enabling personalized communications.

2. Production, delivery and administrative processes: AI optimizes operations by automating tasks and supporting human decision-making. It can detect patterns in production issues, identify defects and facilitate predictive maintenance. Other applications include real-time fleet management, digital security (such as spam detection or preventing dangerous email attachments) and streamlining administrative operations like automated customer responses and invoicing.

3. RandD and innovation processes: AI is transforming research and development by utilizing extensive datasets and advanced prediction algorithms. In sectors like pharmaceuticals and chemicals, AI accelerates RandD through methods like compound identification and neural network-based material discovery. In manufacturing, virtual factories simulate and optimize production processes. Thus, AI not only enhances the efficiency of RandD but also revolutionizes knowledge production by speeding up searches for relevant information and facilitating breakthrough discoveries.

The literature also outlines that the successful implementation of AI in innovation faces several key challenges (Haefner, et al., 2021). Data availability and quality remain critical, as AI requires continuous, high-quality data, with extensive efforts needed for cleaning and integration. The shortage of specialized skills further complicates large-scale AI adoption, as firms struggle to build multidisciplinary teams. Additionally, AI's "black-box" nature raises concerns about transparency and trust, while regulatory and legal uncertainties arise when merging data from multiple sources. Despite these challenges, it remains a powerful driver of industrial innovation, warranting further exploration.

2. Research methodology

For this research, we adopted document analysis as our methodology, collecting information from articles, survey results, case studies and official data published by EU institutions. We conducted a comparative analysis, examining the impact of artificial intelligence both at the macro level, focusing on countries and at the micro level, analyzing its effects on businesses.

We used Eurostat statistical data on the use of artificial intelligence available between 2021 - 2024 as our database. We mapped the most common AI applications identified according to the literature, identifying clusters and analyzing how companies integrate this technology into their operations, both by company size and by country.

To support our research, we checked publications from reputable scientific sources, such as Web of Science and Scopus. The documents were selected using the keywords "the impact of artificial intelligence" or "artificial intelligence in business," with a focus on articles from the fields of business, economics and finance, published since 2019.

To guide this research and provide a structured framework for analysis, two hypotheses were formulated. These hypotheses aim to examine the relationship between AI adoption and organizational performance, as well as the influence of enterprise size and regional technological readiness on the level of AI integration.

Hypothesis 1:

The adoption of artificial intelligence positively influences organizational performance across various business dimensions, including productivity, flexibility, and sustainability.

Hypothesis 2:

Enterprise size and regional technological readiness are significant determinants of the level and effectiveness of AI integration within modern businesses.

3. Results and discussions

A detailed study from McKinsey and Company forecasts that Artificial Intelligence will significantly boost global economic output, adding approximately $15.7 trillion by 2030 (McKinsey and Company, 2023). Within this estimate, Generative AI, which focuses on producing original content and innovative solutions, is projected to contribute an extra $4 trillion. These projections emphasize AI's profound ability to transform industries, streamline processes and drive economic growth worldwide in the years ahead.

AI tools process vast amounts of data, enabling people to lead better and safer lives, support business growth and contribute to the sustainable development of global economies. But does AI truly present new

opportunities, or does it introduce new risks for humanity? According to the 2020 Eurobarometer on EU citizens' attitudes toward digitalisation, public opinion on the benefits and usage of digital technologies is mixed. While many recognize the advantages, there are also concerns, with notable differences across demographic groups. For instance, women, older adults, individuals with lower education levels and those living in childless households tend to rate their digital skills lower. Differences also emerge at the national level: residents of countries like Italy and Hungary report lower confidence in their digital abilities, whereas in countries such as Spain, Estonia and the UK, citizens generally express much higher confidence (Săseanu, Gogonea and Ghiță, 2024).

Using Eurostat data from 2021, 2023 and 2024, we created the following graph to analyze the evolution of AI adoption in enterprises by country. One of the limitations is that for 2022 there isn't available any data. It can be observed that Northern European countries, along with Belgium, Luxembourg and Netherlands, show the highest percentages of AI adoption. Over the analyzed period, AI usage has increased each year, indicating that companies are recognizing the potential and benefits of artificial intelligence and are increasingly investing in its adoption.

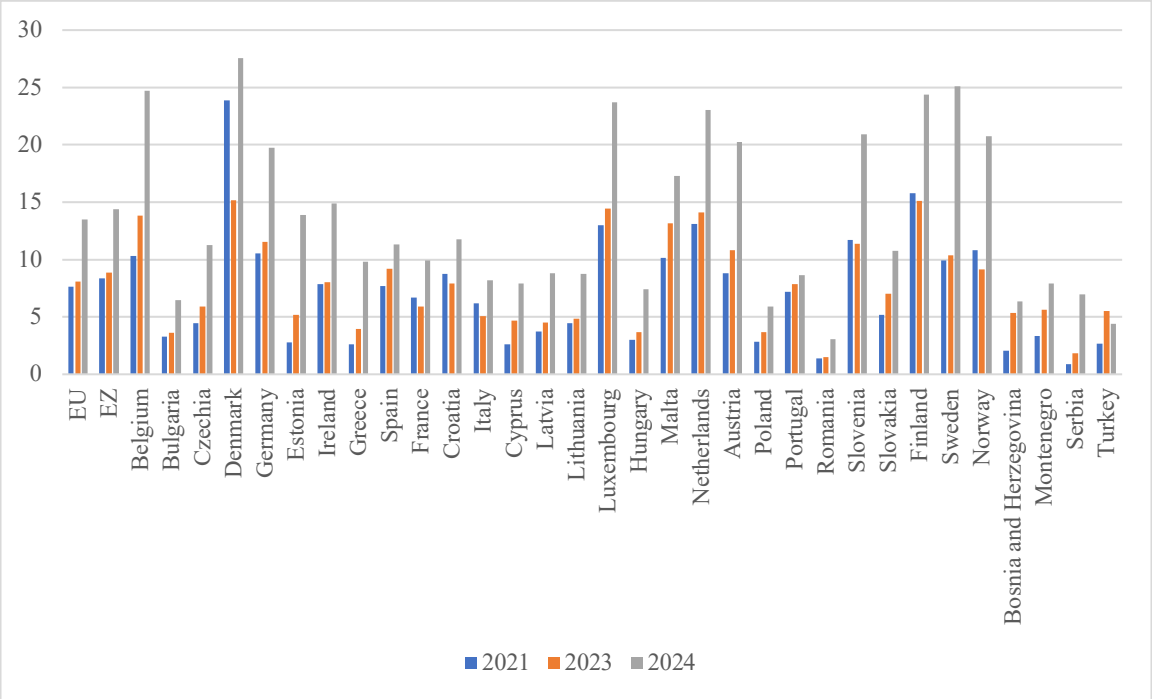

Figure no. 1. Enterprise AI Adoption Across Countries (% of enterprises)
Source: Eurostat (2025)

It is important to mention that the European Union introduced the AI Act, the first comprehensive regulatory framework for AI by a major authority, which which may hinder the expansion of artificial intelligence due to stricter regulations compared to other regions. According to it, "AI system means a machine-based system that is designed to operate with varying levels of autonomy and that may exhibit adaptiveness after deployment, and that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments".

In our opinion, this definition highlights some key characteristics of this disruptive technology, including: machine-based system, autonomy, adaptiveness, the ability to generate outputs and the capacity to influence physical or virtual environments.

Through an extensive review of literature on artificial intelligence, we have compiled a detailed summary of its primary capabilities, accompanied by concise explanations and practical applications within the banking sector. Our findings reveal that this technology significantly enhances operational efficiency by accelerating processes, thereby leading to considerable cost savings for organizations.

While the banking industry serves as a key example, the utility of this technology is by no means limited to this field. Its potential for innovation and optimization extends to virtually all sectors, underscoring its versatility and far-reaching impact.

Table no. 1. Exploring AI: capabilities, applications and impact

Capability	**What Can AI Do for Us?**	**Examples from Banking Industry**
Prediction	Predict an event, likelihood of something happening	Next best product, customer propensity, liquidity and rating forecast
Discovery	Pattern recognition: Normal vs. not Outlier vs. Anomaly e.g. Fraud detection	Customer segmentation, Channel affinity
Planning/Optimization	Substitute manual or rules-based engines for planning and optimization	ATM Cash optimization
Computer Vision	Understand images, videos e.g. floor plans, satellite images	Fraud ID
Linguistics	Understand Text e.g. Chatbots, translators etc.	Contact center, transaction classification
Speech/Audio	Speech to text, transcriptions e.g. Live transcription of calls	Microsoft Teams
Content creation	Create text and images	GenAI usage in Marketing

Source: Data processed by the authors (2025)

As previously mentioned, the industry or company size is not the only determining factor in AI adoption. In the figure below, we analyzed the integration of AI within enterprises, using data from Eurostat.

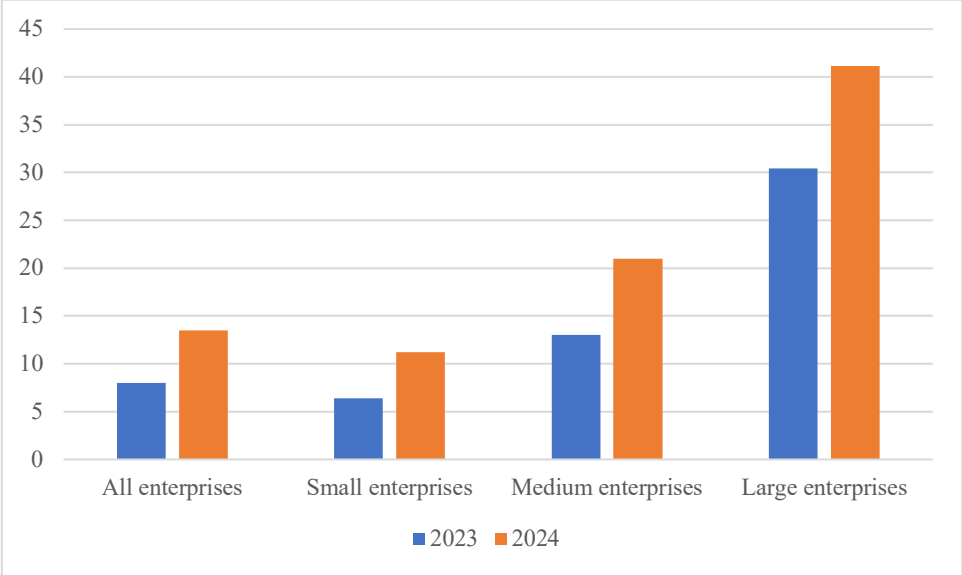

Figure no.2. Enterprise AI usage by size class (% of enterprises)
Source: Eurostat (2025)

In 2023, the overall usage rate across all enterprises stood at 8%. Small companies had the lowest rate at 6.4%, while medium-sized ones showed a higher rate of 13%. Large enterprises were far ahead, with 30.4% adopting AI technologies, revealing a clear pattern that bigger organizations are more inclined to incorporate AI into their operations.

By 2024, the overall usage rate rose to 13.5%, indicating a growing trend in AI adoption across all company sizes. For small enterprises the rate increased to 11.2%, while medium-sized ones saw a significant jump to 21% in AI usage, nearly doubling their rate from the previous year. Large enterprises maintained their lead, with a notable rise to 41.2%, further increasing the disparity with smaller companies.

The data highlights a marked increase in AI adoption across all enterprise sizes between 2023 and 2024, with the most substantial growth seen in large firms. This suggests that larger organizations, likely benefiting from greater resources and infrastructure, are more quickly integrating AI technologies. However, the significant growth in small and medium-sized firms also indicates a wider acceptance of AI, possibly driven by the availability of more accessible AI tools and growing recognition of its advantages. This trend emphasizes the increasing role of AI in the EU business landscape, with implications for competitiveness and innovation, especially for smaller enterprises working to keep up with larger ones.

We would like to conclude our research referring to a global survey made in 2022 by the CFA Institute, which highlights the increasing demand for finance professionals with AI and big data expertise (Cao, 2022). Among respondents, 35% prioritized finance or investment talents with AI and big data training, while 32% valued expertise in both fields. The survey also emphasizes the widespread usage of AI and big data, with 56% applying these technologies in data analysis. The graphs below display the aggregated survey responses:

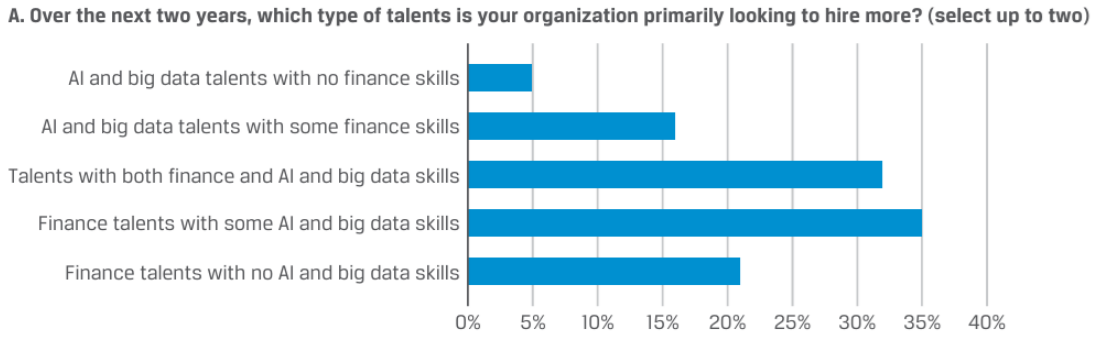

Figure no. 3. Talent hiring priorities over the next two years
Source: CFA Institute (2022)

Organizations are prioritizing hybrid talent, particularly those with finance expertise combined with AI and big data skills. This suggests a growing demand for professionals who can bridge technical and financial domains, likely driven by the increasing integration of AI and big data in financial decision-making. Pure AI/big data talent without finance skills is the least sought after, indicating a specific focus on finance-driven applications.

Figure no.4. Routine applications of AI and Big Data
Source: CFA Institute (2022)

AI and big data are most frequently applied in core business data analysis, highlighting their critical role in driving insights and operational efficiency. Risk management and Sales and marketing also see significant usage, reflecting the importance of predictive analytics and customer targeting. Lower adoption in compliance and mid-/back-office operations suggests either slower integration in these areas or less perceived value compared to core business functions.

The CFA survey responses reflect a strategic shift in organizations toward integrating AI and big data with finance expertise, likely in response to digital transformation trends. The focus on hybrid talent and applications in data analysis and risk management indicates that organizations are leveraging these technologies to enhance decision-making and competitiveness in finance-heavy sectors. However, the lower usage in compliance and back-office operations may point to challenges such as regulatory hurdles or implementation complexity, which could be explored further in the future. These findings align with broader trends in FinTech and data-driven decision-making as of early 2025.

Conclusions

The integration of artificial intelligence across diverse industries is transforming the landscape of modern business. AI technologies have significantly influenced workplace culture and possess the potential to redefine historical trajectories. Our research contributes to the innovation management literature by offering new insights into the role of artificial intelligence and machine learning algorithms in shaping the future. The findings highlight specific areas where AI technologies can be effectively applied to support organizational innovation, particularly in contexts where the innovation process is hindered by information processing limitations.

The findings reveal a consistent upward trend in AI adoption across all enterprise sizes and regions, with Northern European countries and large enterprises leading the way. While larger organizations are leveraging their resources to integrate AI more rapidly, the increasing uptake among small and medium-sized firms suggests a democratization of AI technologies facilitated by greater accessibility and awareness of its benefits. The introduction of the European Union's AI Act suggests the region's commitment to responsible innovation, though it may also pose regulatory challenges that affect the pace of AI integration compared to other jurisdictions. Nevertheless, AI's capacity for prediction, optimization and content generation is transforming operations.

As digital transformation continues to reshape global industries, our analysis confirms AI's pivotal role as a driver of innovation, efficiency and strategic decision-making. The findings supported the relevance of both hypotheses and highlighted the importance of these factors in shaping AI adoption trends. There is also a need to conduct future research on additional topics and consider other aspects as well, in order to get a clearer outlook of the AI utilization and its effects in organizations. Future research should explore the long-term impacts of regulatory frameworks and talent development on AI's integration across sectors, as well as address challenges in areas like compliance and back-office functions, where adoption remains limited.

References

Agrawal, A., Gans, J. and Goldfarb, A., 2019. *The Economics of Artificial Intelligence: An Agenda*. University of Chicago Press.

Baruffaldi, S., Beuzekom, B., Dernis, H., Harhoff, D., Rao, N., Rosenfeld, D. and Squicciarini, M., 2020. Identifying and Measuring Developments in Artificial Intelligence: Making the Impossible Possible. *OECD STI Working Papers*, 5. https://doi.org/10.1787/5f65ff7e-en

Brock, J.U. and Wangenheim, F., 2019. Demystifying AI: what digital transformation leaders can teach you about realistic artificial intelligence. California Management Review, 61(4), pp.110-134. 61(4), pp.110-134. https://doi.org/10.1177/1536504219865226

Cao, L., 2022. Handbook of artificial intelligence and big data applications in investments. s.l.:CFA Institute Research Foundation

Corrado, C., Haskel, J. and Jona-Lasinio, C., 2021. Artificial intelligence and productivity: an intangible assets approach. *Oxford Review of Economic Policy*, 37, pp.435-458. https://doi.org/10.1093/oxrep/grab018

Deperi, J., Bertrand, O., Meschi, P. and Nesta, L., 2022. An organizational learning approach to digital and non-digital firm acquisition behavior. *European Management Journal*, 40(6), pp.873-882. https://doi.org/10.1016/j.emj.2022.09.005

Fetzer, J. H., 1990. *Artificial Intelligence: Its Scope and Limits*. s.l.:Springer, Dordrecht.

Giustiziero, G., Kretschmer, T., Somaya, D. and Wu, B., 2023. Hyperspecialization and hyperscaling: A resource-based theory of the digital firm. *Strategic Management Journal*, pp.1391-1424. https://doi.org/10.1002/smj.3365

Haefner, N., Wincent, J., Parida, V. and Gassmann, O., 2021. Artificial intelligence and innovation management: A review, framework, and research agenda. *Technological Forecasting and Social Change,* 162, p.120392. https://doi.org/10.1016/j.techfore.2020.120392

Haenlein, M., Kaplan, A., Tan, C.-W. and Zhang, P., 2019. Artificial intelligence (AI) and management analytics. *Journal of Management Analytics*, 6(4), pp.341-343. https://doi.org/10.1080/23270012.2019.1699876

Kumar, S., 2023. Usages of AI by Entrepreneur in Business to Boost their Revenue. *International Journal For Multidisciplinary Research*, 5(2), p.2161. https://doi.org/10.36948/ijfmr.2023.v05i02.2161

Lee, J., Suh, T., Roy, D. and Baucus, M., 2019. Emerging technology and business model innovation: The case of artificial intelligence. Journal of Open Innovation: Technology, Market, and Complexity, 5(3), p.44. https://doi.org/10.3390/joitmc5030044

Luckin, R. and Holmes, W., 2016. *Intelligence unleashed: An argument for AI in education*. UCL Knowledge Lab, London, Pearson.

McKinsey and Company, 2023. *The Economic Potential of Generative AI: The Next Productivity Frontier.* [online] Available at: <https://www.mckinsey.com> [Accessed 10 May 2025].

Nolan, A., 2020. Artificial intelligence, digital technology and advanced production, in: OECD. The Digitalisation of Science, *Technology and Innovation: Key Developments and Policies*, pp.119-142. https://doi.org/10.1787/b9e4a2c0-en

Rammer, C., Fernández, G. and Czarnitzki, D., 2022. Artificial intelligence and industrial innovation: Evidence from German firm-level data. Research Policy, 51(7), p. 104555. https://doi.org/10.1016/j.respol.2022.104555

Săseanu, A.S., Gogonea, R.M. and Ghiţă, S.I., 2024. The Social Impact of Using Artificial Intelligence in Education. *Amfiteatru Economic*, pp.89-105. https://doi.org/10.24818/EA/2024/65/89

Vecchiarini, M. and Somià, T., 2023. Redefining entrepreneurship education in the age of artificial intelligence: An explorative analysis. *International Journal of Management in Education*, 21(3), p. 100879. https://doi.org/10.1016/j.ijme.2023.100879

Robots in Society: Design, Functionality, and Ethical Challenges in Human-Robot Interaction

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Abstract

This article provides a comprehensive and comparative overview of the main types of robots, including social, educational, entertainment, industrial, collaborative, mobile, service, and humanoid robots, focusing on their technical, functional, and social characteristics. A key objective is to explore how anthropomorphic design, through human-like appearance, voice, and behavior, affects robot classification and shapes human-robot interaction in different domains, including healthcare, education, retail, and entertainment. The study utilizes a structured literature review methodology that integrates recent peer-reviewed research in engineering, human-computer interaction, and the behavioral sciences. Through a comparative analysis, the paper identifies overarching topics such as the merging of technology capabilities, the increasing fluidity of robot classifications, and the ethical implications of emotional engagement with robots. Factors related to user trust, perceived agency, and consumer acceptance such as emotional intelligence, contextual adaptability, design aesthetics, and interaction intensity are examined. The results show that the increasing anthropomorphism of robots can significantly enhance user engagement, emotional attachment, and acceptance. However, it also raises important ethical challenges. These include the risks of emotional manipulation, stereotype reinforcement, and psychological dependence. The paper highlights that successful robot integration depends not only on technical efficiency, but also on ethical considerations, context-aware design, and the alignment of robot behavior with human social expectations. This paper provides original value by connecting technical classifications with socio-psychological dimensions of human-robot interaction, offering a conceptual framework for understanding how design elements and application context interact to influence societal acceptance.

Keywords

Social robots, educational robots, entertainment robots, industrial robots, collaborative robots, service robots, humanoid robots.

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Introduction

Robots have transformed over the past few years from being specialized industrial tools to adaptable agents capable of executing complex tasks and engaging in social interactions. This transformation is primarily driven by advancements in artificial intelligence, sensor integration, and human-machine interface technology (Lee, 2021; Rubio et al., 2019). Currently, robots are progressively integrated into various sectors including education, healthcare, retail, logistics, and personal assistance. These include industrial manipulators, mobile drones, social robots designed for emotional interaction, and humanoid robots that replicate human gestures and behaviors (Pei and Nie, 2018; Zhang et al., 2024).

Artificial intelligence, sensor integration, and machine learning are leading robots forward at a remarkable pace. This is transforming the ways in which robots engage with people and function across different sectors, such as industry, healthcare, education, entertainment, and retail. While researchers are increasingly categorising robots according to their morphology, functionality, autonomy, and social role (Lee, 2021), technological convergence has obscured these traditional boundaries, resulting in the emergence of multifunctional, socially interactive robotic agents (Rubio et al., 2019). For instance, social robots have transitioned from being task-oriented assistants to companions that can engage in emotional interactions, employing anthropomorphic traits to enhance user trust and involvement (Gao et al., 2024; Pelau et al., 2025).

Research is currently emphasizing the possibilities and ethical challenges linked to the integration of robots into daily life. While anthropomorphic design strategies can improve human-robot interaction, they may also reinforce stereotypes and heighten perceptions of threat if not appropriately contextualized (Zhang et al., 2024; Pelau et al., 2024). Moreover, as emotional ties between humans and robots grow, especially in virtual and hybrid settings it prompts important questions into the authenticity of robot companionship and its psychological effects (Zou et al., 2023).

This paper addresses the research problem of how the design, functionality, and social integration of robots are evolving in different domains, and how these changes are reshaping the interactions between humans and robots. The approach involves a comprehensive literature review of recent studies on social robots, humanoid robots, educational robots, entertainment robots, industrial robots, service robots and mobile robots. By integrating the latest findings, the review identifies the key trends, challenges, and ethical considerations that will shape the future of robots. The structure of the paper begins by exploring robot classifications and anthropomorphism, continues by analysing functional applications across sectors, and concludes by outlining future research directions and the need for responsible, human-empowered innovation.

Methodology

The objective of our research is to explore the main types of robots and their applicability in different domains, with a particular focus on how their technical features and social functions influence user perception and interaction. This research also intends to assess the role of anthropomorphic design in shaping the classification, emotional engagement and social acceptance of robots. To achieve this, we performed a structured literature review based on academic sources indexed in the Web of Science database.

The type of robot discussed in each study served as the primary selection criterion. Peer-reviewed publications that addressed at least one of the following topics were included: humanoid robots, industrial robots, collaborative robots, social robots, educational robots, entertainment robots, mobile robots, and service robots. Keyword combinations associated with each type of robot were used in the search process, along with phrases like "anthropomorphism," "user perception," and "ethical challenges." Research was eliminated if it failed to specifically address one of the targeted robot categories or its technical, functional, and social aspects that are related to the context of human-robot interaction.

The selected studies were analysed using qualitative content analysis to identify key themes related to robot morphology, autonomy, interaction style and emotional intelligence. Comparative insights were provided across multiple domains, including healthcare, education, retail, industrial automation, and entertainment, to understand how robots are designed and adapted to domain-specific needs and their applicability. This methodological approach provided the basis for the theoretical insights and practical implications discussed in the remainder of the article and allowed for a synthesis of technical and socio-psychological perspectives.

Results

The results of this paper show that robots are increasingly being integrated into a wide range of domains, including healthcare, education, entertainment, industry, logistics and retail, each with different functional needs and social roles. Robots are evolving into socially interactive, emotionally responsive and multifunctional systems that are no longer limited to isolated task-based operations. The applicability of each type of robot is closely linked to its morphology, level of autonomy and ability to interpret and respond to human behaviour.

In addition, while anthropomorphic features increase trust and acceptance, they also raise ethical concerns, such as emotional deception and the strengthening of stereotypes. In industrial settings, precision and collaboration are dominant; in education and health care, emotional intelligence and user adaptability are key. The results confirm the growing trend of robot classification integration, the increasing importance of context-aware design, and the need for multidisciplinary approaches to ensure socially responsible and human-robot integration.

Robots in different domains and technological integration

Robots are now essential in a wide range of fields, including personal services, healthcare, education, entertainment, and industrial production. Robots are increasingly categorised in academic literature according to their morphology, functionality, degree of autonomy, and social role (Lee, 2021). As technological convergence accelerates up, particularly with the emergence of artificial intelligence (AI), robots are developing into sophisticated, multifunctional agents that can act independently in a variety of settings and interact with people in a natural way (Rubio et al., 2019).

Social robots, anthropomorphism, and human-robot interaction

Social robots are a developing class of artificial agents intended to carry out emotional and communicative tasks in both home and business settings. The research of Gao et al. (2024) shows that social home robots (SHRs) like Jibo, Kuri, and Buddy are designed to mimic emotional support and domestic companionship. These robots use anthropomorphic designs to boost perceived intelligence and user engagement. However, a lot of social home robots fail commercially despite high expectations because of unclear value statements, privacy concerns, and low consumer trust. Self-construal, perceived support, and usage intention are all mediated by trust, indicating that social cognition theories are crucial for simulating acceptance.

The concept of anthropomorphism is applicable to a variety of robot domains. Anthropomorphic features, like gendered voices, facial expressions, and socially stereotypical behaviours, can increase trust and engagement when they are in line with user expectations, according to Zhang et al. (2024) systematic review of 118 studies. However, in delicate service contexts like healthcare, overuse of anthropomorphism can also increase feelings of threat, strengthen stereotypes, and decrease acceptance. Song and Kim (2022) further demonstrate that in humanoid retail service robots (RSRs), human-robot interaction (HRI) depends heavily on the robot's perceived usefulness, social capability, and appearance. The CASA theory (Computers Are Social Actors) explains why humans engage socially with robots that offer enough human-like cues. However, robot anxiety, triggered by feelings of eeriness or discomfort, can inhibit consumer acceptance, underlining the delicate balance designers must achieve when creating service robots.

Recent research has shown that emotional drivers such as empathy, attachment and warmth, as well as functional efficiency, shape consumer interaction with AI. Pop et al. (2023) highlight that interaction quality, in combination with anthropomorphic features and emotional expressiveness, significantly increases user trust and ongoing acceptance. Further to the study, customers may develop social relationships with AI systems as a result of frequent, tailored interactions, viewing them as friends rather than just tools. These results support the expanding use of social and emotionally responsive service robots in industries like retail, education, and healthcare, where adoption depends on human-like engagement and trust.

Humanoid, educational, and entertainment robots

Humanoid robots, which are machines made to mimic human form and human biomechanics like walking, gesturing, and sitting, are closely related to social robots. A major advancement in robotics research, humanoid robots seek to mimic human form as well as human-like movement, manipulation, and cognitive capacities (Rubio et al., 2019). As a prime example, Yu et al. (2014) highlight the BHR-5 humanoid robot's aluminium build, hard plastic exterior, and sophisticated sensory systems, which include cameras, accelerometers, force/torque sensors, gyroscopes, and accelerometers. The robot's open architecture allows for modular development for future research, and its ability to walk at 2.0 km/h and execute complex tasks like playing table tennis shows sophisticated stability control using Zero-Moment Point (ZMP) strategies.

In education, robots are being used more and more as teaching assistants and learning partners. Intelligent assistant robots, virtual simulation platforms, multifunctional suite robots are all types of educational robots (Pei and Nie, 2018). It has been demonstrated that these robots enhance learning outcomes, teamwork, and student engagement, especially in special education and language learning. Ouyang and Xu (2024) emphasize the strong positive effects of programming robots, such as Lego Mindstorms and VEX Robotics, on student performance and computational thinking development. Although social robots have a somewhat

smaller direct effect on learning outcomes, they contribute significantly to motivation and engagement through human-like interaction capabilities.
Entertainment robots are another category that is gaining prominence. Fujita and Kitano (1998) introduced MUTANT, a pet-like, four-legged robot developed by Sony that incorporated emotional modules, stereo microphones, and touch sensors to generate life-like behaviors. Designed for robot entertainment, MUTANT demonstrated how emotionally engaging machines could normalize the presence of robots in domestic environments and advance research on embodied AI. Wang et al. (2025) further classify entertainment robots into musical performance robots, dance robots, violin-playing robots, singing robots, and marimba-playing robots. Systems like Shimon exemplify the use of non-verbal cues, such as head movements, to enhance synchronization with human musicians, while violin-playing robots utilize reinforcement learning algorithms to master bowing techniques, illustrating the fusion of mechanical dexterity and AI-driven expressiveness.

Industrial, collaborative, and mobile robots

Meanwhile, the industrial sector continues to be dominated by robots designed for precision, speed, and durability in structured environments. Singh and Banga (2022) emphasize the critical role of inverse kinematics in the design of industrial robots used in welding, assembly and material handling. Traditional robots in industrial settings often operate in isolated workspaces. However, there has been a shift towards collaborative robots, or cobots, that can work safely alongside humans without protective barriers. Simões et al. (2020) argue that factors such as workforce readiness, process integration, competition, and regulatory pressures influence the adoption of cobots. Dzedzickis et al. (2021) further highlight examples such as the Universal Robots UR5 and Franka Emika Panda, cobots that are easily programmable and adaptable for human-centered automation, aligning with Industry 4.0 trends.

Robots are also making significant contributions to routine industrial operations and hazardous environments through telerobotics. Sheridan (2016) differentiates between semi-autonomous telerobots used in factories and warehouses, and fully human-controlled teleoperators deployed in extreme environments like space missions or underwater exploration. These robots extend human operational capabilities while addressing risks associated with direct human involvement. Although communication latency remains a challenge, telerobots and teleoperators underscore the critical synergy between human cognition and robotic precision.

Autonomous systems extend the reach of robotics into transportation and logistics. Autonomous passenger and cargo vehicles integrate navigation algorithms, environmental sensing, and adaptive control to provide partial or full autonomy, ensuring safety and efficiency in increasingly complex environments. In agriculture, autonomous robots automate essential tasks such as sowing, plant identification, and harvesting, significantly increasing productivity and sustainability (Dzedzickis et al., 2021).

Mobile robots represent another critical development, defined by their ability to navigate autonomously in dynamic and unstructured environments. Rubio et al. (2019) and Zhang et al. (2019) discuss how mobile robots, including wheeled, legged, aerial, and aquatic platforms, use sophisticated motion planning strategies that integrate global, sensor-level, and action-level trajectories. Their operation requires robust navigation algorithms, perception of the environment, and adaptation in real time. The authors highlight how new developments in AI and robotics, such as simultaneous localization and mapping (SLAM) and cooperative multi-robot systems, have significantly increased operational capabilities across industries.

Embodiment and service robots

The perception of robot agency and embodiment becomes especially complex within virtual and hybrid environments. Zou et al. (2023) explore how social robots, particularly through platforms like Character AI, provide emotional companionship by simulating social presence without true embodiment. The emergence of such disembodied AI agents highlights the shift towards virtual identity formation in the metaverse. While chatbots and AI companions offer emotional connection, the relationship remains asymmetrical and ethically controversial: humans dominate these interactions, while robots passively imitate companionship without genuine reciprocity. Emotional connections formed with social robots are often described as emotional deception, raising concerns that overreliance on AI companions may weaken users' ability to form authentic human relationships (Zou et al., 2023).

Service robots are rapidly adopted across hospitals, hotels, homes, and retail environments. Lee (2021) classifies service robots into professional non-social, professional social, domestic non-social, and domestic social categories. Each type demands different levels of interaction, adaptability, and technological complexity. Healthcare robots, for example, must navigate crowded hospital wards, interpret social cues,

and comply with stringent hygiene protocols, necessitating seamless AI and ergonomic integration. In retail, humanoid service robots such as Pepper and NAO (Song and Kim, 2022) provide interactive shopping experiences, showcasing how embodiment, appearance, and social responsiveness drive consumer acceptance or rejection.

A growing body of literature questions how much control AI robots have. To assess how anthropomorphic design influences perceptions of robot agency, Pelau et al. (2024) adopted a scenario-based approach. The study finds that qualities such as moral responsibility, opinion, and identity are more likely to be attributed to robots with a human-like appearance. In particular, men were found to be more likely than women to attribute agency to these robots. This reflects broader societal perceptions about the embodiment of AI and the blurred line between machines as tools and machines as intentional agents.

Throughout these developments, several thematic insights emerge. Anthropomorphism, while useful in promoting user engagement, introduces ethical and psychological dilemmas, particularly when deployed in emotional or moral contexts (Zhang et al., 2024; Pelau et al., 2024). The importance of user trust and age-related acceptance in robot adoption is also emphasized by recent findings. Ciofu et al. (2024) show that younger users have a higher tolerance for robot errors and greater trust in integrating AI systems into customer interactions, suggesting that generational familiarity with the technology strongly influences acceptance. Technological advances such as machine learning, affective computing, and real-time sensor integration are becoming universal across all robot types, but are expressed differently depending on context, whether enhancing precision in factories or fostering empathy in domestic settings. The emotional companionship offered by robots, particularly disembodied agents, raises ethical concerns about authenticity, manipulation, and long-term social adaptation (Zou et al., 2023).

Robots designed to simulate emotional and social behaviors, such as AIBO, NAO, LOVOT, and RoBoHoN, are gaining increased attention. (Joshi et al. 2024) discuss how accessorization, through aesthetic modifications or interactive attachments, deepens emotional bonding between users and robots, enhancing acceptance and user experience. Customization strategies tap into the psychological processes of attachment and personalization, which are critical for widespread adoption.

Conclusions

This paper reviews the main types of robots in different domains, highlighting how they differ in design, function, and interaction with humans. A key finding is the growing influence of anthropomorphism, which can increase user confidence, but is also a source of ethical concern. The study shows that the classification of robots is becoming more fluid as technologies merge.

Research findings illustrate that as technologies evolve and merge, the classification of robots by type, social, educational, industrial, humanoid, or mobile-is becoming increasingly fluid. However, the different challenges and opportunities associated with each of these categories underline the need for context-specific design, ethical foresight, and interdisciplinary research. As robots become more integrated into everyday life and public services, a deeper understanding of their design, perception, and function will be crucial to guide their responsible development and societal acceptance.

Humanoid and entertainment robots highlight significant efforts to mimic and complement human behaviour, while telerobots and autonomous systems demonstrate the potential to extend human capabilities into hazardous and inaccessible environments. In healthcare and education, robots are improving precision, accessibility, and engagement. They are fundamentally changing traditional practices. Social robots are creating new forms of companionship through personalisation and emotional expressiveness. They are also strengthening human-robot interactions. Mobile robots, equipped with hybrid and real-time planning strategies, ensure safe and natural integration into dynamic shared environments.

The study also emphasises the need for context-aware and ethically responsible design of robots, especially in socially sensitive areas such as health care and education. It also calls for more in-depth research into the long-term interactions between humans and robots and for the development of inclusive and culturally sensitive design principles. Future research should explore hybrid, adaptive systems that meet complex human needs in dynamic environments, as robots continue to integrate with AI and other emerging technologies.

Critical attention must be paid to fostering interdisciplinary collaboration, promoting ethically responsible innovation, and prioritising user-centred design as robots continue to advance. The future of robots is not

only about improving task efficiency, but also about fostering meaningful, empathetic human-machine interactions in diverse social, industrial, and personal contexts.

References

Ciofu, I., Kondort, G., Pop, S. and Cioc, R., 2024. *Artificial Intelligence in Business Operations: Exploring Productivity and Acceptance*. Analele Universității din Oradea. Seria Științe Economice, TOM XXXIII(2), pp.263–274.

Dzedzickis, A., Subačiūtė-Žemaitienė, J., Šutinys, E., Samukaitė-Bubnienė, U. and Bučinskas, V., 2021. Advanced Applications of Industrial Robotics: New trends and possibilities," *Applied Sciences*, 12(1) p.135, https://doi.org/10.3390/app12010135.

Fujita, M. and Kitano, H., 1998. Development of an Autonomous Quadruped Robot for Robot Entertainment. *Autonomous Robots*, 5(1), pp.7–18, https://doi.org/10.1023/a:1008856824126.

Gao, Y., Chang, Y., Yang, T. and Yu, Z., 2024. Consumer acceptance of social robots in domestic settings: A human-robot interaction perspective. *Journal of Retailing and Consumer Services*, p.82104075, https://doi.org/10.1016/j.jretconser.2024.104075.

Joshi, S., Kamino, W. and Šabanović, S., 2024. Social robot accessories for tailoring and appropriation of social robots. *International Journal of Social Robotics*, https://doi.org/10.1007/s12369-023-01077-y.

Lee, I., 2021. Service Robots: A Systematic Literature Review. *Electronics*, 10(21), p.2658, https://doi.org/10.3390/electronics10212658.

Ouyang, F. and Xu, W., 2024. The effects of educational robotics in STEM education: a multilevel meta-analysis. *International Journal of STEM Education*, 11(1), https://doi.org/10.1186/s40594-024-00469-4.

Pei, Z., and Nie, Y., 2018. Educational Robots: Classification, Characteristics, Application Areas and Problems. *2018 Seventh International Conference of Educational Innovation Through Technology (EITT)*, pp.57–62, https://doi.org/10.1109/eitt.2018.00020.

Pelau, C., Barbul, M., Bojescu, I., and Niculescu, M., 2025. AI, How Much Shall I Tell You? Exchange and Communal Consumer–AI Relationships and the Willingness to Disclose Personal Information. *Behavioral Sciences*, 15(3), p.386, https://doi.org/10.3390/bs1503038

Pelau, C., Pop, S. and Ciofu, I., 2024. Scenario-Based approach to AI's agency to perform Human-Specific tasks. *Proceedings of the ... International Conference on Business Excellence*, 18(1), pp.2311–2318, https://doi.org/10.2478/picbe-2024-0195.

Pop, S., Pelau, C., Ciofu, I. and Kondort, G., 2023. *Factors Predicting Consumer-AI Interactions*. In: R. Pamfilie, V. Dinu, C. Vasiliu, D. Pleșea & L. Tăchiciu, eds. *Proceedings of the 9th BASIQ International Conference on New Trends in Sustainable Business and Consumption*, Constanța, Romania, 8–10 June 2023. Bucharest: ASE, pp. 592–597. https://doi.org/10.24818/BASIQ/2023/09/068

Rubio, F., Valero, F. and Llopis-Albert, C., 2019. A review of mobile robots: Concepts, methods, theoretical framework, and applications. *International Journal of Advanced Robotic Systems*, 16(2), https://doi.org/10.1177/1729881419839596.

Sheridan, T.B., 2016. Human–Robot interaction. *Human Factors the Journal of the Human Factors and Ergonomics Society*, 58(4), pp.525–532, https://doi.org/10.1177/0018720816644364.

Simões, A.C., Soares, A.L. and Barros, A.C., 2020. Factors influencing the intention of managers to adopt collaborative robots (cobots) in manufacturing organizations. *Journal of Engineering and Technology Management*, p.57101574. https://doi.org/10.1016/j.jengtecman.2020.101574.

Singh, G. and Banga, V.K., 2022. Robots and its types for industrial applications. *Materials Today: Proceedings*, 60, pp.1779–1786, https://doi.org/10.1016/j.matpr.2021.12.426.

Song, C.S., and Kim, Y.K., 2022. The role of the human-robot interaction in consumers' acceptance of humanoid retail service robots. *Journal of Business Research*, p.p.146489–503, https://doi.org/10.1016/j.jbusres.2022.03.087.

Wang, H., Hughes, J., Nonaka, T., Abdulali, A., Lalitharatne, T.D. and Iida, F., 2025. Editorial: AI-powered musical and entertainment robotics. *Frontiers in Robotics and AI*, 12, https://doi.org/10.3389/frobt.2025.1572828.

Yu, Z., Huang, Q., Ma, G., Chen, X., Zhang, W., Li, J. and Gao, J., 2014c. Design and development of the humanoid robot BHR-5. *Advances in Mechanical Engineering*, p.6852937. https://doi.org/10.1155/2014/852937.

Zhang, W., Slade, E.L. and Pantano, E., 2024. Humanlike service robots: A systematic literature review and research agenda. *Psychology and Marketing*, 41(12), pp.3157–3181, https://doi.org/10.1002/mar.22099.

Zhang, X., Wang, J., Fang, Y. and Yuan, J. 2019. Multilevel humanlike motion planning for mobile robots in complex indoor environments. *IEEE Transactions on Automation Science and Engineering*, 16(3), pp.1244–1258, https://doi.org/10.1109/tase.2018.2880245.

Zou, S., Xu, Z. and Han, X., 2023. Research on Embodiment and Social Robotics from the Perspective of Metacosmos——Research based on character AI," *SHS Web of Conferences*, p.16803020, https://doi.org/10.1051/shsconf/202316803020.

The Impact of Artificial Intelligence on Consumer Behavior in e-Commerce

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Abstract

Artificial Intelligence (AI) significantly influences consumer behavior in e-Commerce by enabling personalized experiences. Through data analysis and machine learning, AI systems provide tailored product recommendations, dynamic pricing, and real-time customer support via chatbots. These enhancements improve user satisfaction, increase engagement, and drive purchase decisions, reshaping how consumers interact with online platforms. In this context, this article aims to examine the impact of AI implementation in e-Commerce on consumer behavior, with a particular focus on how it influences customer satisfaction and decision-making process. A quantitative approach is adopted in this study through the use of a structured consumer survey. The results of the research conducted among 355 online consumers in Romania indicated that the integration of AI-based tools (such as chatbots, personalized marketing, and product recommendations) within e-Commerce platforms has a positive impact on the online shopping experience and influences the purchase decision-making process, with younger consumers, in particular, considering these tools essential to their digital buying behavior. Therefore, this research offers insights into the evolving relationship between technological advancements and consumer behavior in the online marketplace.

Keywords

Artificial Intelligence (AI), e-Commerce, consumer behavior, chatbots, personalized marketing, AI-based product recommendations.

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Introduction

Artificial Intelligence (AI) has become an extremely common concept nowadays and it implies the ability of a machine to learn from experience, adapt to new information inputs and perform tasks like humans (Duan, Edwards and Dwivedi, 2019; Ţală et al., 2024). AI implications has covered many economic fields, including e-Commerce. Implementing AI has increased the performance of businesses because of the resource-saving and the automation of the whole process. These kinds of technological upgrades are not only meant to automate processes, but also to enhance digital experiences by enabling personalization for the customer - a step that helps satisfy consumer needs (Pillarisetty and Mishra, 2022). Thus, the exploration of AI and its profound impact on consumer behaviour within the realm of e-Commerce has garnered considerable attention in recent years. This reflects the rapid and significant advancement of technology and its seamless integration into consumer interactions and experiences. The perspective of e-Commerce is continuously evolving and developing based on advancement in technology just to match the consumers' expectations. e-Commerce applications have become essential tools in everyday life, offering user-friendly interfaces and personalized experiences, allowing AI to analyze data and provide the best tailored recommendations (He, Du and Pu, 2025).

The impact of AI in e-Commerce can be observed through chatbots that assist customers in real time by simulating human interaction, personalized marketing offers, product recommendations based on social media marketing, and notifications based on last-minute personalized deals. These kinds of actions can help

predicting the consumers preferences. Research shows that there is a continuous increase in the use of chat interfaces (Adam, Wessel and Benlian, 2021; Shawar and Atwell, 2007). Also, AI tools help build relationships between the platform and consumers, significantly influencing decision-making by providing personalized, real-time recommendations and enhancing the overall shopping experience (Hariguna and Ruangkanjanases, 2024). Once the chatbot collects user data, consumers can be continuously notified about personalized deals - an important step in transforming occasional buyers into loyal customers.

This article aims to investigate the impact of AI on consumer behaviour in e-Commerce, using a quantitative survey to identify the AI applications that influence consumers' decision-making process and the online shopping process. The paper is divided into five main sections. After this introductory section, the literature review follows, focusing on AI applications in e-commerce and their impact on the online experience and the purchasing decision-making process. The next section presents the research methodology, followed by the analysis and interpretation of the main findings of the study. Finally, the key conclusions are presented.

1. Review of scientific literature

The landscape of digital shopping has transformed dramatically, creating new opportunities and challenges for both businesses and customers. Lopes, Silva and Massano-Cardoso (2024) highlighted the necessity for consumers to feel comfortable with AI technologies, emphasizing that understanding consumer attitudes is crucial for fostering responsible growth in AI applications. As Zhang and Xiong (2024) explain, AI-driven processes - such as personalized recommendations and sales forecasting - have transformative effects that significantly improve the buying and selling experience for both consumers and retailers. Braga (2020) further delves into the consumer decision-making process, illustrating how AI facilitates quicker access to information and aids companies in anticipating consumer needs. The findings of this research suggest that while AI adoption is still in its infancy, its potential to influence consumer behaviour is profound.

The role of chatbots in enhancing customer satisfaction is explored by Klein (2021), who illustrates how conversational agents can refine offers and streamline the purchasing process. This study points the growing relevance of chatbot technology in e-Commerce and indicates that consumer perceptions of value and trust are important in mediating the relationship between AI services and purchasing intentions. Sharma M. et al. (2024) contribute to this perspective by examining the attributes of digital assistants. Their findings emphasize the importance of enhancing digital assistant attributes to foster engagement and improve customer experiences.

Also, Ameen et al. (2021) and Chen and Prentice (2024) discuss the broader implications of AI in consumer interactions, noting the increasing reliance on digital technologies and the potential for AI to reshape customer experiences. Authors highlight the need for businesses to adapt to these changes, emphasizing that effective AI implementation can lead to improved customer satisfaction.

The systematic review by Peruchini, da Silva and Teixeira (2024) further explores AI's capabilities in understanding customer preferences and enabling rapid customization of offerings, reinforcing the potential benefits of AI in enhancing consumer experiences. Finally, Adulyasak et al. (2024) contextualize these developments within the post-COVID landscape, illustrating how AI has become an integral part of retail operations and decision-making processes, despite existing limitations.

Together, these studies provide a comprehensive overview of the multifaceted impact of AI on consumer behaviour in e-Commerce, revealing both opportunities and challenges that online businesses must navigate in this evolving landscape.

2. Research methodology

As indicated throughout this article, aspects related to the use of AI in e-Commerce have been addressed in the literature. However, we have not identified other comprehensive studies targeting online consumers from Romania. To address these gaps, this article aims to present the results of a research conducted among Romanian online consumers.

The primary objectives of our research were as follows:

• identify the key applications of AI in e-Commerce that influence online consumer behavior, as perceived by respondents;

• assess the extent of the influence and the positive impact of AI applications on the behavior of Romanian online consumers;

• evaluate the extent to which online consumers consider AI-based product recommendations in their decision-making process.

This research was based on a standard methodology that is applied in questionnaire-based surveys. The method chosen for data collection was the self-administered questionnaire, which was developed on the Google Forms platform and was distributed as a link by e-mail.

The sample used in the survey was 355 respondents. Given the limited sample size, this online questionnaire-based survey is exploratory research. Data collection was carried out between March and April 2025.

It is important to note that the findigs presented in this paper are part of a broader research examining the impact of AI on the behavior of Romanian consumers.

3. Results and discussions

The integration of AI in e-Commerce has introduced transformative changes in how businesses interact with customers and deliver value. While previous studies have extensively explored AI's capabilities, this research aims to delve into its tangible impact on customer behavior, particularly focusing on satisfaction and decision-making processes. By examining the role of chatbots and personalized marketing strategies, this study provides insights into how AI tools influence consumer perceptions and interactions in the digital marketplace. This survey aimed to capture consumer perceptions, experiences, and concerns regarding AI-driven tools such as chatbots or personalized recommendations. The survey delved into various aspects of AI's influence. Additionally, it assessed which AI tools had the most significant impact on consumer experiences.
The socio-demographic distribution of respondents ensured a diverse representation in terms of age, gender, and educational background, enabling a comprehensive analysis of consumer behavior (Table no. 1).

Table no. 1. The socio-demographic profile of the respondents

Variable		Percentage
Gender	Female	61.9%
	Male	37.4%
	Prefer not to stay	0.6%
Age	18 – 25	65.8%
	26 – 35	21.9%
	36 – 45	7.1%
	46 – 55	2.6%
	55+	2.6%
Education	High School	39.4%
	Bachelor's degree	41.3%
	Master's degree	16.1%
	Doctorate or higher	3.2%

Source: Authors' own research

The survey findings reveal that AI tools significantly influence consumer behavior in e-Commerce, with younger consumers (18–25 years, 65.8%) being the most engaged. Women (61.9% of respondents) are also prominent users, reflecting their active role in online shopping. Most of the people (41.3%) who have completed this survey have graduated with a bachelor's degree.

As shown the Figure no. 1, the most influential tool is special offers or discounts, which covers 37.4% of users. Following that, virtual chatbots for assistance influence 21.9% of users. Personalized marketing offers affect 18.7%, while product recommendations based on social media marketing impact 16.8%. Lastly, getting notified based on last-minute deals has the least impact, affecting only 5.2% of users. This data highlights that personalized and promotional AI tools significantly shape user behavior in e-Commerce.

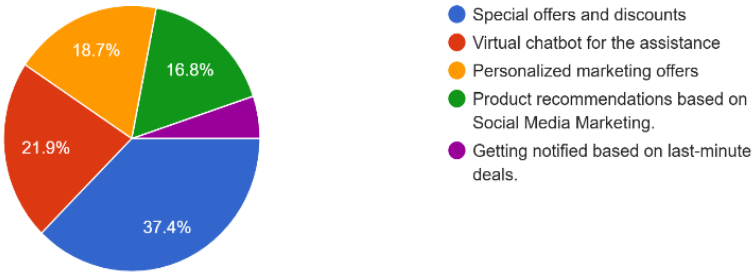

Figure no. 1. The primary AI applications influencing online consumer behavior
Source: Authors' own research

Figure no. 2 shows that 40.6% of respondents receive AI-based product recommendations but find them uninteresting, while 27.1% find them very useful. A smaller portion, 17.4%, do not receive recommendations but wish they did, and 14.8% neither receive nor desire them. Overall, opinions on AI recommendations are mixed, with nearly equal shares valuing, dismissing, or desiring them.

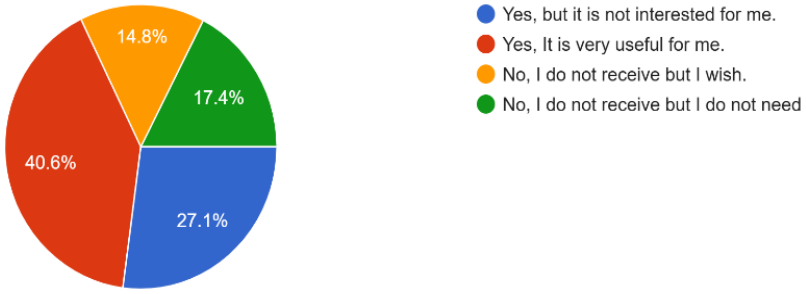

Figure no. 2. Receiving AI-based product recommendations
Source: Authors' own research

Figure no. 3 shows how 355 respondents rated the impact of AI on their purchasing decisions, from 1 (Very poor) to 5 (Excellent). The majority (49.7%) rated it as "Fair," while 21.3% found it "Good." Only 2.6% considered the impact "Excellent," and a small percentage (10.3%) rated it as "Very poor." Overall, AI has a moderate influence, with most finding it adequate but not exceptional.

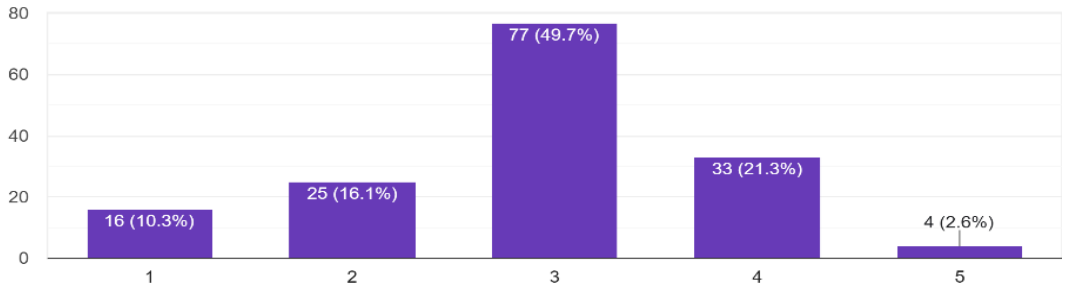

Figure no. 3. The degree to which AI tools influences online buying decisions
Source: Authors' own research

Figure no. 4 illustrates the results regarding whether AI has positively impacted their use of e-Commerce platforms as consumers. Based on responses, the data shows that 71.6% of respondents believe AI has had a positive impact, while 28.4% do not perceive any positive influence. The chart highlights a clear majority favoring the positive effects of AI in enhancing their e-Commerce experiences, indicating that AI tools are generally well-received by most consumers.

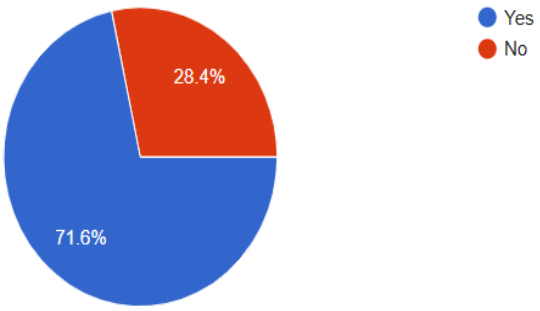

Figure no. 4. Assessing whether AI tools have a positive impact on customers of e-Commerce platforms
Source: Authors' own research

The survey conducted on the impact of AI tools in e-Commerce platforms aligns with findings from existing academic research, while also offering unique insights. For instance, the prominence of special offers and discounts as the most impactful AI tool is consistent with Saurabh and Raghav's (2024) study, which highlights that personalized discounts significantly drive consumer engagement. Similarly, the positive perception of virtual chatbots for assistance mirrors Akdemir and Bulut's (2024) conclusion that chatbots enhance customer experience by providing real-time support. However, the survey uniquely identifies last-minute deal notifications as having minimal influence, a factor less emphasized in prior studies.

Regarding AI recommendations, the survey's finding that most of respondents find them "very useful" aligns with Yin, Qiu and Wang's (2025) observation that such recommendations are valued by online users. Yet, the notable 27.1% who desire but do not currently receive recommendations underscores an unmet demand. The survey's moderate rating of AI's impact on purchasing decisions (49.7% rate it as "Fair") resonates with Sharma S. et al. (2024) assertion that AI's influence is often subtle rather than transformative.

Finally, the overall positive perception of AI's impact is corroborated by Sulastri's (2023) study, which reports a similar perspective of consumers satisfied with AI in e-Commerce. However, the 28.4% who perceive no positive impact suggests areas for improvement. Additionally, the survey reveals that AI's ability to personalize marketing offers is a key driver of user satisfaction, a finding supported by recent industry trends. Furthermore, the data emphasizes that users value relevance and timeliness in AI-driven interactions, highlighting the need for more context-aware systems. It also shows that younger respondents are more likely to engage with AI tools, reflecting broader differences in technology adoption. Lastly, the results suggest that transparency in AI decision-making could enhance trust and adoption rates, a critical consideration for future implementations.

Conclusions

This study highlights the profound impact of AI on consumer behavior within the e-Commerce landscape. The integration of AI-driven tools, such as chatbots, personalized marketing, and special offers, has significantly enhanced the shopping experience by providing convenience, efficiency, and tailored interactions. Survey results demonstrate that most consumers embrace these tools as integral to their online shopping experiences. This indicates strong adaptability and engagement with AI technologies.

The findings reveal that special offers and discounts, as well as virtual chatbots, are the most influential AI features, reflecting consumer preferences for personalization and real-time assistance. However, tools like last-minute notifications require further refinement to meet consumer expectations and effectively drive engagement. The survey also underscores the importance of trust in AI systems, with 71.6% of respondents

reporting a positive experience, while 28.4% express concerns. These insights align with existing literature (Gonçalves et al., 2023) that emphasizes the need for ethical implementation and transparent practices to ensure consumer confidence and loyalty.

Obviously, our research has certain limitations, such as the predominance of respondents aged 18 to 25 and the small sample size. Additionally, many other aspects of AI usage in e-commerce can be explored from the perspective of customer experience.

Beyond enhancing convenience and satisfaction, AI poses challenges, particularly in addressing ethical concerns such as data security and potential manipulation through over-personalization. Businesses must strike a balance between innovation and responsibility, ensuring that AI-driven strategies are inclusive, fair, and secure. As AI continues to evolve, its role in shaping e-Commerce will depend on how effectively these challenges are managed.

In conclusion, AI has revolutionized e-Commerce by reshaping consumer interactions and creating new opportunities for businesses. Its ability to analyze data, predict preferences, and personalize offerings makes it a cornerstone of modern online shopping. However, the long-term success of AI in e-Commerce will require businesses to prioritize ethical considerations, continuously innovate their approaches, and address consumer concerns about trust and transparency. By doing so, they can harness AI's potential to build stronger, more sustainable relationships with their customers and further drive the growth of the digital marketplace.

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References

Adam, M., Wessel, M. and Benlian, A., 2021. AI-based Chatbots in Customer Service and their Effects on User Compliance. *Electronic Markets,* 31(1), pp.427-445. https://doi.org/10.1007/s12525-020-00414-7

Adulyasak, Y., Cohen, M.C., Khern-Am-Nuai W. and Krause, M., 2024. Retail Analytics in the New Normal: The Influence of Artificial Intelligence and the Covid-19 Pandemic. *IEEE Engineering Management Review,* 52(1), pp. 268-280. https://doi.org/10.2139/ssrn.4007401

Akdemir, D.M. and Bulut, Z.A., 2024. Business and Customer-Based Chatbot Activities: The Role of Customer Satisfaction in Online Purchase Intention and Intention to Reuse Chatbots. *Journal of Theoretical and Applied Electronic Commerce Research*, 19(4), pp. 2961-2979. https://doi.org/10.3390/jtaer19040142

Ameen, N., Tarhini, A., Reppel, A. and Anand, A., 2021. Customer Experiences in the Age of Artificial Intelligence. *Computers in Human Behavior*, 114, 106548. https://doi.org/10.1016/j.chb.2020.106548

Braga, F.M.I., 2020. *The Influence and Impact of Artificial Intelligence in the Consumer Decision-Making Process: Comparing Generation X with Millennials*. ISCTE - Instituto Universitário de Lisboa. [online] Available at: <https://repositorio.iscte-iul.pt/bitstream/10071/21828/1/master_fabio_iglesias_braga.pdf> [Accessed 8 April 2025].

Chen, Y. and Prentice, C., 2024. Integrating Artificial Intelligence and Customer Experience. *Australasian Marketing Journal*, 33(2), pp.141-153. https://doi.org/10.1177/14413582241252904

Duan, Y., Edwards, J.S. and Dwivedi, Y.K., 2019. Artificial Intelligence for Decision Making in the Era of Big Data - Evolution, Challenges and Research Agenda. *International Journal of Information Management*, 48, pp. 63-71. https://doi.org/10.1016/j.ijinfomgt.2019.01.021.

Gonçalves, A.R., Costa Pinto, D., Rita, P. and Pires, T., 2023. Artificial Intelligence and Its Ethical Implications for Marketing. *Emerging Science Journal*, 7(2), pp. 313-327. http://doi.org/10.28991/ESJ-2023-07-02-01

Hariguna, T. and Ruangkanjanases, A., 2024. Assessing the Impact of Artificial Intelligence on Customer Performance: A Quantitative Study using Partial Least Squares Methodology. *Data Science and Management*, 7(3), pp. 155-163. https://doi.org/10.1016/j.dsm.2024.01.001

He, Y., Du, Y. and Pu, X., 2025. Personalized Recommendation System of E-Commerce in the Digital Economy Era: Enhancing Social Connections with Graph Attention Networks. *Applied Artificial Intelligence*, 39(1). https://doi.org/10.1080/08839514.2025.2487417

Klein, K., 2021. *Conversational Commerce: Anthropomorphic Chatbots in E-Commerce and their Effect on Consumer Behavior*. Nova School of Business and Economics. [online] Available at: <https://run.unl.pt/handle/10362/132598> [Accessed 8 April 2025].

Lopes, J.M., Silva, L.F. and Massano-Cardoso, I., 2024. AI Meets the Shopper: Psychosocial Factors in Ease of Use and Their Effect on E-Commerce Purchase Intention. *Behavioral Sciences*, 14(7), p.616. https://doi.org/10.3390/bs14070616

Peruchini, M., da Silva, G.M. and Teixeira, J.M., 2024. Between Artificial Intelligence and Customer Experience: A Literature Review on the Intersection. *Discover Artificial Intelligence,* 4(1), p.4. https://doi.org/10.1007/s44163-024-00105-8

Pillarisetty, R. and Mishra, A., 2022. A Review of AI (Artificial Intelligence) Tools and Customer Experience in Online Fashion Retail. *International Journal of E-Business Research*, 18(2), pp.1-12.

Saurabh, K. and Raghav, A., 2024. AI-Augmented Discount Optimization Engines for E-Commerce Platforms. *Iconic Research and Engineering Journals*, 8(5), pp. 1057-1075.

Sharma, M., Joshi, S., Luthra, S. and Kumar, A., 2024. Impact of Digital Assistant Attributes on Millennials' Purchasing Intentions: A Multi-Group Analysis using PLS-SEM, Artificial Neural Network and fsQCA. *Information Systems Frontiers,* 26, pp. 943-966. https://doi.org/10.1007/s10796-022-10339-5

Sharma, S., Islam, N., Singh, G. and Dhir, A., 2024. Why Do Retail Customers Adopt Artificial Intelligence (AI) Based Autonomous Decision-Making Systems?. *IEEE Transactions on Engineering Management*, 71, pp. 1846-1861,

Shawar, B.A. and Atwell, E., 2007. Chatbots: Are they ready for real use? *Natural Language Engineering*, 13(4), pp. 1-19.

Sulastri, L., 2023. The Role of Artificial Intelligence in Enhancing Customer Experience: A Case Study of Global E-commerce Platforms. *International Journal of Science and Society*, 5(3), pp. 451-469. https://doi.org/10.54783/ijsoc.v5i3.1257

Țală, M.L., Müller, C.N., Albăstroiu Năstase, I., State, O. and Gheorghe, G., 2024. Exploring University Students' Perceptions of Generative Artificial Intelligence in Education. *Amfiteatru Economic*, 26(65), pp. 71-88. https://doi.org/10.24818/EA/2024/65/71.

Yin, J., Qiu, X. and Wang, Y., 2025. The Impact of AI-Personalized Recommendations on Clicking Intentions: Evidence from Chinese E-Commerce. *Journal of Theoretical and Applied Electronic Commerce Research*, 20(1), 21. https://doi.org/10.3390/jtaer20010021

Zhang, Q. and Xiong, Y., 2024. Harnessing AI Potential in e-Commerce: Improving User Engagement and Sales Through Deep Learning-Based Product Recommendations. *Current Psychology,* 43, pp. 30379–30401. https://doi.org/10.1007/s12144-024-06649-3

Structural and Perceptual Constraints in AI Adoption: Financial and Human Capital Challenges Facing Small Businesses in the Era of Industry 4.0

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Abstract

Our study investigates the structural complexities and perceptual constraints associated with the implementation of digitization and Artificial Intelligence (AI) in firms, with a specific focus on small and medium-sized enterprises (SMEs) operating in the context of Industry 4.0. It explores the impact of financial and human resource limitations, employee resistance, data privacy concerns, and the role of digital leadership in AI adoption. The research adopts a mixed-methods approach, incorporating a literature review and a structural equation modeling (SEM) analysis to examine the hypothesized relationships between perceived barriers and firms' adoption of AI. Key indicators such as RMSEA, CFI, and TLI were used to assess model fitness, while regression coefficients and p-values determined the strength and significance of the relationships.

The findings reveal that the perception of financial limitations does not significantly hinder AI adoption, challenging conventional assumptions. Conversely, a lack of qualified personnel shows a weak but notable negative correlation with AI implementation capacity. Resistance from employees, initially perceived as a barrier, was found to have a surprisingly positive effect—possibly due to prior exposure to automation. Ethical concerns and data privacy did not significantly deter AI initiatives, with firms adhering to GDPR frameworks. The lack of awareness regarding available funding opportunities emerged as a notable external constraint.

This study offers original insights into how internal perceptions and structural limitations shape the digital transformation journey of SMEs. It moves beyond deterministic views of financial barriers, highlighting the nuanced interplay between organizational readiness and human factors.

The results underscore the need for targeted skill development, transparent AI communication strategies, and improved access to funding information. Policymakers and firm leaders should prioritize digital leadership, workforce reskilling, and inclusive innovation to foster sustainable AI integration in SMEs.

Keywords

Artificial Intelligence Adoption, Digital Transformation Challenges, Small and Medium Enterprises (SMEs), Financial and Human Capital Constraints, Employee Resistance to Automation, Ethical and Data Privacy Concerns

DOI: 10.24818/BASIQ/2025/11/035

Introduction

The implementation of Artificial Intelligence (AI) in business operations has emerged as both a strategic opportunity and a complex organizational challenge. While AI offers the potential to enhance operational efficiency, decision-making, and competitive advantage, its adoption is often hindered by significant structural and perceptual barriers—particularly in small and medium-sized enterprises (SMEs). Recent research emphasizes that key obstacles include financial limitations, shortage of skilled personnel, and employee resistance, which are intensified in the context of Industry 4.0 (Soni et al., 2020; Barsha and Munshi, 2024; Morandini et al., 2023). Furthermore, ethical concerns and data privacy issues have become increasingly prominent, as firms grapple with the integration of AI within frameworks that ensure transparency and regulatory compliance (Chatterjee et al., 2020; von Eschenbach, 2021). Our paper investigates the specific interplay between perceived financial and human capital constraints and the firms' ability to adopt AI-driven solutions. In contrast to dominant narratives, the findings challenge the assumption that limited financial resources are a major deterrent, revealing instead that motivational and informational gaps may be more significant. The study also explores how a perceived lack of qualified personnel affects AI readiness and highlights the paradoxical role of employee resistance, which may, under certain conditions, facilitate rather than obstruct AI integration. To address these questions, the study employs a mixed-methods approach combining literature review with structural equation modeling (SEM) to test two key hypotheses related to financial and personnel-related constraints. The structure of the paper is as follows: after this introduction, Section 2 reviews the scientific literature; Section 3 presents the methodology; Section 4 discusses the findings; and Section 5 concludes with managerial implications and recommendations for future research.

1.Review of the scientific literature

The adoption of Artificial Intelligence (AI) presents notable challenges for small and traditional enterprises, with high financial investment remaining one of the most significant obstacles. The costs associated with research and development (RandD)—particularly those related to acquiring and processing high-quality datasets for training customized AI models—often exceed the financial capacities of such firms (Soni et al., 2020; Okeke et al., 2024). Despite AI's recognized potential to reduce human error, increase operational efficiency, and optimize resource allocation, many traditional businesses lack the necessary digital infrastructure to support these advancements (Apu, 2025). Furthermore, AI implementation typically demands parallel investment in complementary technologies such as sensors, robotics, systems integration, and cybersecurity frameworks (Barsha and Munshi, 2024). While AI-based tools like dynamic pricing algorithms may enable small and medium-sized enterprises (SMEs) to adapt rapidly to market changes (Barua et al., 2024), the overall cost of full-scale deployment remains a considerable deterrent (Rana et al., 2024).

A further constraint is the limited availability of skilled professionals in AI, which hampers organizational capacity to design, implement, and maintain intelligent systems (Barsha et al., 2024). Morandini et al. (2023) argue that closing this talent gap requires a strategic assessment of internal capabilities and the development of targeted training initiatives. However, to avoid such investments, many companies prefer to recruit pre-trained professionals, inadvertently deepening the industry-wide skills shortage. For SMEs in particular, the financial burden of establishing a comprehensive AI infrastructure can severely impact their ability to remain competitive in increasingly automated environments (Rane et al., 2024). This challenge is exacerbated by limited access to funding, especially for firms serving niche markets (Thadani, 2023). Nonetheless, the long-term benefits of AI remain substantial, with applications in predictive analytics, intelligent automation, and personalized services offering transformative potential for business models across sectors (Mutasa et al., 2024).

Irrespective of organizational size, sector, or resource availability, there is a growing institutional commitment toward enhancing cybersecurity and mitigating operational risks (Shetty, 2023; Cai et al., 2023). Within this framework, the C.I.A. triad—confidentiality, integrity, and availability—has emerged as a foundational model for safeguarding information systems and sensitive data assets (Nie, 2024). This heightened focus on data protection has, in turn, accelerated interest in the deployment of AI-driven cybersecurity solutions. The imperative is further amplified by widespread consumer hesitancy to disclose personal and sensitive data, particularly financial and medical information, due to persistent privacy concerns (Chatterjee et al., 2020; Bijlsma et al., 2023). When strategically integrated into enterprise platforms such as customer relationship management (CRM) systems, artificial intelligence holds considerable potential to reinforce trust through robust data security protocols.

Empirical insights from the pharmaceutical sector illustrate this development, demonstrating that AI integration correlates with improved adherence to data protection regulations and a marked reduction in data breach incidents (Syed, 2022). In addition to enhancing compliance, AI contributes to cybersecurity resilience by leveraging machine learning to identify and learn from prior attack vectors, while employing predictive analytics to anticipate and neutralize emerging threats in real time (de Azambuja et al., 2023). Beyond threat detection, AI facilitates the automation of incident response protocols and augments the capabilities of cybersecurity professionals by providing advanced diagnostic and analytical tools (Familoni, 2024).

Employee resistance to the implementation of Artificial Intelligence (AI) is largely driven by concerns regarding potential job displacement. According to Raisch et al. (2021) and Noordeen (2024), this fear is fueled by the widespread perception that AI is primarily designed to automate human tasks rather than to support or enhance employee roles within organizations.

One of the most commonly cited barriers in the academic literature regarding AI adoption is the technology's inability to replicate essential human interaction traits such as empathy (Alam, 2022), emotional intelligence, morality (Gerrans, 2024), and interpersonal relationships formed within teams (Booyse and Scheepers, 2024). Although emotion recognition technologies in AI often rely on analyzing facial expressions, speech patterns, and physiological cues, the accuracy and reliability of these systems can be compromised by cultural diversity and biases embedded in the training datasets (Singh et al., 2024). However, recent studies indicate a growing research focus on addressing these limitations. Neural networks are showing promise in recognizing emotional patterns, which can be integrated into more advanced AI systems to improve emotional intelligence, thereby fostering more natural and human-like interactions (Preetha, 2024; Wu, 2024; Siwek et al., 2024; Vanitha et al., 2024).

Addressing the multifaceted resistance to AI adoption necessitates a shift in its organizational positioning—from a substitute for human leadership to a complementary decision-support system. Empirical evidence suggests that employees exhibit lower acceptance of decisions generated by artificial systems, particularly when such systems are perceived as lacking alignment with organizational culture and social norms (Sumarlin and Kusumajaya, 2024). These perceptions can erode morale and reduce overall productivity. Resistance is further intensified by limited transparency in algorithmic processes, notably in task prioritization, as well as by disruptions to established workflows stemming from insufficient change management strategies (López-García and Rojas, 2024; Neumann et al., 2024).

Noordeen (2024) identifies a persistent tension between organizational economic imperatives and employees' anxieties regarding job displacement, which frequently manifests in avoidance behaviors. Mabungela (2023) corroborates this, noting that automation-related uncertainty is exacerbated when employee perspectives are excluded from the implementation discourse. Moreover, SimanTov-Nachlieli (2023) observes that high-performing employees may actively resist AI-driven tools, perceiving them as threats to personal agency and professional relevance. To overcome such resistance, scholars advocate for a comprehensive, ethically grounded change strategy. This includes transparent communication, inclusive decision-making, targeted employee training, and the establishment of resilient organizational structures. Noble and Chahal (2024) stress the importance of fostering a culture of inclusion anchored in leadership accountability and innovation openness. Meanwhile, Madanchian and Taherdoost (2025) emphasize that the success of AI integration is closely linked to digitally competent leadership, adaptive organizational culture, and the utilization of advances in natural language processing and machine learning. Ultimately, as Kanapathipillai et al. (2024) argue, bridging digital skill gaps, ensuring compliance with regulatory frameworks, and cultivating trust are indispensable for AI adoption. Singh and Pandey (2024) reinforce this position, underlining the pivotal role of strategic and visionary digital leadership in steering organizations through the intricate process of transitioning toward intelligent automation.

Booyse et al. (2024) emphasize several critical impediments to the integration of artificial intelligence (AI) in automated decision-making processes, chief among them being the erosion of user trust, limited transparency, and unresolved ethical dilemmas (Sethy et al., 2023). These issues largely stem from the inherent opacity of black-box AI models, which obscure the rationale behind algorithmic outputs and hinder interpretability for end-users. Additionally, such systems are susceptible to algorithmic bias and cybersecurity vulnerabilities, both of which further exacerbate trust deficits (Booyse and Scheepers, 2024; von Eschenbach, 2021). As a countermeasure, there is a growing shift towards white-box AI frameworks, which enhance transparency by elucidating the internal decision logic and enabling greater user oversight. However, the deployment of these systems necessitates continuous vigilance through real-time monitoring and the implementation of proactive strategies to detect and mitigate potential security breaches (Rana et al., 2022). Notably, the convergence of AI systems with business analytics tools introduces additional complexity, often resulting in a blurred interface that compromises the clarity and accountability of

automated decision-making mechanisms. To mitigate such risks, the adoption of AI must be supported by clear data protection strategies and contingency plans for dealing with security incidents (Rana et al., 2022). At the same time, issues of data privacy and ethics have become a central topic in both academic and organisational discourse (Shukla and Taneja, 2024). The integration of AI into business operations brings with it numerous ethical challenges, including accountability in decision-making, fairness and data governance, which need to be addressed responsibly (Purwanto et al., 2024).

These concerns are no longer limited to academic circles, but are increasingly dominating the agendas of governments, media and the public as AI is used in more and more sectors (Shawky et al., 2023; Taneja et al., 2024; Pramanik, 2024). In particular, the adoption of AI in African higher education has highlighted specific risks in terms of institutional readiness and ethical compliance (Afolabi, 2024). Therefore, the responsible integration of AI requires a balanced and well-thought-out approach that considers both data security and the ethical dimensions of the technology.

Over recent years, funding opportunities for AI start-ups have increased significantly, driven by the perception that such investments yield high long-term returns (Soni et al., 2020). However, access to financing remains disproportionately limited for established firms across various business sectors. Compounding this issue is the insufficient dissemination of information regarding available funding programs, which further restricts firms' ability to secure capital for AI-related investments. As a result, established companies often rely solely on their internal financial resources to support strategic technology adoption. In contrast, early-stage ventures outside the fintech domain face considerable challenges in attracting AI-specific funding at the outset. Lee (2020) emphasizes that access to finance should be a central pillar of policy strategies related to the design, development, and deployment of AI, particularly within financial services. Addressing these financing disparities, Mhlanga (2021) advocates for the creation of robust public–private partnerships aimed at supporting both small-scale enterprises and mature firms in their efforts to invest in AI and machine learning technologies. Furthermore, financial institutions are encouraged to increase their commitment to AI investment, as a means of enhancing financial inclusion and fostering innovation in emerging industries (Mhlanga, 2021).

2.Research methodology

The SEM model computed the Chi-square values, the p-value, the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), the Root Mean Square Error Approximation (RMSEA), and the SEM beta regression estimates. The RMSEA, CFI, and TLI are goodness-of-fit indices. A good model–data fit is indicated by RMSEA < .06, CFI > .95, and TLI > .95 (Xia and Yang, 2019). The hypothesis tests are the Chi-square and p-values; p-value < 0.05 indicates a statistically significant relation between the variables in the regression model. The SEM beta regression coefficients indicate the direction and magnitude of the relation; negative values indicate an inverse relationship, while positive values indicate a directly proportional relationship (Keith, 2019). In cases where there is only 1 dependent variable and 1 independent variable, the SEM illustration figure is not presented.

H1: The perception of a lack of financial resources correlates negatively with the perception of the adoption of AI for automation and the perception of data analysis.

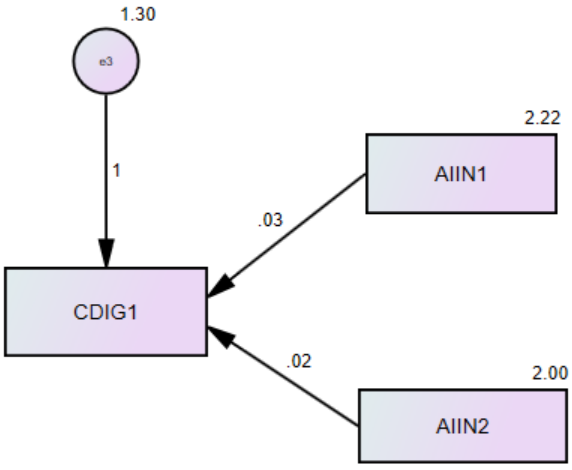

Figure no.1. The H1 SEM regression graphical model

Table no. 1. Structural Equation Modeling (SEM) Results for H1 – Impact of Perceived Financial Constraints on AI Adoption for Automation and Data Analysis

	RMSEA	CFI	TLI	χ^2	p-value	β
Model fitness	1.005	0.003	-2.034	137.251		
CDIG1 <--- AIIN1					.643	0.030
CDIG1 <--- AIIN2					.792	0.018

The model data fit is poor. The lack of financial resources for digitization has a positive correlation with the perception of the adoption of AI for automation and data analysis. However, the p-values are higher than 0.05, indicating that the positive correlation is not significant and only happens by chance. The null hypothesis stating "The perception of a lack of financial resources correlates negatively with the perception of the adoption of AI for automation and the perception of data analysis" is rejected.

H2: The perception of a lack of qualified personnel correlates negatively with the perception of the firm's ability to implement AI-driven initiatives.

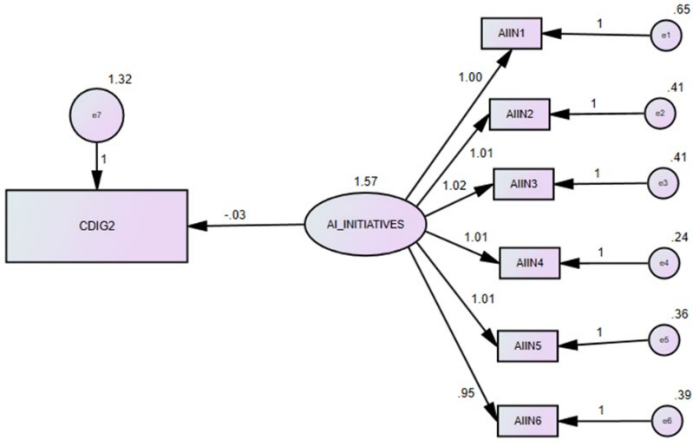

Figure 2: The H2 SEM regression graphical model

Table no. 2. Structural Equation Modeling (SEM) Results for H2 – Impact of Perceived Lack of Qualified Personnel on Firms' Capacity to Implement AI-Driven Initiatives

	RMSEA	CFI	TLI	χ^2	p-value	β
Model fitness	0.124	0.968	0.951	42.892		
CDIG2 <--- AI_INITIATIVES					.739	-0.027

The model data fit is good since CFI and TLI meet the threshold. The firm's AI initiatives (from AI IN 1-6) have a significant positive influence on the overall AI Initiatives since the regression estimates and the p-values are less than 0.05. The overall AI initiatives have a negative relationship with the lack of qualified personnel as a challenge in digitization, the relationship is not significant since the p-value is higher than 0.739. Since the lack of personnel correlates negatively with the perception of the firm's ability to implement AI-driven initiatives, the null hypothesis is accepted.

The study hypothesized that a lack of financial resources hindered the adoption of AI for automation and data analytics, however, this was rejected by the findings of the analysis. This implies that firms have the financial resources to invest in AI for automation and data analytics but have not made the effort. This can be investigated in a different study to understand the causes of the reluctance. Rather than the resistance of employees hindering the adoption of AI to increase automation efficiency, it had a positive impact. This could be explained by the employees already trained in some of the automation systems, and hence do not resist the technologies in use.

The introduction of new technology increases the automation efficiencies further. Likewise, the perception of ethical data privacy concerns did not hinder the adoption of AI initiatives in the firms; rather, firms follow the General Data Protection Regulations adopted by the EU, hence, the firms have no negativity about AI. The other hypotheses were accepted since they were in line with the literature review.

3.Results and discussion

The study hypothesized that a lack of financial resources hindered the adoption of AI for automation and data analytics, however, this was rejected by the findings of the analysis. This implies that firms have the financial resources to invest in AI for automation and data analytics but have not made the effort. This can be investigated in a different study to understand the causes of the reluctance. Rather than the resistance of employees hindering the adoption of AI to increase automation efficiency, it had a positive impact. This could be explained by the employees already trained in some of the automation systems, and hence do not resist the technologies in use. The introduction of new technology increases the automation efficiencies further. Likewise, the perception of ethical data privacy concerns did not hinder the adoption of AI initiatives in the firms; rather, firms follow the General Data Protection Regulations adopted by the EU, hence, the firms have no negativity about AI. The other hypotheses were accepted since they were in line with the literature review.

Conclusions

The study highlights the multifaceted structural and perceptual challenges hindering the effective adoption of digitization and Artificial Intelligence (AI) in firms, particularly small and medium enterprises (SMEs) within the Industry 4.0 context. While AI promises enhanced efficiency, predictive capabilities, and competitive advantage, its widespread implementation remains obstructed by high financial costs, lack of digital infrastructure, and limited access to qualified personnel.

Contrary to expectations, the study's findings reveal that the perceived lack of financial resources does not significantly deter AI adoption, suggesting that firms may possess adequate capital but face motivational or strategic barriers. Additionally, resistance from employees—often presumed to stem from fears of job loss—was found to be less influential when training and transparency are present. Instead, a supportive organizational culture and inclusive leadership play a pivotal role in easing transitions toward automation.

The importance of data security and ethical AI usage also emerged as a major theme, with firms increasingly adopting AI-powered cybersecurity solutions and aligning with global data protection regulations. Ethical concerns and transparency in decision-making continue to influence trust in AI systems, underscoring the need for explainable, human-centered design. Furthermore, a widespread lack of awareness regarding funding opportunities—especially for non-startup firms—limits strategic investment in AI. The findings call for policy-level support, improved access to funding, investment in digital skills development, and a strong emphasis on organizational change management to enable effective digital transformation.

This study is limited by its focus on perceptual and structural barriers within a specific sample of SMEs, which may restrict the generalizability of findings across larger or more digitally mature organizations. Additionally, the reliance on self-reported data may introduce response bias. Future research should explore cross-sectoral comparisons and incorporate longitudinal designs to track the evolution of AI adoption over time. Investigating the psychological drivers behind managerial reluctance to embrace AI, despite financial capability, would also enrich the understanding of non-economic constraints. Broader, multinational studies could further validate the framework and inform targeted digital transformation policies.

Overall, the study underscores that AI adoption is not merely a technological issue but a complex interplay of financial, cultural, ethical, and strategic dimensions.

References

Afolabi, A., 2024. Ethical Issues in Artificial Intelligence Adoption in African Higher Education Institutions in Nigeria. African Journal of Information and Knowledge Management, 3(2), 22–33.

Alam, L., 2022. *Examining Cognitive Empathy Elements within AI Chatbots for Healthcare Systems*. Open Access Dissertation, Michigan Technological University, https://doi.org/10.37099/mtu.dc.etdr/1437

Apu, K. U., 2025. AI-Driven Data Analytics and Automation: A Systematic Literature Review of Industry Applications. 2(01), pp.21–40.

Azambuja, d., A.J.G., Plesker, C., Schützer, K., Anderl, R., Schleich, B., Almeida, V.R., 2023. Artificial Intelligence-Based Cyber Security in the Context of Industry 4.0—A Survey. Electronics 2023, Vol. 12, p.1920. https://doi.org/10.3390/ELECTRONICS12081920

Barsha, S., Munshi, S.A., 2024. Implementing artificial intelligence in library services: a review of current prospects and challenges of developing countries. *Library Hi Tech News,* 41, pp.7–10. https://doi.org/10.1108/LHTN-07-2023-0126/FULL/XML

Barua, T., Jabin, J. and Barua, S., 2024. Economic transformation of data analytics through ai: emerging opportunities and challenges in the workforce. 4(3), pp.32–43.

Bijlsma, M., van der Cruijsen, C. and Jonker, N., 2023. Not All Data are Created Equal - Data Sharing and Privacy. *Social Science Research Network*. http://dx.doi.org/10.2139/ssrn.3959866

Booyse, D., Scheepers, C.B., 2024. Barriers to adopting automated organisational decision-making through the use of artificial intelligence. *Management Research Review,* 47, 64–85. https://doi.org/10.1108/MRR-09-2021-0701/FULL/PDF

Cai, M., Wu, C., Fan, K., Zhao, X., and Sun, Q., 2023. Data security risk analysis of typical internet companies in China. 12609, p.1260928.

Chatterjee, S., Ghosh, S.K., Chaudhuri, R., Chaudhuri, S., 2020. Adoption of AI-integrated CRM system by Indian industry: from security and privacy perspective. *Information and Computer Security*, 29, pp.1–24. https://doi.org/10.1108/ICS-02-2019-0029/FULL/XML

Eschenbach, v., W.J., 2021. Transparency and the Black Box Problem: Why We Do Not Trust AI. *Philos Technol,* 34, pp.1607–1622. https://doi.org/10.1007/S13347-021-00477-0/METRICS

Familoni, B.T., 2024. Cybersecurity Challenges In The Age Of Ai: Theoretical Approaches And Practical Solutions. *Computer Science and IT Research Journal,* 5, pp.703–724. https://doi.org/10.51594/CSITRJ.V5I3.930

Prof Gerrans, Philip, 'Engineering empathy: Emotion and self representation in artificial intelligence', Anatomy of an Avatar: The virtual self in pathologies of self awareness, International Perspectives in Philosophy and Psychiatry (Oxford, 2024; online edn, Oxford Academic, 19 Aug. 2024), https://doi.org/10.1093/9780191994395.003.0010

Kanapathipillai, K., Ghazali, J. binti, Magalingam, K. and Othman, N.H., 2024. Trailblazing ai implementation: overcoming regulatory hurdles and bridging talent gaps to turn resistance into resilience at rhb bank headquarters, malaysia. *European Journal of Human Resource Management Studies*, 8(2).

Lee, J., 2020. Access to Finance for Artificial Intelligence Regulation in the Financial Services Industry. *European Business Organization Law Review*, 21, pp.731–757. https://doi.org/10.1007/S40804-020-00200-0/METRICS

López-García, J. A., and Rojas, E. M., 2024. Barriers to AI Adoption and Their Influence on Technological Advancement in the Manufacturing and Finance and Insurance Industries. Pp.1–6.

Mabungela, M., 2023. Artificial Intelligence (AI) and Automation in the World of Work: A Threat to Employees? *Research in Social Sciences and Technology*, 8(4), https://doi.org/10.46303/ressat.2023.37

Madanchian, M. and Taherdoost, H. (2025). Barriers and Enablers of AI Adoption in Human Resource Management: A Critical Analysis of Organizational and Technological Factors. Information, 16(1), 51.

Mhlanga, D., 2021. Financial Inclusion in Emerging Economies: The Application of Machine Learning and Artificial Intelligence in Credit Risk Assessment. *International Journal of Financial Studies*, 9, p.39. https://doi.org/10.3390/IJFS9030039

Morandini, S., Fraboni, F., Angelis, D., M., Puzzo, G., Giusino, D., Pietrantoni, L., 2023. The impact of artificial intelligence on workers' skills: Upskilling and reskilling in organisations. *Inf Sci*, 26, pp.39–68.

Mutasa, E. T., Dhiwwale, C. and Gopal, S.S.A., 2024. Artificial Intelligence in Developing Economies: Unpacking Business Innovations, Prospects, and Challenges. *International Journal of Academic Research in Business and Social Sciences*.

Neumann, O., Guirguis, K., Steiner, R., 2024. Exploring artificial intelligence adoption in public organizations: a comparative case study. *Public Management Review*, 26, pp.114–141. https://doi.org/10.1080/14719037.2022.2048685

Nie, S., 2024. Review on the application of data security in the enterprise management. *Applied and Computational Engineering*.

Noble, P. and Chahal, B.P.S., 2024. From Resistance to Adoption. Advances in Human Resources Management and Organizational Development Book Series, pp.47–68.

Noordeen, A. R., 2024. Are AI's being approached or avoided? *Proceedings of the 2024 Computers and People Research Conference,* pp.1-3

Okeke, N. I., Bakare, O. A., and Achumie, G.O., 2024. Artificial Intelligence in SME financial decision-making: Tools for enhancing efficiency and profitability. Open Access Research Journal of Multidisciplinary Studies, 8(1), pp.150–163. https://doi.org/10.53022/oarjms.2024.8.1.0056

Pramanik, S., 2024. *Managing the AI Period's Confluence of Security and Morality.* Advances in Computational Intelligence and Robotics Book Series, pp.227–242.

Preetha, A. S., 2024. Using Text Data, Neural Networks are Trained to Develop Emotions that Mimic Human Emotional Understanding. *International Journal of Innovative Science and Research Technology,* pp.637-639. http://doi.org/ 10.38124/ijisrt/ijisrt24mar640

Purwanto, A. N. I., Fauzan, M., Widya, T. and Azzaky, N. S., 2024. Ethical Implications and Challenges of AI Implementation in Business Operations. *Techcomp Innovations*, 1(2), pp.68–82. http://doi.org/ 10.70063/techcompinnovations.v1i2.52

Rana, M., Sall, S. B., Bijoor, V. S., Gaiwad, V., Gaikwad, U., Patil, P. M. and Meher, K., 2024. Obstacles to the Full Realization and Adoption of Artificial Intelligence (AI). *South Eastern European Journal of Public Health,* pp.1003–1016. https://doi.org/10.70135/seejph.vi.2251

Rana, N.P., Chatterjee, S., Dwivedi, Y.K., Akter, S., 2022. Understanding dark side of artificial intelligence (AI) integrated business analytics: assessing firm's operational inefficiency and competitiveness. *European Journal of Information Systems*, 31, pp.364–387. https://doi.org/10.1080/0960085X.2021.1955628

Rane, N., Desai, P. and Choudhary, S. K., 2024. Challenges of implementing artificial intelligence for smart and sustainable industry: Technological, economic, and regulatory barriers. *Deep Science Publishing*, pp. 82-94. https://doi.org/10.70593/978-81-981271-1-2_5

Sethy, A., Shaik, N., Yadavalli, P. K. and Anandaraj, S., 2023. *9 AI: issues, concerns, and ethical considerations*. De Gruyter, pp. 189–212. https://doi.org/ doi.org/10.1515/9783111323749-009

Shawky, S., Quach, S., Quach, S. and Ferm, L. C., 2023. *Ethical Issues of Artificial Intelligence (AI).* IGI Global, pp. 283–300. https://doi.org/10.4018/978-1-6684-9591-9.ch013

Shukla, R. P. and Taneja, S., 2024. *Ethical Considerations and Data Privacy in Artificial Intelligence*. IGI Global, pp. 86–97.

SimanTov-Nachlieli, I., 2023. More to Lose: High Performers' Opposition to the Adoption of Powerful AI Aids. *Proceedings - Academy of Management,* 1, https://doi.org/10.5465/AMPROC.2023.10721abstract

Singh, A. and Pandey, J., 2024. Artificial intelligence adoption in extended HR ecosystems: enablers and barriers. An abductive case research. *Frontiers in Psychology.* 14, https://doi.org/10.3389/fpsyg.2023.1339782

Siwek, J., Pierzyński, K., Siwek, P., Wójcik, A. and Żywica, P., 2024. Artificial Empathy and Imprecise Communication in a Multi-Agent System. *Applied Sciences*, 15(1), p.8, https://doi.org/10.3390/app15010008

Soni, N., Sharma, E.K., Singh, N. and Kapoor, A., 2020. Artificial Intelligence in Business: From Research and Innovation to Market Deployment. *Procedia Comput Sci,* 167, pp.2200–2210. https://doi.org/10.1016/J.PROCS.2020.03.272

Beyond Profit? How E-Commerce Adoption Strengthens Marketing and Strategic Benefits in Romanian Accommodation SMEs

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Abstract

The purpose of this study is to analyze the impact of e-commerce adoption on the performance of SMEs in the Romanian accommodation sector, focusing on both financial and non-financial outcomes. Using a quantitative approach, data were collected through a self-administered online questionnaire completed by 47 managers of accommodation facilities. The analysis was conducted using Structural Equation Modeling (SEM) in SmartPLS 4, based on the updated DeLone and McLean IS Success Model. The findings reveal that while e-commerce does not significantly influence financial performance, it has a strong positive effect on marketing performance, net benefits, and competitive advantage. This suggests that digitalization in Romanian hospitality SMEs serves primarily as a strategic enabler rather than a direct profit generator. The study is among the first to investigate this topic in Romania, filling a gap in the literature and offering a contextualized view of e-commerce adoption in an emerging market. Practically, the results imply that managers should focus on e-commerce as a tool for enhancing customer experience, brand differentiation, and long-term competitiveness, rather than expecting immediate financial returns.

Keywords

E-commerce, tourism, performance, SMEs, managers' perspective, Romania.

DOI: 10.24818/BASIQ/2025/11/038

Introduction

Several researchers have analyzed the impact of e-commerce (from the perspective of its adoption and use within the company) on business performance. They had different views regarding the dimensions that form e-commerce. There are also different views on the concept of use and adoption of e-commerce at a general level and within companies in the tourism and hospitality industry and different perspectives regarding the business performance aspect. Kong et al. (2020) consider that the term e-commerce refers to the selling and buying of goods and services over the internet, with the transfer of money and data to complete the transactions and Rosário and Raimundo (2021) mention that e-commerce involves the use of digital technologies in business to facilitate online sales and transactions.

Lebas and Euske (2002) conceptualize performance as a multidimensional construct comprising both financial and non-financial indicators that reflect the extent to which an organization attains its objectives and desired outcomes. They argue that performance can be effectively represented through a causal framework illustrating how present actions influence future results.

In a complementary perspective, Charles and Ochieng (2023) define firm performance as the execution of organizational activities with a degree of efficiency and effectiveness that surpasses generally accepted benchmarks or norms. In this study, the steps followed in order to develop the paper were followed: Review of the scientific literature, Research methodology, Results and discussion.

1. Review of the scientific literature

In their 2009 study, Intan Salwani et al. (2009) explored the influence of e-commerce usage on business performance by proposing a conceptual framework encompassing three key dimensions:

- the technological context (defined through technological competence);
- the organizational context (firm size, managerial beliefs, and investment in web technologies);
- and the environmental context (intensity of competitive pressure and regulatory support).

This framework, termed E-VALUE, represents a multidimensional theoretical model that integrates elements from both the Technology-Organization-Environment (TOE) model and the Resource-Based View (RBV) theory.

Similarly, Mutia Sobihah, Ahmad Munir and Mohamad Saladin (2014) investigated the role of e-commerce adoption in enhancing organizational performance among Malaysian hotels, employing a synthesized theoretical framework derived from several prior studies. Their findings confirmed significant relationships between the e-commerce business network, e-commerce competence, and organizational performance.

Building on the TOE model, the influence of e-commerce usage intensity on firm performance was systematically analyzed, with significant insights provided by Chang, Magobe and Kim (2015). They investigated several relationships, including whether external pressure intensity positively affects the scope of e-commerce use, whether perceived benefits of e-commerce adoption enhance its application, whether technological competence facilitates wider usage, and whether barriers impede its adoption. Additionally, they assessed whether expanding the scope of e-commerce usage subsequently increases its value for the firm.

Also building on the TOE model, Anshari and Payangan (2020) examined factors influencing firm performance, considering e-commerce adoption as an intervening variable. Their research, grounded additionally in RBV theory, demonstrated that the use of e-commerce had a significant positive effect on overall firm performance.

In the United States, Hua, Morosan and DeFranco (2015) analyzed the impact of e-commerce expenditures on hotel performance, using strictly financial indicators. Their results showed that the proportion of e-commerce expenses had a significant and positive impact on revenue per available room across all years studied, with the exception of 2007, indicating a consistent and sustained influence over time.

The impact of e-commerce on the performance of tourism firms, particularly travel agencies, was the central focus of the study conducted by Sunayana and Parveen (2019). They conceptualized e-commerce adoption through several dimensions, including e-marketing, e-advertising, e-customer support services, e-ordering and delivery, and e-payment. Hypothesis testing revealed a positive relationship between the use of these e-commerce applications and the organizational performance of the analyzed firms.

Previous research has emphasized the multifaceted nature of e-commerce adoption and its positive impact on organizational performance, particularly within the tourism sector. Mishra and Gupta (2020) developed a structural model encompassing eight key constructs—technological compatibility, relative technological advantage, firm learning capacity, managerial beliefs, organizational scope, competitive pressure, regulatory support, and institutional interventions—demonstrating that e-commerce adoption significantly enhances performance among start-ups.

Similarly, Alshaweesh and Bandi (2021) identified six dimensions of e-commerce—e-advertising, e-marketing, e-customer service, e-ordering and delivery, e-training, and e-payment—and found that e-ordering and e-payment systems notably improved performance in tourism enterprises in Jordan.

Complementing these findings, David and Musabila (2021) employed the updated DeLone and McLean IS Success Model alongside the Iceberg Competency Model to explore the relationship between e-commerce and SME performance in the tourism sector. Their study highlighted that e-advertising, e-ordering, and online payments have a direct positive impact on market share, sales volume, and customer reach.

More broadly, e-commerce has been shown to offer various benefits such as expanded market access, cost reductions, and stronger customer relationships. In the tourism industry, digital tools like online reservation systems, mobile applications, and loyalty programs are now critical for improving customer experience and operational efficiency.

Despite its potential benefits, the adoption of e-commerce among Romanian SMEs continues to face significant challenges. According to Eurostat data, key barriers include a persistent consumer preference for in-store shopping, limited digital literacy across segments of the population, and ongoing concerns about the security of online transactions.

These issues collectively impede the broader integration and effectiveness of e-commerce solutions. Although the proportion of Romanian individuals engaging in online shopping has grown from just 2.2% in 2009 to a considerably higher rate by 2023, the country still lags behind the European Union average by nearly a decade in terms of adoption speed. Similar gaps are evident in the contribution of e-commerce to enterprise revenue, particularly within the accommodation and food service sectors, further underscoring the structural and behavioral obstacles to digital transformation in Romania.

2. Research methodology

In the case of the present study, the choice of the research model (Figure no. 1) occurred after a thorough process of analysis of several models that initially seemed suitable for the proposed objectives. Following this careful approach, it was decided to use the IS Success Model of DeLone and McLean, updated in 2003 and applied on e-commerce in 2004. According to DeLone and McLean (2003), the success of e-commerce systems depends on several interrelated quality dimensions. Information quality refers to the relevance, clarity, completeness, personalization, and security of web content, which are essential for user trust and engagement. System quality encompasses features such as usability, reliability, adaptability, and response time—key attributes that influence the user experience. Service quality reflects the level of customer support offered during online interactions; insufficient support can lead to customer dissatisfaction and revenue loss. Use captures user interaction with the system, ranging from simple navigation to completing transactions. User satisfaction evaluates the overall user experience, from information access to post-purchase services. In this study, the concept of user satisfaction is expanded into marketing performance, incorporating elements such as customer satisfaction, loyalty, and perceived value.

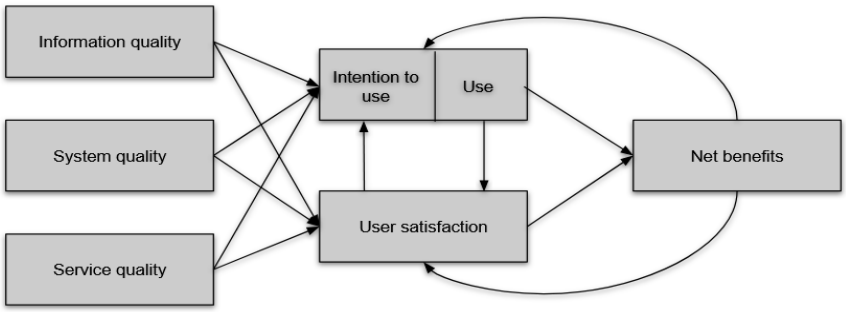

Figure no. 1. Diagram of research model
Source: updated after DeLone and McLean, 2004

Regarding performance from a marketing perspective, which is non-financial, Neely (2002) mentions that in recent times, four concepts (market orientation, customer satisfaction, customer loyalty and brand equity) have attracted extensive attention as representing good marketing inputs. He also highlights that most adopt the perspective that marketing should focus less on completing the individual transaction and more on developing long-term relationships with profitable customers.

In order to counter balance, it is decided to also add the accounting-financial perspective of performance, so that the impact of using e-commerce regarding the performance can be analyzed from both a financial and non-financial perspective. Net benefits refer to the success of e-commerce while a consumer is using the service or products and indicate the important factor for measuring success (DeLone and McLean, 2004).

In order to complete the picture, a decision is made to introduce, as a complement to net benefits, the dimension represented by competitive advantage from the perspective of differentiation.

Barney (1991) mentions that competitive advantage is generally conceptualized as the implementation of a strategy that is not currently implemented by other firms and that facilitates cost reduction, exploitation of market opportunities and/or neutralization of competitive threats.

The purpose of this case study is to analyze the influence of e-commerce use on the performance of SMEs in the Romanian accommodation sector for the year 2024.

Among the objectives pursued are: Determining the impact of information quality on the use of e-commerce; Determining the impact of information quality on the performance of the company - from a marketing perspective; Determining the impact of system quality on the use of e-commerce; Determining the impact of system quality on the performance of the company - from a marketing perspective; Determining the impact of service quality on the use of e-commerce; Determining the impact of service quality on the performance of the company - from a marketing perspective; Determining the impact of e-commerce use on the performance of the company - from a marketing perspective; Determining the impact of e-commerce use on the performance of the company - from an accounting/financial perspective; Determining the impact of e-commerce use on the net benefits of the company; Determining the impact of trade use on the competitive advantage of the company - from a differentiation perspective.

Based on the above mentioned, the diagram of the model to be followed in the current study is as it follows (Figure no. 2).

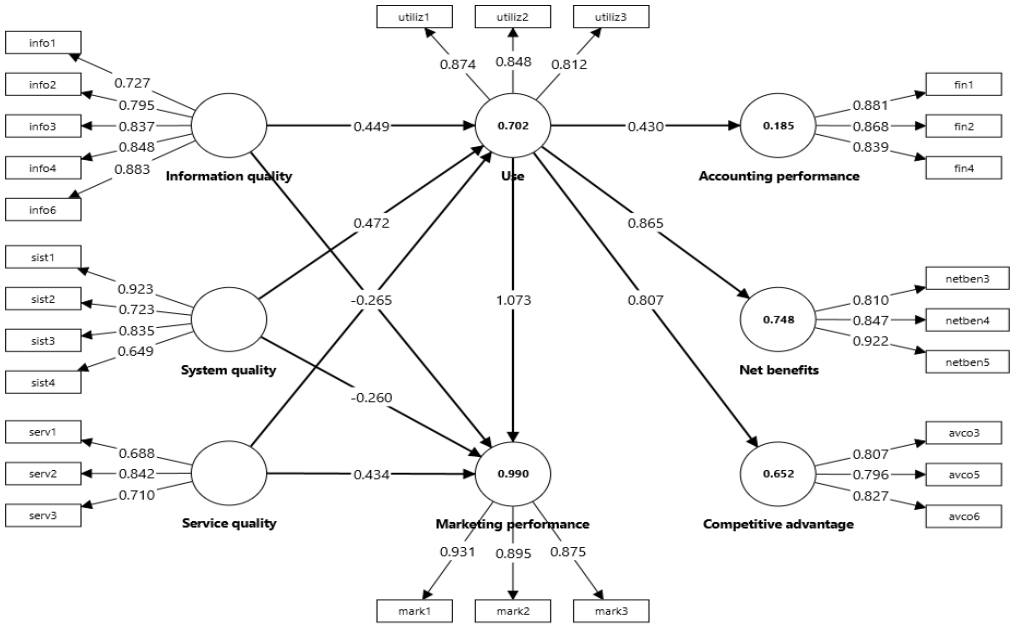

Figure no. 2. Diagram of the model

In short, among the indicators used regarding the quality of the information we have, if it is useful, updated, and sufficient. For the quality of the system, if it has an adequate response time, if it is easy to use or if it protects customer confidentiality. Related variables are the quality of the service, the quality of technical support and if it meets ethical standards. For the performance from a marketing perspective, the degree of customer satisfaction, the customer retention rate, the market share. For the competitive advantage, the distinctive character of the brand, the credibility and prestige of the company, the ability to personalize products and services. Regarding the performance from an accounting perspective, the increase in profit and sales (in the last 3 years), the revenue per available room in the last 3 years and the achievement of financial objectives in the last 3 years. Among the indicators of the net benefit variable we find, improving the decision-making process, saving time, saving costs and simplifying the work of employees.

The hypotheses are the following:

- H1: Information quality has a significant positive impact on e-commerce usage;
- H2: Information quality has a significant positive impact on marketing performance;
- H3: System quality has a significant positive impact on e-commerce usage;

- H4: System quality has a significant positive impact on marketing performance;
- H5: Service quality has a significant positive impact on e-commerce usage;
- H6: Service quality has a significant positive impact on marketing performance;
- H7: The use of e-commerce has a significant positive impact on marketing performance;
- H8: The use of e-commerce has a significant positive impact on accounting performance;
- H9: The use of e-commerce has a significant positive impact on the firm's net benefits;
- H10: The use of e-commerce has a significant positive impact on the firm's competitive advantage.

Similar studies in this field have predominantly employed quantitative research methods, and the present study follows the same approach. As noted by Rana, Gutierrez and Oldroyd (2023), quantitative research involves the collection and statistical analysis of numerical data to address scientific questions, identify patterns, test causal relationships, and generalize findings to broader populations. In this research, data were processed using SPSS 26 and SmartPLS 4. An initial descriptive analysis was conducted in SPSS. Based on these responses, several relevant observations can be made (Table no. 1).

Tabel no. 1. Structure of responding companies

Category	Type	Value / Percentage	Category	Type	Value / Percentage
Responses	Total	49/100%	Locations	Brașov	6/13%
	Valid	47/96%		Constanța	5/11%
Employees	< 2	27/57%		Bihor	5/11%
	2-9	12/26%		București	4/9%
	10-25	6/13%		Suceava	3/6%
	other	2/4%		Mureș	3/6%
Turnover	< €50.000	18/38%		Sibiu	2/4%
	€50.000-€100.000	17/36%		Other	19/40%
	€500.000-€1 mil	5/11%	E-commerce adoption	5-8 years	15/32%
	€100.000-€200.000	4/9%		3-4 years	14/30%
	other	3/6%		1-2 years	8/17%
E-commerce	both proprietary & outsourced	22/46.8%		13-15 years	4/8.5%
	outsourced only	21/44.7%		9-12 years	4/8.5%
	proprietary only	4/8.5%		16-20 years	1/2%
				>20 years	1/2%

Data is collected exclusively through a self-administered online questionnaire (via Google Forms) addressed to tourism and hospitality companies (SME category only) in Romania. In order to obtain information about commercial companies operating as tourist reception structures with accommodation functions, the website of the Ministry of Economy, Entrepreneurship and Tourism of Romania was consulted. A sample was made from which at the time of carrying out this analysis, only 49 companies responded with 47 valid answers. We decided to continue the research because testing the proposed model is a priority, and we are counting on increasing the number of responses over time through semi-structured interviews. The purpose of evaluating the reflective measurement model is to ensure the reliability and validity of the construct measures and therefore provide support for their appropriate inclusion in the path model. In the case of the reflective measurement model, Hair et al. (2017) recommend examining the results of the following SEM-PLS calculations: Internal Consistency Reliability (Cronbach's Alpha and Composite Reliability), Convergent Validity (Outer Loadings and Average Variance Extracted- AVE) and Discriminant Validity (heterotrait-monotrait ratio- HTMT) (Table no. 2).

Table no. 2. Internal Consistency Reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Accounting performance	0.897	0.898	0.897	0.745
Competitive advantage	0.851	0.851	0.851	0.656
Information quality	0.91	0.914	0.911	0.672
Marketing performance	0.927	0.929	0.928	0.811
Net benefits	0.894	0.899	0.895	0.741
Service quality	0.79	0.801	0.793	0.562
System quality	0.867	0.882	0.867	0.623
Use	0.881	0.883	0.882	0.714

Cronbach's Alpha (recommended values between 0.60-0.90) provides an estimate of reliability based on the intercorrelations of the observed indicator variables, in the present situation the values are above 0.80 and just above 0.90. Composite Reliability (recommended values between 0.60-0.90), takes into account the different outer loadings of the indicator variables, the values recorded are from above 0.80 to above 0.90. Outer Loadings (recommended values >0.70), here in majority all values are above 0.70, while some are really close, 0.668 and only one is below 0.650. Average Variance Extracted (AVE, recommended values >0.50), is defined as the grand mean value of the squared loadings of the indicators associated with the construct (i.e., the sum of the squared loadings divided by the number of indicators) in our model all the values are above 0.60. Heterotrait-monotrait ratio (HTMT, recommended values - the confidence interval does not include 1), in short, HTMT is the ratio of the correlations between traits to the correlations within traits. In this case all the values are below 1 and in 25 out of 28 relations between the indicators the values are below 0.850. In the present situation it can be mentioned that the majority of requirements are met, thus the structural model can be evaluated. This evaluation involves examining the predictive capabilities of the model and the relationships between the constructs. Hair et al. (2019) mention that, after these steps and before assessing the structural relationships, collinearity must be examined to make sure it does not bias the regression results. In the current model, all the recorded VIF values are below the limit 5. Hair et al. (2017) recommend the following procedure for evaluating the structural model. Assessing the significance and relevance of the structural model relationships (Structural Model Path Coefficients), Hair et al. (2017) mention that, as a rule of thumb, for sample sizes of up to about 1,000 observations, path coefficients with standardized values above 0.20 are usually significant, and those with values be-low 0.10 are usually not significant. Based on their sizes, it would appear that the relationships between Service quality -> Marketing performance; Information quality -> Use; System quality -> Use; Use -> Competitive advantage; Use -> Net benefits Use -> Marketing performance are significant (all path coefficient being above 0.40). After running the PLS-SEM algorithm, estimates are obtained for the structural model relationships (i.e., the path coefficients), which represent the hypothesized relationships among the constructs.

3. Results and discussion

The evaluation of the structural model results was based on several key indicators commonly used in Partial Least Squares Structural Equation Modeling (PLS-SEM), in line with established methodological guidelines.

First, path coefficients were analyzed to assess the strength and direction of the relationships between latent constructs, with values close to +1 indicating strong positive associations (see Figure no.2). The statistical significance of these relationships was determined using bootstrapped p-values, where values below 0.05 indicate significance at the 95% confidence level (Table no. 3). When assuming a significance level of 5% (like in this case), the p value must be smaller than 0.05 to conclude that the relationship under consideration is significant. To evaluate the model's explanatory power, the coefficient of determination (R^2) was used, with values of 0.75 or higher considered substantial, 0.50 moderate, and 0.25 weak (Table no. 4). The highest R^2 value was recorded for *Marketing Performance* (0.99), indicating excellent predictive strength.

Additionally, the f^2 effect size was calculated to determine the individual contribution of each exogenous construct to the explained variance of the dependent constructs. Effect sizes above 0.35 are considered large, with *Use* → *Marketing Performance* reaching an exceptionally high value of 36.042 (Table no. 5). Furthermore, predictive relevance (Q^2) was assessed using the blindfolding procedure and the Cross-Validated Predictive Ability Test (CVPAT), confirming that all endogenous constructs exhibited good predictive capacity. Together, these indicators provided a comprehensive validation of the model's robustness, predictive strength, and practical relevance.

Table no. 3. Bootstrap routine – path coefficients and P values

	Original sample (O)	P values
System quality -> Marketing performance	-0.031	0.745
Information quality -> Marketing performance	-0.042	0.744
Service quality -> Use	0.063	0.598
Information quality -> Use	0.41	0.007
Service quality -> Marketing performance	0.293	0.004
System quality -> Use	0.401	0.003
Use -> Accounting performance	0.383	0.002
Use -> Competitive advantage	0.7	0

	Original sample (O)	P values
Use -> Marketing performance	0.753	0
Use -> Net benefits	0.771	0

Additionally, the f^2 effect size was calculated to determine the individual contribution of each exogenous construct to the explained variance of the dependent constructs. Effect sizes above 0.35 are considered large, with *Use → Marketing Performance* reaching an exceptionally high value of 36.042 (Table no. 5). Furthermore, predictive relevance (Q^2) was assessed using the blindfolding procedure and the Cross-Validated Predictive Ability Test (CVPAT), confirming that all endogenous constructs exhibited good predictive capacity. Together, these indicators provided a comprehensive validation of the model's robustness, predictive strength, and practical relevance.

Table no. 4. R-square and R-square adjusted

	R-square	R-square adjusted
Accounting performance	0.185	0.167
Competitive advantage	0.652	0.644
Marketing performance	0.99	0.99
Net benefits	0.748	0.742
Use	0.702	0.681

Table no. 5. f-square

	f-square
Information quality -> Marketing performance	2.632
Information quality -> Use	0.319
Service quality -> Marketing performance	8.539
Service quality -> Use	0
System quality -> Marketing performance	2.498
System quality -> Use	0.357
Use -> Accounting performance	0.227
Use -> Competitive advantage	1.874
Use -> Marketing performance	36.042
Use -> Net benefits	2.968

The analysis of the structural equation model reveals several key insights into the role of e-commerce adoption within Romanian accommodation SMEs. Among all tested relationships, only three paths are statistically significant and positive at the 5% level: Use → Marketing Performance, Use → Net Benefits, and Use → Competitive Advantage. These results highlight that the primary benefits of e-commerce are not directly financial, but rather strategic, with strong effects observed in areas such as customer engagement, brand differentiation, and perceived organizational value.

This is further supported by the R^2 values, which are substantial for Marketing Performance (0.99) and Net Benefits (0.748), and moderate for Use (0.702) and Competitive Advantage (0.652). Conversely, the R^2 for Accounting Performance (0.185) is weak, suggesting a limited or delayed financial impact of e-commerce initiatives.

Additionally, effect size analysis (f^2) indicates that the use of e-commerce has a particularly large impact on marketing-related outcomes, with the most notable value being $f^2 = 36.042$ for the Use → Marketing Performance relationship. Predictive relevance (Q^2) results, along with the CVPAT test, confirm that the model possesses high predictive accuracy, especially for constructs associated with non-financial performance. The structural diagram (Figure no. 3) visually confirms these findings, showing the strongest path coefficients between Use and the key performance constructs. By contrast, relationships from System Quality, Information Quality, and Service Quality to performance outcomes are weaker or statistically insignificant.

Overall, the results suggest that in the context of Romanian hospitality SMEs, the value of e-commerce lies primarily in its strategic and marketing potential rather than in immediate profitability. The limited financial impact may stem from superficial integration, lack of strategic coherence, or insufficient measurement of online revenues.

Structural challenges—such as consumer mistrust, limited digital marketing capacity, and reliance on traditional business models—may further constrain financial returns. Nonetheless, the evidence underscores the importance of viewing e-commerce as a long-term enabler of market visibility, customer satisfaction, and competitive positioning.

Conclusions

The present study confirms that the adoption of e-commerce among Romanian accommodation SMEs exerts a significant positive impact primarily on marketing performance, net benefits, and competitive advantage.

Unlike findings from studies such as those by Intan Salwani et al. (2009) and Chang, Magobe and Kim (2015) which reported a strong relationship between e-commerce adoption and both financial and operational performance, our results suggest a more selective influence, with financial outcomes being less directly affected. A possible reason for this divergence could be the limited integration of e-commerce solutions with internal operational and financial systems among Romanian SMEs, resulting in marketing advantages without immediately translating into measurable financial improvements. This divergence may also stem from the fact that the study is based on subjective managerial assessments rather than on concrete financial and operational metrics, leading to a focus on perceived advantages rather than immediately measurable financial impacts.

The findings also align partially with the conclusions of Sunayana and Parveen (2019) and David and Musabila (2021), who emphasized the importance of e-commerce applications in improving customer satisfaction, market share, and brand loyalty. Similar to these studies, the current research demonstrates that e-commerce usage acts as a strategic enabler rather than a direct financial driver. Furthermore, consistent with the observations of Anshari and Payangan (2020), the results highlight that the value of e-commerce adoption lies in its contribution to broader organizational benefits and competitive positioning, rather than short-term profitability.

In summary, while prior research largely recognized a comprehensive impact of e-commerce on firm performance, this study nuances the existing literature by demonstrating that in emerging markets such as Romania, the immediate effects are more pronounced on marketing and strategic differentiation rather than on financial outcomes. These insights call for a re-examination of how e-commerce success is conceptualized and measured in different economic and sectoral contexts.

This research provides valuable insights into the nuanced effects of e-commerce adoption within the hospitality SME sector in Romania. Unlike prior assumptions that linked e-commerce usage directly to financial performance, our findings suggest that its most significant impact is felt through marketing performance, net benefits, and competitive advantage. These results highlight the need for theoretical models to more clearly distinguish between financial and non-financial performance outcomes when assessing e-commerce effects. The study reinforces the validity of multidimensional approaches, such as the updated IS Success Model, but also points to the importance of incorporating constructs like competitive differentiation and marketing effectiveness in future theoretical frameworks.

For managers and entrepreneurs in the Romanian hospitality sector, the findings underline that investing in e-commerce solutions primarily enhances marketing performance and strengthens competitive positioning, rather than immediately boosting financial indicators. Practical efforts should therefore prioritize optimizing customer engagement, digital visibility, and service personalization through e-commerce platforms. Companies should view e-commerce not merely as a sales tool but as a strategic enabler for building brand equity, improving customer satisfaction, and achieving long-term differentiation in a highly competitive market environment.

It can be mentioned that one of the limits is that the number of responses and the response rate overall is relatively small. Besides that, some of the indicators, after testing them, were not suited for the present model, so they were removed. In some cases, the number of indicators is as low as 3, not really a big issue but more indicators the better for the overall model.

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References

Alshaweesh, R. and Bandi, S., 2021. Impact of E-commerce on Business Performance on Tourism Industry in Jordan. *International Journal of Innovation, Creativity and Change*, 15(10), pp. 843-878.

Anshari, A. and Payangan, O.R., 2020. Factors Determinant of E-Commerce and Impacts on Increasing Company Performance. *Global Scientific Journal*, 8(6), pp.2111-2123.

Barney, J., 1991. Firm resources and sustained competitive advantage. *Journal of management*, 17(1), pp.99-120. https://doi.org/10.1177/014920639101700108.

Chang, B.-Y., Magobe, M.J. and Kim, Y.B., 2015. E-commerce applications in the tourism industry: A Tanzania case study. *South African Journal of Business Management*, 46(4), pp.53–64. https://doi.org/10.4102/sajbm.v46i4.109.

Charles, M. and Ochieng, S.B., 2023. Strategic Outsourcing and Firm Performance: A Review of Literature. *International Journal of Social Science and Humanities Research*, 1(1), pp.20–29. https://doi.org/10.61108/ijsshr.v1i1.5.

David, M. and Musabila, A., 2021. E-commerce usage and performance of small and medium tourism enterprises in Tanzania. *East Africa Journal of Social and Applied Sciences*, 3(2), pp. 88-105.

DeLone, W.H. and McLean, E.R., 2003. The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems*, 19(4), pp.9–30. https://doi.org/10.1080/07421222.2003.11045748.

DeLone, W.H. and McLean, E.R., 2004. Measuring e-Commerce Success: Applying the DeLone & McLean Information Systems Success Model. *International Journal of Electronic Commerce*, 9(1), pp.31–47. https://doi.org/10.1080/10864415.2004.11044317.

Hair, J.F., Hult, G.T.M., Ringle, C.M. and Sarstedt, M., 2017. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* Thousand Oaks: Sage Publications Inc.

Hair, J.F., Risher, J.J., Sarstedt, M. and Ringle, C.M., 2019. When to use and how to report the results of PLS-SEM. *European business review*, 31(1), pp.2-24. https://doi.org/10.1108/EBR-11-2018-0203.

Hua, N., Morosan, C. and DeFranco, A., 2015. The other side of technology adoption: Examining the relationships between e-commerce expenses and hotel performance. *International Journal of Hospitality Management*, 45, pp.109-120. https://doi.org/10.1016/j.ijhm.2014.12.001.

Intan Salwani, M., Marthandan, G., Daud Norzaidi, M. and Choy Chong, S., 2009. E-commerce usage and business performance in the Malaysian tourism sector: empirical analysis. *Information management & computer security*, 17(2), pp.166-185. https://doi.org/10.1108/09685220910964027.

Kong, X.T., Zhong, R.Y., Zhao, Z., Shao, S., Li, M., Lin, P., Chen, Y., Wu, W., Shen, L., Yu, Y. and Huang, G.Q., 2020. Cyber physical ecommerce logistics system: An implementation case in Hong Kong. *Computers & Industrial Engineering*, 139, p.106170. https://doi.org/10.1016/j.cie.2019.106170.

Lebas, M. and Euske, K., 2002. A conceptual and operational delineation of performance. In: A. Neely, ed. Business performance measurement: theory and practice. Cambridge: Cambridge University Press, pp. 65–79.

Ministry of Economy, Entrepreneurship and Tourism of Romania, 2024. *Authorized structures in accommodation,* [online] Available at: <https://se.situr.gov.ro/OpenData/OpenDataList?type=listaCazari> [Accessed 14 october 2024].

Mishra, O.N. and Gupta, S., 2020. Antecedents and impact of e-commerce adoption among new venture firms: Evidence from tourism and hospitality industry. *Vision*, 24(4), pp.431-440. https://doi.org/10.1177/097226292092794.

Mutia Sobihah, A.H., Ahmad Munir, M.S. and Mohamad Saladin, M., 2014. The relationship between e-commerce adoption and organization performance. *International Journal of Business and Management*, 9(1), pp.56-63. https://doi.org/10.5539/ijbm.v9n1p56.

Neely, A. ed., 2002. *Business performance measurement: Theory and practice*. Cambridge: Cambridge university press.

Rana, J., Gutierrez, P.L. and Oldroyd, J.C., 2023. Quantitative methods. *In Global Encyclopedia of Public Administration, Public Policy, and Governance* (pp. 11202-11207). Cham: Springer International Publishing.

Rosário, A. and Raimundo, R., 2021. Consumer marketing strategy and E-commerce in the last decade: a literature review. *Journal of theoretical and applied electronic commerce research*, *16*(7), pp.3003-3024.

Sunayana, K. and Parveen, R., 2019, June. The impact of e-commerce on organizational performance of the Indian travel agencies. *In Tourism International Scientific Conference Vrnjačka Banja-TISC* (Vol. 4, No. 1, pp. 482-499).

A Bibliometric Analysis: A Comparative Perspective on the Digitalization of Decision-Making Processes

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Abstract

The bibliometric analysis comparative perspective on the chosen research topic appears and is imposed in a context of necessity due to the popularization of the digital phenomenon. A trend that also affects and changes classical management, making research in the field an important need for both practitioners and researchers, allowing new theories to be identified or even classical ones to be modified. In this sense, the main objective of this paper is precisely to confirm the hypothesis that in the context of decision-making in organizations, digitalization should not be seen as a singular reality, but should be extended to its elements. The paper also focuses on creating a topical framework, establishing the trend of the chosen research topic and presenting possible future directions. Thus, the research will focus on the use of a bibliometric analysis carried out using the VOSviewer software, as well as on the interpretation of the data of the two analyzed networks. The data selection was carried out in two series for the period 2015–2025, both consist only of articles written in English and are extracted from the Web of Science Core Collection. The first dataset contains 823 articles, while the second one includes 2,936 articles. The research results bring a novel element to the field precisely through the comparative perspective of the analysis. They will contribute to a better understanding of the most relevant aspects of the digitalization of the decision-making process and will highlight the scope of the subject.

Keywords

Digitalization, decision making, bibliometric analysis, organizations.

DOI: 10.24818/BASIQ/2025/11/040

Introduction

The digitalization of the decision-making process is becoming an integral part of management and the use of digital technologies is on a normalization trend among managers and organizations; implications that have also led to the growth of studies in the field, thus reflecting the importance and notoriety of the subject for researchers. In this regard, this paper aims to analyze the current situation of the size of the specialized literature in the area of the subject of digitalization of the said process. It is notable that in this matter some studies consider presenting the evolution of research in the field to be something difficult to achieve (Calderon-Monge and Ribeiro-Soriano, 2023), while others believe that there are gaps in theoretical research in areas related to the use of digital features in the decision-making process (Di Vaio, Hassan and Alavoine, 2022). The literature also highlights the fragmentation of these studies, which can create uncertainty in the theoretical area (Bevilacqua et al., 2025). Therefore, the study aims to determine the current state of knowledge in the field and to conduct a bibliometric analysis of the specialized literature, aimed at creating a current context, determining its trend and laying the foundation for possible future research. In this sense, the paper is focused on an exploratory approach, with a structure intended to provide a coherent and practical context. Its configuration includes a presentation of the specialized literature, which

also has the role of deepening the visions of the chosen field of study and which aims to present the conceptual framework; this part being followed by the research methodology, namely the presentation and explanation of the chosen research method and its implications for the study; followed by the results and discussion's part where the results of the research will be presented. The final research results should demonstrate that digitalization is not present in the decision-making process as a singular element, but rather it is encountered through its specific components, such as artificial intelligence, which tends to gain more relevance than the phenomenon of digitalization itself. Additionally, regarding the relevance of the study, it can be said that the comparative approach through bibliometric analysis is not commonly encountered in practice. That is precisely why this study is highly important for complementing the specialized literature with a different perspective, one that aims to highlight current trends in the chosen field of study.

1. Review of the scientific literature

The literature marks the rise of the trend of digitalization of the decision-making process through the prism of bibliometric studies; some authors are of the opinion that the use of such analyses in research can have a guiding role (Ossiannilsson et al., 2024). Moreover, studies in the field of digitalization of the said process and those in related fields, such as the use of AI, also serve as trend setters for those fields, allowing authors to determine certain future directions (Ruiz-Real et al., 2020). Certain authors have managed to identify key areas where AI in relation to sustainable development, has managed to make a significant contribution to the management of organizations (Sulich, Sołoducho-Pelc and Grzesiak, 2023). The usefulness of a bibliometric approach in the matter is largely due to the role it plays in identifying existing patterns in the research area (Trif and Dumitrașcu, 2024), which helps determine the specific features of the digitalization of the said process that have not yet been explored or those that do not have such a high influence on decision-making and which will either cease to exist in the future or undergo radical changes. An impact assessment for the chosen study area is given by the works that highlight the significant difference between the pre and post Covid-19 periods, highlighting the evolution and rapid adaptation of the decision-making process, respectively leadership, to digital technologies (Espina-Romero et al., 2023), while other authors have also managed to highlight the changes in perspectives between these two periods, comparatively analysing the different approaches to data driven decision making (Lagzi et al., 2025). Additionally, through the quantitative analysis of scientific literature, it can be also noted that the process by which AI starts from the elaboration of data and is materialized by its exploitation in various areas also contributes to the said process (López-Robles, et al., 2019), thus emphasizing the ways of using digitalization in decisions. In addition to these, academic efforts in the field of bibliometric approaches have also managed to identify the fundamental role that big data processing has in reconfiguring studies in the area of information management (Ragazou et al., 2023), which at the same time implies a change in perspectives in the decision-making area. In a study analysing the implications of remote work and management, two different approaches were applied, namely a quantitative analysis through VOSviewer and a qualitative one through respondents, a comparison that allowed the identification of major differences between the approaches taken by researchers and respondents, namely the fact that the former focus on digital transformation, supply chain and others, while the respondents focus on aspects related to decision-making, organizational culture and others (Mirakyan and Berezka, 2022). With the help of quantitative studies, it was also possible to determine the relationship between digitalization, decision-making and performance measurement systems and the impact of digitalization on the decision-making process and the role it plays in PMS were highlighted in this context (Sahlin and Angelis, 2019). It can be emphasized that the digital environment brings a series of advantages to the said process, which in turn serves management in a positive way.

2. Research methodology

In order to achieve the proposed objectives, the paper aims to research from a comparative perspective the phenomenon of digitalization in the context of the decision-making process in organizations and the elements of digitalization in the same context. Thus, the present study focuses on the quantitative analysis of certain works indexed in the Web Of Science Core Collection, on which a bibliometric analysis will be performed. The popularity of this research methodology is often emphasized in the specialized literature (Donthu, et al., 2021) and it involves the application of quantitative techniques to bibliometric data (Broadus, 1987). In terms of research methodology, the study focused on using two different data sets, but on which the same filters were applied, namely: the type of work (respectively article), the time period in which the articles were published (2015-2025) and the language of writing (English). For the first dataset, terms were primarily selected to reflect the phenomenon of digitalization in its general context, namely:

digitalization, digitization, digital transformation, digital technologies; alongside these, additional terms were used to reflect the context in which digitalization is situated, namely: decision-making, decision process, organizational decision-making, organization, enterprise, business and corporation. For the second dataset, terms were used to capture the elements of digitalization applied in the decision-making process, namely: artificial intelligence, machine learning, data-driven, big data and predictive analytics, and for the context in which they are found, the same terms were used as in the first set. The selection of the keywords used to generate data for the two series was not random, this being marked by the notoriety that the elements of digitization have in practice, such as the aforementioned AI. The interpretation of the data sets extracted was carried out through the prism of two different tools, namely VOSviewer for network mapping and Excel for cross-tabulation interpretation, respectively performing comparative analyses in PivotTables. Also, within the practical part an equation was applied to determine percentage differences between the data. The chosen research methodology is intended to portray both in an interactive manner (network map) the links between items and the size of the clusters, but also to present from a statistical point of view the number, relevance and differences between the clusters, items, of the two data sets. This approach is extremely useful for validating the initial hypothesis, namely the fact that in recent practice the digitalization of the decision-making process is not seen so much through its unitary character but rather through its elements. Moreover, the chosen research approach is the most appropriate for the subject of this paper, mainly because bibliometric analysis allows for an objective quantitative examination of the scientific literature and accurately reveals its trends.

3. Results and discussion

When it comes to the digitalization of the decision-making process, several perspectives must be taken into account, namely the fact that in the context of decision-making, both in literature and in practice, the phenomenon of digitalization is not found in a singular format, but it can be encountered through the prism of its elements, respectively the particularities that it encompasses, such as the tools used in practice (AI, big data). The paper aims to present two different perspectives, namely the one focused on the connection of digitalization as a singular element with decision-making and the connection of its tools or particularities with the decision-making process.

In the network of digitalization and decision-making in organizations part, a total of 823 articles that met the network and relevance requirements were extracted; and based on the data obtained a network map was created using the VOSviwer software (Figure no. 1). Its main purpose was to portray the strong links between the elements related to the digitalization of the decision-making process and to highlight the most relevant terms used in the literature.

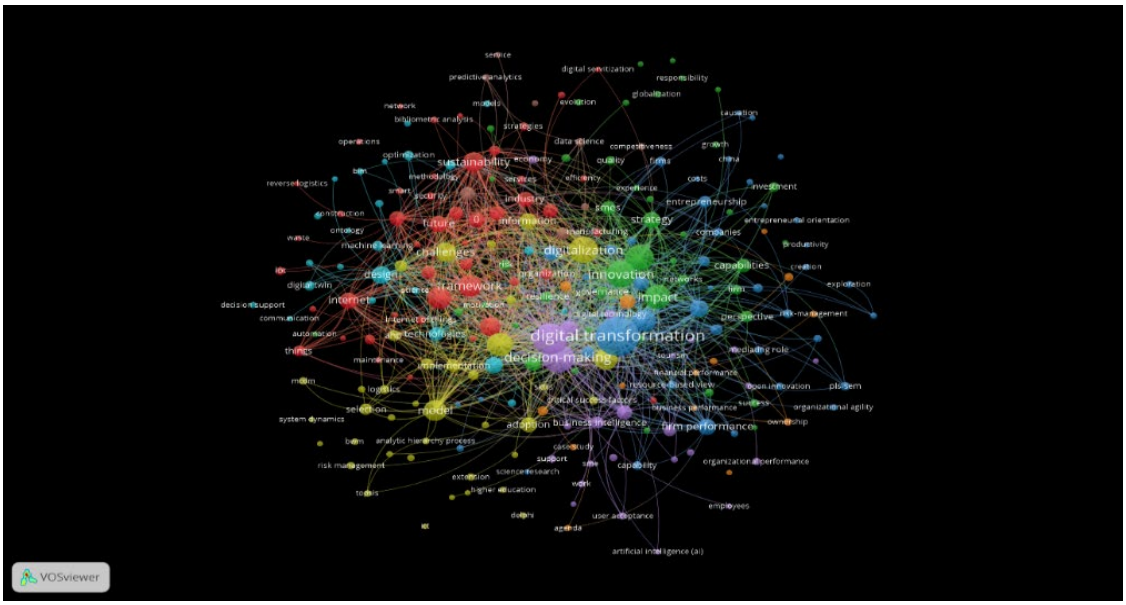

Figure no. 1. VOSviewer network map for digitalization and decision-making

According to the visual network generated by the software, it can be seen that the most "powerful" terms encountered in this context are those of "digital-transformation", "digitization" and "innovation", which

states that within the decision-making process, digitalization is often not directly associated with it but is connected to decision-making through the innovation it brings and the technologies it offers. The figure also shows the strong connection between decision-making and the digital context. Leaving aside the less relevant elements visible in the map, it can be said that the frequency of using the digital environment in the decision-making process is high, thus taking into account the total number of 823 articles compared to the analyzed time period, namely the one between 2025-2015. Further, in a more detailed analysis of the collected data, respectively in terms of items and clusters, the existence of clusters that are very similar in number of items is indicated (Table no. 1).

Table no. 1. Clusters and items list

Clusters	Items
1	46
2	43
3	42
4	38
5	25
6	24
7	14
8	8
General total	**240**

The data processed in VOSviewer were exported and interpreted in Excel, where the clusters and items of the database were grouped by means of a PivotTable; summing up a total number of 8 clusters and a total number of 240 items, thus presenting their groupings and the relevance of each cluster in particular. An analysis of the occurrence that items in each cluster have was also performed in order to determine the size of the frequency with which they are encountered (Table no. 2).

Table no. 2. Occurence of items from each clusters

Clusters	Items	Sum of weigh <Occurrences>
1	46	848
2	43	744
3	42	783
4	38	770
5	25	526
6	24	293
7	14	136
8	8	100
General total	**240**	**4200**

From these interpretations it can be seen that although cluster no. 2 has more items than the third, this aspect does not necessarily reflect a higher occurrence for the items, but in regards to the first 4 clusters it can be stated that their items have a high occurrence value in the database used for the research, which indicates their high use in practice, therefore a relevance for the research area. Next, in order to consolidate the study, a filtering of the first 5 most frequently encountered items and their frequency of occurrence was carried out (Table no. 3).

Table no. 3. Occurrence of first 5 items

Items	Sum of weigh <Occurrences>
decision-making	127
digital transformation	231
digitalization	109
innovation	108
management	146
General Total	**721**

Therefore, regarding the 5 most prevalent items, it can be determined that they are found very frequently in the same context, which indicates a high degree of use of digitalization in the context of: digital changes and innovation in decision-making management. However, it should be noted that in other studies, clusters

such as decision support systems or information management also stood out due to their scale (Trif and Dumitrașcu, 2024).

In the network of elements of digitalization and decision-making in organizations part and in a comparative manner, another database was also analyzed, this one is not focusing on digitalization as a whole, but on its particularities in terms of the elements it has and which are often encountered in practice in organizations. For this part, a total of 2,936 articles corresponding to the network and relevance requirements were extracted, therefore a visibly higher number than in the case of the first part, thus being a significant difference calculated in the following formula:

$$Percentage\ difference = ((2936 - 823) / 823) \times 100 \approx 256{,}7\% \quad (1)$$

Aspects that affirm the hypothesis that digitalization in the context of the decision-making process should not be analyzed only through a perspective restricted to the term itself but extended to its elements most frequently encountered in practice and which researchers, according to the formula above, seem to use much more often. For example, in other studies, artificial intelligence is broken down and analyzed through its application in multiple fields, such as management intelligence (López-Robles, et al., 2019) .Therefore, based on the collected data, a new network map was created, one that marks the density and connections of the data set (Figure no. 2).

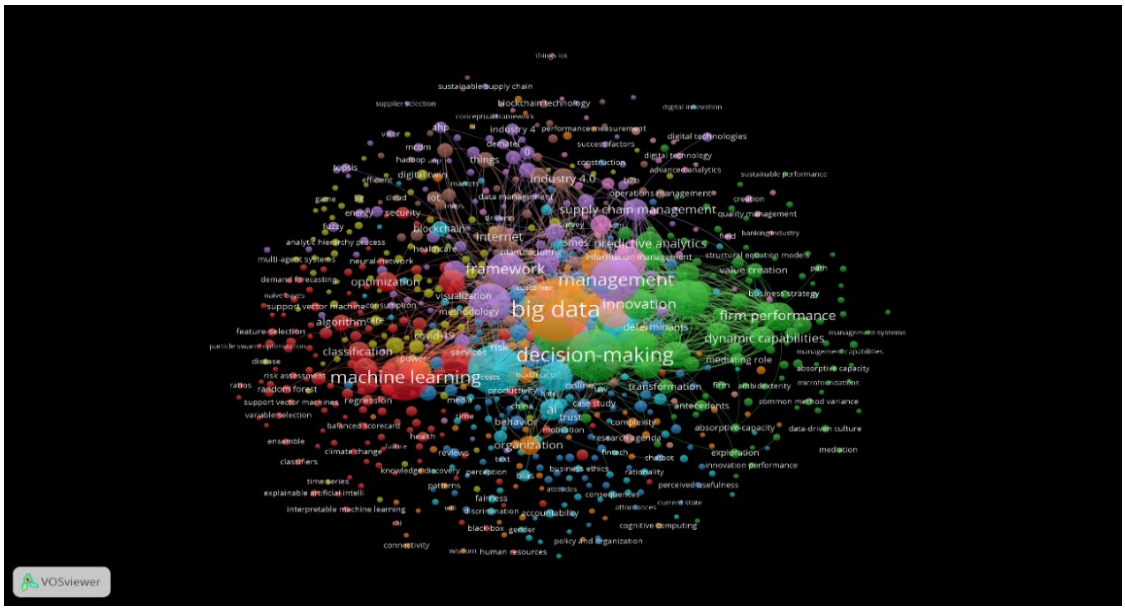

Figure no. 2. VOSviewer network map for digital elements and decision-making

A first considerable difference for the second map is given by the size of the term decision-making; which is much more visible in this context and which confirms the general hypothesis of the study, namely the fact that decision-making is encountered more often in the context of elements related to digitalization; and as for these elements, the most visible in the network can be highlighted as "big data" and "machine learning". However, in a similar study, researchers identified a cluster focused on the existence of opposing visions regarding decision-making in the context of sustainable development, thus identifying the use of AI under the VUCA (volatility, uncertainty, complexity and ambiguity) phenomenon as an important element of the digitalized decision-making process (Nikseresht et al., 2022). Also, in an analysis of the most frequently encountered keywords related to the digitalization of management and business, Covid-19 was identified at the top of the list and some researchers believed that this hierarchy can be explained by the perspective of the influence that the pandemic had on the use of digital technologies and which ultimately created the advantages of data-driven decisions (Talafidaryani, Jalali and Moro, 2023). Nevertheless, it can be observed that in the present analysis, this term no longer holds such significant relevance.

Comparatively, the much more obvious presence of the items: management and innovation, should also be noted, which implies that they are much stronger in this context. In terms of the total number of items and clusters, the accumulated data once again indicates a remarkable difference between the two maps (Table no. 4).

Table no. 4. Clusters and items list

Clusters	Items
1	145
2	114
3	112
4	91
5	81
6	81
7	66
8	56
9	35
10	13
Total general	**794**

From the data presented in the table it can be seen that although the total number of clusters is not significantly higher, in terms of items the situation is notable, as there are high differences of items per cluster. As a comparative example, Cluster no. 1 from both series can be highlighted, the difference in volume between them being the following:

$$Percentage\ difference = ((145 - 46) / 46) \times 100 \approx 215{,}22\% \quad (2)$$

In terms of occurrence, the situation of the second data set also indicates a higher number of occurrences, thus also related to the much higher number of items and similar to the previously presented situation, the cluster with the highest number of items does not equal a higher occurrence (Table no. 5).

Table no. 5. Occurrence of items from each clusters

Clusters	Items	Sum of weigh<Occurrences>
1	145	2627
2	114	3860
3	112	1532
4	91	953
5	81	2371
6	81	1778
7	66	1678
8	56	1183
9	35	763
10	13	258
Total general	**794**	**17003**

Cluster 2 validates the previous assumption that a high number of items≠high number of occurrences, which indicates that it is not the number of items that makes that cluster strong but their frequency in the network. In this sense, for the second data set, the 5 most frequently encountered items are the following (Table no. 6).

Table no. 6. Occurrence of first 5 items

Items	Sum of weigh <Occurrences>
artificial intelligence	449
big data	710
decision-making	508
machine learning	376
Management	384
Total general	**2427**

Within this analysis, one can observe the strong presence of the ”big data” item in the context, but also the appearance of some items also present in the previously analyzed data set, which led to the performance of a comparative analysis of these appearances (Table no. 7).

Table no. 7. Comparison of the first 5 items from each data set

Item	Occurrence 1st data set	Occurrence 2nd data set	% Difference
decision-making	127	508	300%
digital transformation	231	0	-100%
digitalization	109	0	-100%
innovation	108	0	-100%
management	146	384	163%
artificial intelligence	0	449	-
big data	0	710	-
machine learning	0	376	-

From the comparative analysis of the 5 most frequently encountered items of the two network data sets, the percentage difference of the 2 items found in both situations is highlighted. Therefore, from the perspective of the individual analysis of each data set, the following aspects can be determined:

- For the first data set, a lower relevance is identified, indicating the existence of a lower interest in analyzing the decision-making process in organizations in the simple context of digitalization, digital technologies or digitization.
- For the second data set, a higher relevance is identified, indicating the existence of a much higher interest in analyzing the decision-making process in organizations in the context of elements related to digitalization.

From a comparative perspective of the two data sets, the future direction of the research area can be determined, namely the fact that it does not focus much on digitalization as a phenomenon in itself but on its utility, namely on the elements related to the use of digitalization in practice.

Conclusions

The research results show the increasing trend of digitalization of the decision-making process in organizations; only by reporting to the total number of articles used in the two data sets, namely 3759, it can be determined that in terms of research and specialized literature there is a high interest in the phenomenon of digitalization and its particularities, which automatically indicates a much higher use of them in practice in organizations. In terms of future directions, the findings of the work suggest deepening the implications that digital technologies have in the decision-making process in organizations, which indicates a possible separation of the elements of digitalization depending on their use in practice, some of them retaining their relevance while others will either undergo substantial changes in order to remain in practice, or will disappear and be replaced by other tools or new features. The relevance of the results of this study is due in principle to the novelty and topicality of the research topic, as well as to the chosen research method, namely the comparative bibliometric analysis. By this method a reference framework is created for future research or for practitioners, but also an evaluation and portrayal of the current situation is presented, thus confirming the basic hypothesis of the research, namely the fact that in the current context, the digitalization of the decision-making process in organizations should no longer be analyzed only from an individual perspective, but it must be extended to what happens in practice, namely to its particularities most often encountered in management. In terms of limitations, the study faced the lack of similar research, specifically those focusing on comparative bibliometric analyses. In conclusion, the present work can imply that by using a comparative perspective of bibliometric analysis, trends can be determined, hypotheses regarding the impact of a phenomenon in a given context can be confirmed, but also, as in the present case, the most relevant aspects of a chosen research topic can be identified without being limited to a generic framework. As a potential extension of this study, future studies could explore the emergence or even the disappearance of certain elements within the digitalization of the decision-making process

References

Bevilacqua, S., Masárová, J., Perotti, F.A. and Ferraris, A., 2025. Enhancing top managers' leadership with artificial intelligence: insights from a systematic literature review. *Review of Managerial Science*. https://doi.org/10.1007/s11846-025-00836-7.

Broadus, R. N., 1987. Toward a definition of “bibliometrics”. *Scientometrics*, 12(5–6), pp. 373–379, https://doi.org/10.1007/bf02016680.

Calderon-Monge, E., Ribeiro-Soriano D., 2023. The role of digitalization in business and management: a systematic literature review. *Review of Managerial Science*, 18(2), pp.449-491. https://doi.org/10.1007/s11846-023-00647-8.

Di Vaio, A., Hassan, R. and Alavoine, C., 2022. Data intelligence and analytics: A bibliometric analysis of human–Artificial intelligence in public sector decision-making effectiveness. *Technological Forecasting & Social Change*, 174(2). https://doi.org/10.1016/j.techfore.2021.121201.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N. and Lim, W. M., 2021. How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research 133*, p. 285. https://doi.org/10.1016/j.jbusres.2021.04.070.

Espina-Romero, L., Sánchez, J.G.N., Rojas-Cangahuala, G., Garay, J.P., Parra, D.R. and Corredoira, J.R., 2023. Digital Leadership in an Ever-Changing World: A Bibliometric Analysis of Trends and Challenges. *Sustainability*, 15(17), pp.1-25. https://doi.org/10.3390/su151713129.

Lagzi, M.D., Farkhondeh, F., Amoozad Mahdiraji, H. and Sakka, G., 2025. Exploring data-driven decision-making practices: a comprehensive review with bibliometric insights and future directions. *EuroMed Journal of Business*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/EMJB-11-2024-0307.

López-Robles, J.R., Otegi-Olaso, J.R., Porto Gómez, I. and Cobo, M.J., 2019. 30 years of intelligence models in management and business: A bibliometric review. *International Journal of Information Management*, 48(3), pp.22-38. https://doi.org/10.1016/j.ijinfomgt.2019.01.013.

Mirakyan, A. and Berezka, S., 2022. Management and COVID-19: Digital Shift to Remote Work and Remote Management. *In: Alexandrov, D.A., et al. Digital Transformation and Global Society. DTGS 2021. Communications in Computer and Information Science*, 1503, pp.446-460. https://doi.org/10.1007/978-3-030-93715-7_32.

Nikseresht, A., Hajipour, B., Pishva, N. and Mohammadi, H.A., 2022. Using artificial intelligence to make sustainable development decisions considering VUCA: a systematic literature review and bibliometric analysis. *Environmental Science and Pollution Research*, 29(4), pp.42509–42538. https://doi.org/10.1007/s11356-022-19863-y.

Ossiannilsson, E., Altinay, F., Shadiev, R., Benachour, P., Berigel, M., Dagli, G., Ayaz, A., Yikici, B. and Altinay, Z., 2024. Exploring the Intersection of Artificial Intelligence and Human Resource Management: A Bibliometric Study. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*. 15(4), pp.215-230. 10.70594/brain/15.4/15.

Ragazou, K., Passas, I., Garefalakis, A., Galariotis, E., and Zopounidis, C., 2023. Big Data Analytics Applications in Information Management Driving Operational Efficiencies and Decision-Making: Mapping the Field of Knowledge with Bibliometric Analysis Using R. *Big Data and Cognitive Computing*, 7(1), pp.1-28. https://doi.org/10.3390/bdcc7010013.

Ruiz-Real, J. L., Uribe-Toril, J., Torres, J. A. and De Pablo, J., 2020. Artificial intelligence in business and economics research: trends and future. *Journal of Business Economics and Management*, 22(1), pp.98-117. https://doi.org/10.3846/jbem.2020.13641.

Sahlin, J. and Angelis, J., 2019. Performance management systems: reviewing the rise of dynamics and digitalization. *Cogent Business & Management*, 6(1), pp.1-21. https://doi.org/10.1080/23311975.2019.1642293.

Sulich, A., Sołoducho-Pelc, L. and Grzesiak, S., 2023. Artificial Intelligence and Sustainable Development in Business Management Context – Bibliometric Review. *Procedia Computer Science*, 225, pp.3727-3735. https://doi.org/10.1016/j.procs.2023.10.368.

Talafidaryani, M., Jalali, S. M. J. and Moro, S., 2023. Tracing the evolution of digitalisation research in business and management fields: Bibliometric analysis, topic modelling and deep learning trend forecasting. *Journal of Information Science*, pp.1-29. https://doi.org/10.1177/01655515221148365.

Trif, R. and Dumitrașcu, O., 2024. Leveraging artificial intelligence for enhanced decision-making in management: Bibliometrics and meta-analysis. *Annals of the „Constantin Brâncuși" University of Târgu Jiu, Economy Series*, [online] Available at: <https://www.utgjiu.ro/revista/ec/pdf/2024-02/19_Trif.pdf> [Accessed 01 May 2025].

Approaches to Using Artificial Intelligence and Big Data to Improve the Efficiency of Public Health Institutions

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Abstract

This paper is dedicated to exploring the use of artificial intelligence and big data to enhance the efficiencies of public health. In this era of growing healthcare demands with limited resources, governments and public health institutions are looking increasingly towards digital innovation. AI technologies such as predictive analytics, machine learning and natural language processing apply across various aspects of public health when combined with large health data sources.

Given the significance of such techniques, the article outlines several key approaches: predictive models used to predict disease outbreaks and patient suffering (early warning systems); AI-powered systems for allocation of hospital resources; and natural language processing tools which can pull out meaning from unstructured clinical data. Also discussed are the roles of AI involving virtual assistants or chatbots; and Big Data policies for public health in general.

Case studies from countries like South Korea, the United Kingdom and Romania illustrate the real-life impact of AI and big data in handling crises such as the COVID-19 outbreak or everyday care improvement needs. However, the paper also highlights the pressing problems that must be faced: data security, algorithm bias, infrastructure constraints and the need for a clear regulatory framework. The paper concludes by recommending the strategic and ethical integration of AI and big data technologies in public health, emphasizing the necessity to invest in digital infrastructure, personnel training and considerate management. Such integration has the potential to dramatically modernise public health's functions and make healthcare delivery more genuinely effective and fair.

Keywords

Artificial Intelligence, Big Data, Public Health, Healthcare Efficiency, Digital Innovation

DOI: 10.24818/BASIQ/2025/11/043

Introduction

In recent years, public health has been reshaped by the growing influence of Big Data and Artificial Intelligence (AI). As healthcare systems face increasing pressure from aging populations, rising costs, and limited resources, these technologies have emerged as powerful tools to help improve decision-making, efficiency, and outcomes (Reddy, Fox and Purohit, 2019; Topol, 2019). What was once theoretical is now a practical reality: AI-powered systems are being used to predict disease outbreaks, optimize hospital workflows, and personalize patient care based on large, diverse data sets.

AI refers to computer systems capable of performing tasks typically associated with human intelligence, such as pattern recognition, learning from experience, and making inferences. When integrated with Big

Data—information collected from sources like electronic health records, social media, wearable devices, and imaging systems—these technologies can generate real-time insights that support better public health planning and faster clinical decisions (Chen, Mao and Liu, 2014). The potential includes everything from early disease detection and resource optimization to more adaptive and responsive policy-making (Shilo, Rossman and Segal, 2020).

The theoretical foundation for this research draws from interdisciplinary fields, including health informatics, systems thinking, and predictive analytics, all of which emphasize the use of technology to enhance human-centered care and improve public service efficiency (Leischow et al., 2008). Despite this progress, practical implementation remains uneven, especially in European and developing health systems where challenges such as data privacy, infrastructure limitations, and workforce readiness persist.

The aim of this paper is to examine both the advancements and ongoing barriers in the use of AI and Big Data within public health. Specifically, it explores how these technologies are being applied in disease prevention, resource distribution, and strategic decision-making. The paper begins with a review of relevant literature, followed by the methodology used, a presentation of key findings, and a discussion of implications for future practice and policy.

1. Review of the scientific literature

In recent scientific literature, artificial intelligence (AI), big data and public health collide headlong. More generally, health care systems worldwide are striving for more predictive, preventive, or personalized care. This technological integration has ceased being an innovation. Public health cannot continue without it.

In the opinion of researchers in the field, not only clinical decision-making might be revolutionized by AI but also the accuracy of diagnoses, operational efficiency and resource allocation. Models trained on rich health data sets can help the AI detect complex patterns in patient records, gene data profiles and environmental information that are invisible to human clinicians. This makes AI a powerful tool for viral outbreak forecast and early disease recognition (Topol, 2019).

Big data, made up of the masses of health information stored in medical records, via social media and gathered from the new mobile health wearable devices (which are just beginning to be studied), is the basic input for AI applications. If effectively mined and utilized, this data allows more immediate personalized public health interventions. Eschewing the siloed approaches that mar health policy in many countries, public authorities can work together using AI Big Data as they try to develop new systems for acute disease warning and long-term non-communicable diseases, which affect a third of our people (Leimanis and Palkova, 2021) .

Machine learning models have recently been used to predict chronic conditions such as diabetes and cardiovascular disease with high accuracy. They do so by analyzing non-traditional data sources: patterns of purchase or geographic movement records. A different branch of AI, natural language processing NLP is starting to appear in the public health literature ever more frequently and its use is growing. This is carried on an international as well as domestic level, however it remains what we want to know how this will develop in China.

The deployment of AI in public health points firstly to a spreading critical discussion concerning the fairness, transparency and accountability of its source. In response to these problems, the European Parliament (Anon., 2024) has produced widespread ethical guidelines for responsible implementation of AI within healthcare systems. These principles emphasize issues such as precision in AI models, non-discrimination, human oversight and data governance, guaranteeing that technological developments will not undermine ethical values or legal norms.

Leimanis and Palkova (2021) fill in the legal implications further when they show that while AI and big data bring hope, their employment must be regulated in order to respect patient autonomy and privacy. The General Data Protection Regulation (GDPR) of the European Union when it comes to dealing with health data, provides a role model for how AI systems should be used, managed and regulated. Such issues as informed consent, data anonymization and algorithmic bias belong in the center of contemporary scholarly or policy discussions.

Topol (2019) maintains that data-driven health policies based on AI analytics will turn public health systems from reactive to proactive models. Through predictive analytics and machine learning, health authorities can identify vulnerable populations, simulate public health interventions' effect, and allocate resources more fairly.

The international organizations are laying the groundwork for this digital turn. Digital Health and AI need to be integrated into their member countries 'national health systems-a need stressed by the World Health Organization (Anon., 2025b) in 2025 Global Strategy on Digital Health The strategy sets out key enablers, including digital infrastructure capacity building among the workforce for digital health, and standards that are ethical all of which seek to ensure that digital health solutions are fair and equitable.

With all three elements together: scholarship, policy and action studies you have a powerful platform from which to understand how AI and big data will change government health management. According to the literature the deployment of these technologies is very promising, but unanimous opinion emphasizes that synergy, sound regulations, strong governance and an abiding respect for human values which shapes this vast potential into reality remain significant challenges. Similar studies will explore not only what new technologies can do for people they will also look at how the society is respectively impacted and particularly in countries low resource settings where digital disparities continue to persist.

2. Research Methodology

Based on integration of academic research, institutional reports and design case-studies, this paper proposes a qualitative research method. For example, data were selected from published academic journals dealing with AI, public health and specific health technology cases, and real-world applications of AI in the healthcare system.

Figure No. 1 presents a structured overview of a predictive model pipeline, highlighting the key stages involved in developing AI-powered tools for public health applications. This pipeline represents a typical workflow through which diverse health-related data is processed and transformed into predictive insights that can inform policy and practice.

The process begins with data collection, drawing from a wide range of sources including electronic health records (EHRs), wearable devices, genomic databases, social media feeds, and environmental monitoring systems. These inputs form the raw foundation upon which AI systems operate.

Following the collection, the data undergoes preprocessing. This step is essential to clean and standardize the data, address inconsistencies, and integrate datasets from multiple origins. Ensuring high-quality, interoperable data at this stage is crucial for building accurate predictive models.

Next is the model training phase, where machine learning algorithms are applied to the curated data. The aim here is to identify patterns and associations that might not be immediately visible to human analysts. Depending on the complexity of the model, this step may involve several rounds of tuning, validation, and performance testing.

Once trained, the model enters the prediction and evaluation phase. At this point, the system is used to forecast public health outcomes, such as disease outbreaks, patient deterioration, or healthcare resource needs. The results are tested for accuracy and relevance in real-world or simulated environments to ensure their reliability.

The final step is deployment and feedback. Here, the model is integrated into healthcare workflows, where it can support real-time decision-making. Importantly, this stage is not the end of the process. Continuous monitoring, user feedback, and performance data are looped back into the system, enabling ongoing refinement and adaptation of the model.

As shown in Figure No. 1, this predictive model pipeline is not a one-time process but a dynamic cycle. It reflects the evolving nature of AI systems in public health—systems that learn, improve, and respond to changing data and needs over time.

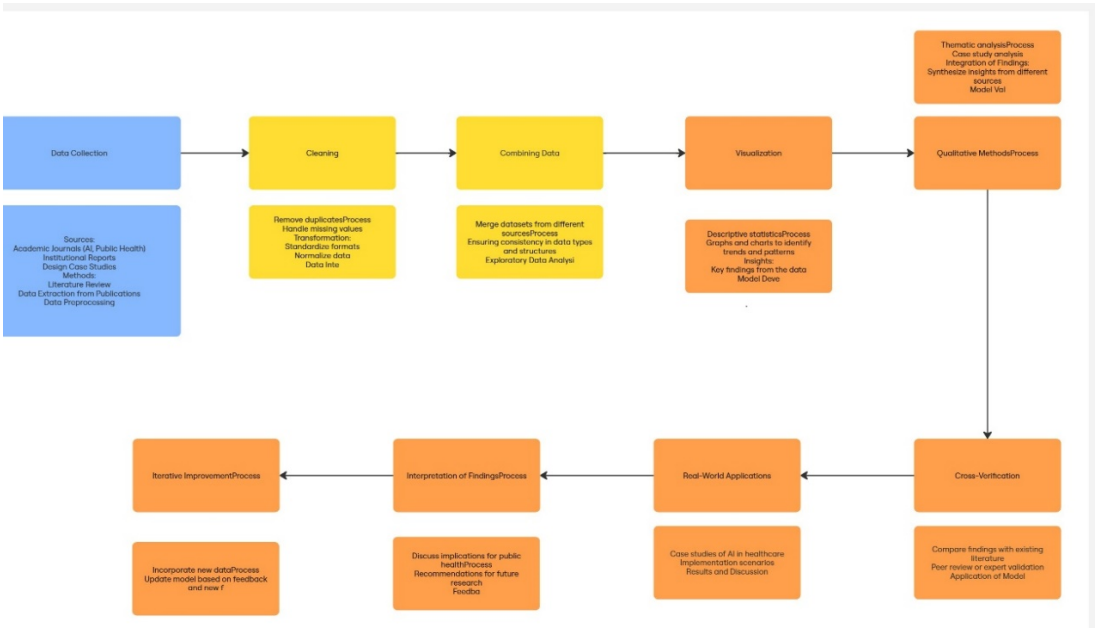

Figure no. 1. A diagram of a predictive model pipeline

3. Results and Discussion

3.1 Predictive Analytics for Disease Prevention

Predictive analysis powered by artificial intelligence (AI) has become an indispensable tool in contemporary public health. As well as getting on the ground early with subsequent interventions can be carried forward through disease risks predicted in advance. Human-like translation Practical Application By analyzing massive data contains like electronic health records (EHRs), genomic information, environmental influences and social background AIs can predict the likelihood of onset or progression of disease. therefore providing valuable information for prevention and control strategies (Petersson et al., 2022).

For example, AI-driven models can predict infectious diseases such as Covid-19. In June 2020, Google AI developed a model that could predict the number of Covid-19 cases to occur in given regions two weeks later. This provided important guidance for public health planning. Likewise, AI systems have been used to analyze travel and mobility data in order to predict potential disease hotspots. These predictions help with the allocation of resources and implementation counter-measures (Gazi and Gazis, 2020), (Zhao et al., 2024).

In addition to infectious diseases, the performance of AI in chronic disease prediction was encouraging. Through the integration of healthcare information systems, genetic data, lifestyle factors, and real-time monitoring AIs can perform comprehensive risk assessments. This type of multidimensional analysis allows early detection complications with chronic diseases (Chinedu James Ezeh et al., 2024).

Furthermore, predictive analytics has turned public health surveillance from a passive practice to one which actively seeks to identify potential risks. Advanced mathematical and computational approaches enable early recognition of impending outbreaks, allowing for timely interventions and allocation of resources.

However, developing AI-based predictive analytics is not without its problems. The protection of data privacy and security, avoidance algorithmic biases, the construction robust regulatory frameworks for these systems are all key considerations. Given that AI systems will need to be integrated into the existing health infrastructures, a substantial investment in both digital infrastructure and re-skilling the workforce is necessary (Chinedu James Ezeh et al., 2024).

In summary, predictive analytics with AI support has great potential for disease prevention in public health. By identifying risks early and putting into effect targeted interventions, these technologies can improve the impact of health care as well as optimize resource utilization. Research and investment will continue to play pivotal roles in overcoming existing challenges and realizing the full benefits of AI-driven predictive analytics as a tool for preventing diseases.

3.2 Resource Allocation and Operative Efficiency

Benefits of AI in Healthcare Optimization of resource allocation and operational efficiency have been completely transformed by AI in the hospitals and healthcare industry. By using predictive analytics and machine learning algorithms, AI can help healthcare providers maximize the use of life-saving resources, including personnel, beds, and medical devices.

In the ED, machine learning models have been created to predict patient volume, and predict peaks due to a surge in demand. These are models that use historical and contemporaneous data to predict ED occupancy, which in turn enables proactive staff scheduling and bed management. For example, a research reported by Vural et al. (2025) developed a machine learning approach that successfully forecasts 24-hour-ahead ED waiting room census to allow timely action to help prevent crowding (Vural et al., 2025).

In addition, AI has uses like stock management in hospitals. By adopting inventory systems that are AI-powered, healthcare establishments can keep their purchase levels more balanced in order to prevent shortages and overstock. A review of (Balkhi, Alshahrani and Khan, 2022) demonstrated the effectiveness of (JIT) inventory systems where AI algorithms can help in timely supply replacements so that waste is reduced and operating costs are reduced.

AI also enables intelligent selection of health care supply chain modes. By using deep reinforcement learning algorithms, AI can relieve staff and reduce time of selecting a suitable supply chain model to promote the efficiency and reactivity of healthcare logistics (Saha and Rathore, 2024). Studies have shown that selection strategies in the AI line are highly consistent with that in target models, reflecting the practical feasibility of utilizing them.

The incorporation of AI into hospital workflow optimizes resource allocation and decision support, ultimately contributing to better outcomes and efficiency. But a sweeping deployment of AI systems also requires addressing issues like data privacy, algorithmic bias and the building of resilient digital infrastructure. Ongoing spends on technology and skilled manpower is necessary in order to harness the full potential of AI toward effective healthcare resource management.

3.3 Natural Language Processing (NLP) in Medical Records

Public health generates an array of unstructured data consisting of clinical notes and reports that are text-based. NLP tools can be used to process this information and extract valuable insights, improving disease surveillance, making case documentation better than previously possible and supporting scientifically high-quality research (Booker et al., 2025).

A notable use of NLP is related to disease surveillance. NLP systems can process clinical notes to detect and track diseases, allowing for timely public health response. For example, the potential of NLP has been shown in identifying the signs/symptoms of infectious diseases, such as COVID-19, from electronic medical records (EMRs), with greater detail and timeliness than structured data by itself (Anon., 2025a).

Within case documentation, NLP enables automation in the identification of clinically relevant information from clinical notes, diminishing the case documentation burden for the user, as well as reducing errors. Tools like Apache cTAKES have been very useful in finding clinical entities like diseases, medications, and procedures in the unstructured text toward standardizing and enhancing patient record (Sheikhalishahi et al., 2019) .

In addition, NLP facilitates scientific research by allowing for mass computation of clinical data. By mining and organizing content from massive volumes of unstructured text, researchers can more expediently conduct epidemiological studies, identify risk factors, and assess treatment outcomes. For instance, NLP has been used to identify pertinent pieces of information from free-text clinical notes on chronic conditions and in the compilation of disease databases.

Despite its many benefits, NLP for healthcare also encounters several challenges, such as data privacy, algorithmic biases, and system integration into current healthcare systems. Concerted efforts in research and development are needed in order to address these challenges and leverage the full impact of NLP on public health.

3.4 AI-Powered Chatbots and Virtual Assistants

The role of AI-driven chatbots and virtual assistant are indispensable in today healthcare - these chatbots play an increasingly important role both in automating administration tasks and on enhancing patient engagement. Digital applications are especially important during public health crisis situations, like pandemics, when more pressure is placed on the healthcare system and there are strained resources.

AI chatbots, for instance, may take responsibility for appointment making, answering standard questions and first symptom assessment. This kind of tool has great positive value during pandemics, when there is constant communication pressure and health workers are overstretched.

Key Functions and Benefits:

- Scheduling Appointments and Administrative Assistance: AI chatbots seamlessly manage routine administrative duties (such as scheduling appointments, medication reminders, patient records) effectively. Through the automation of these tasks, healthcare workers have more time to invest in patient care. For example, the Clearstep's Smart Access Suite includes virtual triage and symptom checker to allow patients to self-triage to the appropriate care.
- Symptom Checker and Triage: AI chatbots have has certain common uses during health emergencies, such as the ongoing COVID-19 pandemic, and they are most commonly utilized during an initial consultation to assess the symptoms and triage the patients. The tools gather patient symptoms and medical history; prioritize cases by severity; and recommend possible diagnoses. These capabilities aid in expediting processes and offload healthcare staff.
- Augmenting Telemedicine Solutions: The AI-powered chatbots support telemedicine consultations allowing for remote consultations and preliminary diagnosis to be made according to reported symptoms. It improves the accessibility to health care, particularly when face-to-face consultations are restricted.
- Public Health Communication: During pandemics, chatbots have been quite useful when health information needs to be shared with urban and remote communities. For instance, in the UK the National Health Service (NHS) launched a symptom checker utilising AI as part of its NHS 111 Online service. The bot advised users on whether or not they needed to visit a doctor, and eased the strain on emergency services during the pandemic.

3.5 Big Data for Policy Making and Epidemiology

The incorporation of big data analytics and AI in public health policy and epidemiology has brought a sea change in monitoring health trends, and forming policies. Through integrating information collection from resources like hospitals, wearable devices and social media, the policy-making departments can obtain real-time population health status (Lee, 2025).

Monitoring and Surveillance in Real-Time

The big data analytics systems to allow real-time monitoring of population health trends. These systems draw on data from clinical encounters, lab reports, prescription records, and even social media and internet searches. This broad-based data collection enables health systems and public health officials to rapidly identify and address emerging health threats such as disease epidemics and environmental health hazards (Anon., 2025).

AI Paneled Dashboards with Scenario Modeling

Dashboards powered by AI make it easier to see and understand complex health data in food systems, as well as inform scenario planning and projections. They help policy makers to visualize possible future health scenarios and build strategic health programs and allocate resources rationally. For instance, in COVID-19, simulation models were used to forecast the spread of disease, as well as evaluate the effects of interventions in making decisions.

Despite the huge advantages of embracing big data and AI in developing public health policy, those efforts face some difficulties. Addressing possible biases of data collection and analysis is crucial, as data privacy and security is the issue. Additionally, good digital systems and trained people are key to the successful utilization of these technologies. Investment in both technology and workforce development must be sustained, so the same can be said for the promise of big data and AI in the context of public health.

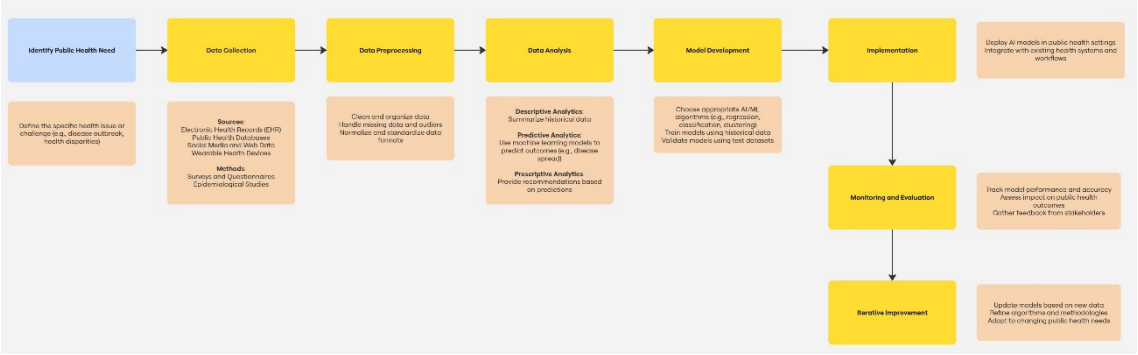

Figure no. 2. AI in Public Health Workflow Flowchart Structure

Figure No. 2 presents a detailed depiction of an AI-driven workflow within public health systems, showcasing how artificial intelligence is seamlessly incorporated into healthcare planning, service delivery, and policy-making processes. The flowchart highlights the interaction between AI technologies, data, infrastructure, and human decision-making across several stages of the public health framework.

The process begins with data acquisition, where inputs originate from a wide range of sources such as electronic health records, wearable healthcare devices, social media data, environmental sensors, and laboratory results. These varied streams provide the raw data necessary for subsequent analysis.

Moving forward, the workflow transitions to data processing and analysis. At this stage, advanced AI techniques like machine learning, natural language processing (NLP), and deep learning are employed to uncover patterns, trends, and population-level risks. This includes predictive analytics to anticipate disease outbreaks, optimize resource utilization, or monitor the prevalence of chronic conditions.

In the third stage, decision support comes into focus. Insights derived from AI analysis are transformed into actionable recommendations to guide healthcare providers in clinical decision-making or assist public health administrators in prioritizing interventions and allocating resources efficiently.

Subsequent to this is operational implementation. Here, AI applications are integrated into practical healthcare environments using tools like triage chatbots, automated scheduling systems, hospital resource management platforms, or early warning systems for disease outbreaks. This step ensures that AI drives tangible improvements in public health outcomes.

The workflow concludes with a feedback loop that emphasizes continuous learning. As performance data and outcomes are consistently collected and analyzed, both AI models and public health strategies are refined and adapted over time. This iterative process ensures the system's responsiveness to evolving needs while maintaining its relevance.

As illustrated in Figure No. 2, the workflow underscores a dynamic and interconnected approach rather than a linear one. It emphasizes how the synergy between technology, data, and human expertise fosters more efficient and adaptive public health systems.

3.6 Real-World Case Studies

To better understand how AI and Big Data are being applied in real-world settings, Table No. 1 provides examples from several countries that have implemented these technologies in their public health systems. These case studies help move the conversation beyond theory by showing what's actually working on the ground. For example, South Korea combined AI with data from credit card transactions, CCTV footage, and location tracking to perform rapid and highly effective COVID-19 contact tracing. In the United Kingdom, the NHS used an AI app developed by DeepMind to catch early signs of acute kidney injury, helping improve patient outcomes. Meanwhile, Romania has taken steps toward digital transformation by digitizing its health records, laying the groundwork for future AI integration. As shown in Table No. 1, each of these efforts demonstrates the real impact AI and Big Data can have when applied thoughtfully and strategically in public health.

Table no. 1 Practical Implementations of AI and Big Data for Public Health Impact

Country	Application	Technology Used	Impact/Outcome
Soth Korea	COVID-19 contact tracing	AI, Big Data, Location Tracking, Credit Card Data, CCTV Analysis	Enabled rapid contact tracing, comprehensive isolation measures, and virus control (Gazi and Gazis, 2020)
United Kingdom	Early detection of acute kidney injury	DeepMind's Streams App (AI)	Improved early diagnosis, reduced complications, and enhanced patient outcomes (Ratcliffe et al., 2025)
Romania	Digitization of health records through SIUI and CNAS systems	Integrated Health Information Systems (pre-AI)	Set foundation for future use of AI and analytics in Romanian public health systems.

3.7 Challenges and Ethical Issues

Data Privacy and Security

Handling sensitive medical data requires strict observance of privacy regulations such as the GDPR. Institutions must place transparency high up on their lists and security controls as tight as practicable, to maintain public confidence (Srivastava et al., 2025).

Bias and Equality

AI systems trained on biased datasets run the risk of keeping, if not worsening, the existing health divides. Vulnerable populations, such as ethnic minorities or the homeless, could be hurt disproportionately. This is why fairness must be actively managed.

Infrastructure and Human Resources

Many public health systems lack both the infrastructure and the trained personnel needed to currently implement AI's solutions. To flame this gap, we need to seek efforts through betal tools and investments in education.

Regulatory and Legal Frameworks

Otherwise, as AI becomes embedded in healthcare, inconsistent and clear regulatory standards need to be develop as to uphold safety, accountability, and ethical pro services (Srivastava et al., 2025), (Petersson et al., 2022).

Conclusions

AI and Big Data have immense potential to transform public health in meaningful ways. When integrated effectively, these technologies can streamline day-to-day operations, enhance our capacity to predict and manage health trends, and guide the creation of more data-driven, informed policies. Their use can lead to quicker decision-making, more efficient resource allocation, and a deeper understanding of what communities need to maintain and improve their health.

However, realizing these benefits will require deliberate effort and investment. Governments and organizations must focus on establishing robust digital infrastructures that ensure the secure and seamless transfer of health data across platforms. Simultaneously, healthcare professionals need adequate training to help them confidently adopt and utilize new digital tools and interpret data effectively.

Equally important is the establishment of ethical frameworks. As the collection and usage of health data grow, it's imperative to manage information responsibly—protecting privacy, fostering trust, and ensuring transparency regarding how data is utilized. Responsible progress also demands piloting AI initiatives in

real-world environments and conducting ongoing research to identify what truly works before scaling solutions more broadly.

With dedicated support, thorough planning, and a commitment to prioritizing both people and technology, AI and Big Data can enable public health systems to adapt more fluidly, respond more effectively, and tackle future challenges with resilience.

References

Anon. 2024. *Artificial Intelligence Act: MEPs adopt landmark law | News | European Parliament*. [online] Available at: <https://www.europarl.europa.eu/news/en/press-room/20240308IPR19015/artificial-intelligence-act-meps-adopt-landmark-law> [Accessed 5 May 2025].

Anon. 2025a. *JMIR Public Health and Surveillance - Natural Language Processing for Improved Characterization of COVID-19 Symptoms: Observational Study of 350,000 Patients in a Large Integrated Health Care System.* [online] Available at: <https://publichealth.jmir.org/2022/12/e41529/?utm_source=chatgpt.com> [Accessed 3 May 2025].

Anon. 2025. List of COVID-19 simulation models. In: *Wikipedia*. [online] Available at: <https://en.wikipedia.org/w/index.php?title=List_of_COVID-19_simulation_models&oldid=1279797679> [Accessed 3 May 2025].

Anon. 2025b. *WHO issues first global report on Artificial Intelligence (AI) in health and six guiding principles for its design and use*. [online] Available at: <https://www.who.int/news/item/28-06-2021-who-issues-first-global-report-on-ai-in-health-and-six-guiding-principles-for-its-design-and-use> [Accessed 1 May 2025].

Balkhi, B., Alshahrani, A. and Khan, A., 2022. Just-in-time approach in healthcare inventory management: Does it really work? *Saudi Pharmaceutical Journal : SPJ*, 30(12), pp.1830–1835. https://doi.org/10.1016/j.jsps.2022.10.013.

Booker, J., Penn, J., Noor, K., Dobson, R.J.B., Fersht, N., Funnell, J.P., Hill, C.S., Khan, D.Z., Newall, N., Searle, T., Sinha, S., Thorne, L., Williams, S.C., Kosmin, M. and Marcus, H.J., 2025. Utilising Natural Language Processing to Identify Brain Tumor Patients for Clinical Trials. *WORLD NEUROSURGERY*, 197, p.123907. https://doi.org/10.1016/j.wneu.2025.123907.

Chen, M., Mao, S. and Liu, Y., 2014. Big Data: A Survey. *Mobile Networks and Applications*, 19(2), pp.171–209. https://doi.org/10.1007/s11036-013-0489-0.

Chinedu James Ezeh, Sandra Chioma Anioke, Sola Oyewole, and Munakur Garnvwa David, 2024. The role of predictive analytics in enhancing public health surveillance: Proactive and data-driven interventions. *World Journal of Advanced Research and Reviews*, 24(3), pp.3059–3077. https://doi.org/10.30574/wjarr.2024.24.3.3909.

Gazi, T. and Gazis, A., 2020. Humanitarian aid in the age of COVID-19: A review of big data crisis analytics and the General Data Protection Regulation. *INTERNATIONAL REVIEW OF THE RED CROSS*, 102(913), pp.75–94. https://doi.org/10.1017/S1816383121000084.

Lee, S., 2025. *10 Innovative Applications of Population Health Analytics in Healthcare*. [online] Available at: <https://www.numberanalytics.com/blog/10-applications-population-health-analytics-healthcare> [Accessed 3 May 2025].

Leimanis, A. and Palkova, K., 2021. Ethical Guidelines for Artificial Intelligence in Healthcare from the Sustainable Development Perspective. *European Journal of Sustainable Development*, 10(1), pp.90–90. https://doi.org/10.14207/ejsd.2021.v10n1p90.

Leischow, S.J., Best, A., Trochim, W.M., Clark, P.I., Gallagher, R.S., Marcus, S.E. and Matthews, E., 2008. Systems Thinking to Improve the Public's Health. *American journal of preventive medicine*, 35(2 0), pp.S196–S203. https://doi.org/10.1016/j.amepre.2008.05.014.

Petersson, L., Larsson, I., Nygren, J.M., Nilsen, P., Neher, M., Reed, J.E., Tyskbo, D. and Svedberg, P., 2022. Challenges to implementing artificial intelligence in healthcare: a qualitative interview study with healthcare leaders in Sweden. *BMC HEALTH SERVICES RESEARCH*, 22(1), p.850. https://doi.org/10.1186/s12913-022-08215-8.

Reddy, S., Fox, J. and Purohit, M.P., 2019. Artificial intelligence-enabled healthcare delivery. *Journal of the Royal Society of Medicine*, 112(1), pp.22–28. https://doi.org/10.1177/0141076818815510.

Saha, E. and Rathore, P., 2024. The impact of healthcare 4.0 technologies on healthcare supply chain performance: Extending the organizational information processing theory. *Technological Forecasting and Social Change*, 201, p.123256. https://doi.org/10.1016/j.techfore.2024.123256.

Sheikhalishahi, S., Miotto, R., Dudley, J.T., Lavelli, A., Rinaldi, F. and Osmani, V., 2019. Natural Language Processing of Clinical Notes on Chronic Diseases: Systematic Review. *JMIR Medical Informatics*, 7(2), p.e12239. https://doi.org/10.2196/12239.

Shilo, S., Rossman, H. and Segal, E., 2020. Axes of a revolution: challenges and promises of big data in healthcare. *Nature Medicine*, 26(1), pp.29–38. https://doi.org/10.1038/s41591-019-0727-5.

Srivastava, R., Bhat, L., Prasad, S., Deshpande, S., Das, B. and Jadhav, K., 2025. MedPromptExtract (Medical Data Extraction Tool): Anonymization and High-Fidelity Automated Data Extraction Using Natural Language Processing and Prompt Engineering. *The Journal of Applied Laboratory Medicine*. [online] https://doi.org/10.1093/jalm/jfaf034.

Topol, E., 2019. *Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again*. Hachette UK.

Vural, O., Ozaydin, B., Aram, K.Y., Booth, J., Lindsey, B.F. and Ahmed, A., 2025. *An Artificial Intelligence-Based Framework for Predicting Emergency Department Overcrowding: Development and Evaluation Study*. https://doi.org/10.48550/arXiv.2504.18578.

Zhao, A.P., Li, S., Cao, Z., Hu, P.J.-H., Wang, J., Xiang, Y., Xie, D. and Lu, X., 2024. AI for science: Predicting infectious diseases. *Journal of Safety Science and Resilience*, 5(2), pp.130–146. https://doi.org/10.1016/j.jnlssr.2024.02.002.

Examining the Influence of Digitalization and Innovation on Improving Energy Structure toward Renewables. Evidence from the European Union

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Abstract

The article investigates the effects of digitalization and innovation on energy consumption and structure in the 27 countries of the European Union during 2000–2023. This article uses the Autoregressive Distributed Lag (ARDL) model to test the influence of the level of digitalization and the potential for innovation on energy consumption (primary, final, and renewable) while controlling for certain factors expected to have a significant impact on energy consumption (economic development and structure, prices, and trade dynamics). The results indicate that in the long run, both the level of digitalization and the innovation potential influence energy consumption. However, these drivers have the most significant and straightforward impact on the energy structure by increasing the share of renewable energy in final consumption. Additionally, ICT exports, economic structural changes, and inflation boost renewable energy shares. The study includes factors specific to the situation of the EU in the empirical analysis, such as investments in research and development and ICT exports and imports, to determine their role in the balance of the energy market. These results imply that EU economies should implement and enhance innovation, research and development, and education policies to facilitate the transition to clean energy. Additionally, EU nations should regard ICT trade as crucial in their green energy policies.

Keywords

Digitalization, innovation, ICT trade, energy consumption and structure, renewable energy, research and development.

DOI:10.24818/BASIQ/2025/11/046

Introduction

The European Union is restructuring its power industry, which is expected to emerge in the next few years and become its primary focal point. The energy and climate policies and the European Union (EU) packages aim to make Europe the first continent to achieve climate neutrality. The EU will accomplish this by ensuring energy security, reducing carbon emissions, promoting energy efficiency, achieving a fully integrated internal market, and promoting research and innovation (European Commission, 2022; European Parliament, 2022). Russian foreign policy actions propelled the entire concept, which originated from the aspiration to convert Europe into a continent with zero emissions by utilizing gas as a temporary resource. During a crucial period, Europe must seek resolutions to ensure reliable supply and promote progress in renewable energy sources.

Undeniably, the field of study is not resistant to opposing findings. This is why, further comprehensive analysis centered on various countries are essential to grasp the extent of market transformation. The

European Union's energy consumption accounts for 75% of its emissions is constituting an important factor in establishing sustainable economic development and growth. Digitalization advancement has a direct impact on energy consumption by facilitating the growth of information and communication technology (ICT) infrastructure, devices, and data traffic (Salahuddin and Alam, 2015). The impact of digitalization and innovation on energy consumption and renewable energy consumption (REN) is significant. This influence is primarily attributed to their effects on energy intensity, energy efficiency, changes in economic structure, and economic growth. These effects are facilitated by technological innovation, green technologies, digital transformation, and the presence of a highly skilled labor force (Wang, et al., 2022; Akram, et al., 2023; Zhou, et al., 2023). The expansion of innovation and digitalization has been found to improve energy efficiency and lower energy intensity, leading to a subsequent decrease in energy consumption (Ishida, 2015; Xu, et al., 2022). It is widely recognized that energy efficiency plays a crucial role as an initial measure in reducing energy consumption (Husaini and Lean, 2022). Furthermore, the use of digitalization and innovation mechanisms fosters the generation of renewable resources and the implementation of carbon capture and storage technologies.

Given the context mentioned above, the objective of our study is to examine the influence of digitalization and innovation on energy consumption and energy structure, specifically the proportion of renewable energy consumption in overall energy consumption in the European Union. The role of energy consumption in economic growth is of utmost importance, as it serves as a crucial input for the production of commodities and services that are strongly associated with industrialization, technological advancement, and overall economic development. Therefore, our paper presents two novel ideas:

1. Its analysis focuses on the European Union as a distinct case study, as it diverges from other countries or groups of countries in two key aspects. Firstly, the European Union adopts a policy that prioritizes the equilibrium of the energy market. Second, it proposes solutions that prioritize investments in research and innovation.
2. Drawing from the latest findings in the field of energy research, this study incorporates elements of its empirical examination that are unique to the European Union (EU). These factors include investments in research and development, as well as in the export and import of information and communication technologies. The objective is to determine to what extent these factors contribute to the equilibrium of the energy market.

The paper is organized into five distinct sections. The first section provides a comprehensive analysis of the selected subject matter. The following section presents a comprehensive examination of the existing body of literature related to empirical investigations on the effects of digitalization and innovation on energy consumption, energy structure, and sustainable economic development. The third section delineates the methods employed for estimation and the sources of data used. The fourth section covers an analysis of empirical findings. The final part of the article presents several policy implications and recommendations.

1. Literature review

Due to the rapid advancement of digitalization, numerous scholarly investigations have focused on examining the correlation between digitalization and energy usage. The existing body of research has identified a variety of significant impacts of digitalization on energy consumption. These include both direct and indirect effects arising from the production, usage, and disposal of information and communication technologies (Xu, Zhong and Li, 2022). Additionally, there are substitution and income effects associated with digitalization (Takase and Murota, 2004; Khayyat, et al., 2016), as well as effects on environmental quality (Hilty, et al., 2006). Furthermore, studies have found that digitalization has growth and sectoral effects (Salahuddin and Alam, 2016; Lange, et al., 2020). The impact of digitalization on energy usage might vary, with both advantageous and disadvantageous outcomes contingent on the manner in which it is managed, applied, and used (Bergman and Foxon, 2023).

Many studies have substantiated the advantageous impacts of digitalization on energy consumption. In their research, Xu, et al. (2022) used SYS-GMM and mediating effect models to look at the global effects of digitalization on energy and how these effects work. The results validate that the digitization has the capacity to decrease energy intensity and consumption while simultaneously enhancing energy structure. Husaini and Lean (2022) used the CS-ARDL technique to investigate the influence of digitalization on energy consumption in five ASEAN countries. The findings of the study suggest that digitization leads to a reduction in energy usage over time, both in general and from specific sources. Furthermore, Ishida (2015) assesses the long-lasting correlation between digitalization, energy consumption, and economic

growth in Japan employing the ARDL-bound testing methodology. The results indicate that the digital transformation of enterprises and public domains leads to a decrease in primary energy consumption, energy intensity, and carbon dioxide emissions.

The primary factor contributing to the rise in energy consumption during digital transformation is the substantial growth in the quantity and utilization of ICT devices, together with the corresponding infrastructure (Bergman and Foxon, 2023). Ren, et al. (2021) conducted a study that examined the relationship between internet advancement and energy consumption in China. The results emphasize that digitalization has a favorable effect on the extent of energy consumption and a negative effect on the structure and power of energy consumption. Salahuddin and Alam (2015; 2016) analyzing the link between digitization and power usage in Australia and the OECD countries. The observations resulted indicate that the long-term impact of digitalization on electricity use has not yet identified the foreseen advantages of its expansion. Bildirici, et al. (2022) explored, in a recent study, the correlation between digitalization, energy intensity, economic growth, carbon dioxide (CO2) emissions, and energy consumption within the G7 nations. The observations indicate a one-way causal relationship from digitalization to energy consumption, furthermore from CO2 emissions to digitalization and energy efficiency.

In the transition to sustainable energy, digitalization and innovation play a crucial role (Xu, Zhong and Li, 2022). The energy structure can be optimized by integrating wind and solar power as renewable energy sources and green technology into the energy system having as result an improved environmental quality and reduced dependence on fossil fuels. In addition, the green transition can be enabled by different factors, including innovations, technical advancements, and structural changes within the economy (Khurshid, et al., 2022). The digitalization process has the prospective to facilitate the dematerialization of economic sectors, promote innovation in the energy sector, and provide intelligent solutions to energy-related challenges (Dehghan Shabani and Shahnazi, 2019). Moreover, digitalization advancement of the countries can be propelled by an increase in renewable energy consumption (Thanh, et al., 2023). In addition, advances in data storage, processing, and dissemination resulting from digitalization have a beneficial impact on the advancement of renewable energy technology through research and development efforts. Most studies have indicated that digitalization and innovation have positive impacts on the consumption of renewable energy. Akram, et al. (2023) investigated the impact of digitalization on the use of renewable energy and the promotion of green growth in five polluting economies. The findings suggest that the Internet has a positive impact on the use of renewable energy and the promotion of green growth, both in the short and long term.

As an element of eco innovation, energy innovation, has an impact on renewable energy adoption by the development of renewable energy technologies and inventions (Wiebe, 2016). Technological boosts have the potential to enhance energy use efficiency and eliminate the toxic emissions (Wang and Wang, 2020). In their research, Solarin, et al. (2022) observed and analyzed the effects of technical innovation on green growth. Their results suggested a substantial positive relationship between renewable energy innovation and renewable energy production. Irandoust (2018) conducted a study based on the four Nordic countries to investigate the direct causal relationship between technical innovation and renewable energy. The results of his study emphasize that innovation influences the use of renewable energy and, ultimately, stimulates innovation. Moreover, other researches have pointed out that RD significantly improves environmental quality in the long term, exceeding its short-term effects (Dogan and Pata, 2022). This is the result of its decisive role in the development of the renewable energy technologies and building infrastructure (Khoshnevis Yazdi and Shakouri, 2017).

2. Research Methodology

This study employed the Auto-Regressive Distributed Lag (ARDL) model to investigate the factors influencing energy consumption. The ARDL model integrates the features of two dynamic models: AR (auto regressive) and DL (distributed lag), allowing to find among the explanatory variables (X_t) the lagged dependent variable (Y_{t-p}) and the past values of the independent variable (X_{t-p}). The general structure of an ARDL model is outlined as follows.

$$Y_t = \varphi + \sum_{i=1}^{p} a_i Y_{t-i} + \sum_{j=0}^{q} b_j X_{t-j} + e_t \qquad (1)$$

where $e_t \sim iid\ (0, \sigma)$.

The ARDL model makes it possible to estimate the short-run dynamics and the long-run effects for cointegrated series or even integrated at different orders (Pesaran, et al., 1997; Pesaran and Shin, 1999). Cointegration between series assumes the existence of one or more long-run equilibrium relations between them, which relations can be combined with the short-run dynamics of these series in an error-correction model. Therefore, the following specification presents the ARDL model, in the form of an ECM or a VEC, which presumes the presence of a cointegration relationship between series:

$$\Delta Y_t = \sum_{i=1}^{p-1} \alpha_i \Delta Y_{t-i} + \sum_{j=0}^{q-1} \beta_j \Delta X_{t-j} + \varphi[Y_{t-1} - (\pi_0 + \pi_1 X_{t-1})] + e_t \quad (2)$$

where α and β indicate the short-run coefficients linked to the lagged dependent variable and the explanatory variables, while π signifies the long-run coefficients, and φ represents the pace of adjustment towards the long-run equilibrium (Samargandi, Fidrmuc and Ghosh, 2014).

In this study, the dependent variable is primary and final energy consumption (PEN and FEN), measured in tons of oil equivalent (TOE) per capita, representing the scale of energy consumption, and the share of renewable energy consumption to total final energy consumption (REN), representing the structure of energy consumption. Explanatory variables include digitalization, innovation, economic development, and ICT trade. Digitalization is estimated through internet users (% of population) (INT) and mobile cellular subscriptions (per 100 people) (MOB). Innovation potential is assessed through RD expenditures (% GDP) and the share of the population aged 25-34 who have completed tertiary studies (TED). ICT goods trade (exports/imports as % of total goods exports/imports), respectively, ICTEX and ICTIM, is evidence of innovation potential and digitalization. GDP per capita (constant 2015 US$) and inflation (annual consumer price index%) (INF) are used to evaluate economic development. The ratio of services to industry value added (GVAS), the proxy of economic structure, also known as the upgrading of the industrial structure, reflects the switch from traditional industries with low efficiency and value added to knowledge-intensive or technology-intensive industries with high efficiency and value added. Data sources are World Development Indicators (World Bank, 2025) and Eurostat (European Commission, 2025).

3. Results and Discussion

Table no. 1 reports the results of the ARDL model for primary energy consumption (PEN), final energy consumption (FEN), and renewable energy consumption (REN). It is worth mentioning that the error correction coefficients are negative and highly significant (-0.088 for both PEN and FEN and -0.125 for REN). The highest speed of adjustment towards the long-run equilibrium is exhibited by REN, with 12.5% of the equilibrium error corrected in each period.

In the long run, both the level of digitalization and the innovation potential will have a significant impact on energy consumption. The most important factors proved to be INT and RD, with significant coefficients at a confidence level of 99%. INT has a significant negative effect both on primary energy consumption and final energy consumption, similar to the results of Salahuddin and Alam (2016), Ren, et al. (2021), Bildirici, et al. (2022), but in contrast to Dehghan Shabani and Shahnazi (2019), Husaini and Lean (2022), yet a significant positive effect on energy structure toward increasing the share of renewable energy consumption in final energy consumption, in line with Xu, et al. (2022), Akram, et al. (2023) and Zhou, et al. (2023). RD exhibits a significant positive effect on all three dependent variables (primary, final, and renewable consumption). It should be noted that REN is the most responsive to an increase in gross domestic expenditure on RD (with an influence coefficient of 0.305), consistent with Kocsis and Kiss (2014), Bano, et al. (2022), and Wu and Song (2023). These findings suggest that digitalization and innovation stimulate the deployment of renewable energy, consistent with Geng and Ji (2016) and Irandoust (2018). Therefore, technological factors have an important contribution to the energy transition in addition to economic and environmental factors (Tzeremes, Dogan and Alavijeh, 2023), with product and process innovation being important determinants in the adoption of energy efficiency technologies (Gerstlberger, et al., 2016).

Table no. 1. ARDL Estimation

Dependent Variable	D(lnPEN)	D(lnFEN)	D(lnREN)
Long-run estimation			
lnINT	-0.545*** (-6.694)	-0.542*** (-7.818)	0.506*** (5.118)
lnMOB	-0.152 (-1.623)	0.179** (2.590)	0.426*** (3.945)
lnRD	0.209*** (4.856)	0.124*** (3.720)	0.305*** (3.401)
lnTED	0.131** (2.050)	0.186*** (3.253)	0.190** (2.224)
lnGDP	0.643*** (16.281)	0.495*** (19.825)	-0.673*** (-7.554)
lnINF	-0.668*** (-6.534)	-0.760*** (-10.250)	1.387*** (7.884)
lnGVAS	0.002 (0.039)	0.210*** (5.140)	0.343*** (2.924)
lnICTEX	-0.027 (-0.525)	0.014 (0.387)	0.621*** (6.904)
lnICTIM	0.188** (1.977)	0.037 (0.547)	-1.242*** (-9.986)
Short-run estimation			
Cointeq	-0.088*** (-3.160	-0.088** (-2.192)	-0.125*** (-5.088)
D(lnINT)	-0.021 (-0.516)	0.030 (1.023)	-0.064 (-0.533)
D(lnMOB)	-0.075 (-1.291)	-0.065* (-1.739)	0.020 (0.155)
D(lnRD)	-0.056 (-0.805)	-0.024 (-0.424)	0.023 (0.156)
D(lnTED)	0.060 (0.843)	0.023 (0.342)	-0.544*** (-4.070)
D(lnGDP)	0.579*** (7.841)	0.686*** (7.954)	-0.648 (-1.627)
D(lnINF)	0.448** (2.582)	0.488*** (2.792)	-0.131 (-0.175)
D(lnGVAS)	-0.011 (-0.107)	0.077 (1.246)	-0.106 (-0.470)
D(lnICTEX)	-0.046 (-1.319	-0.045 (-1.474)	-0.031 (-0.280)
D(lnICTIM)	0.051*** (1.033)	0.076* (1.940)	0.079 (0.641)

Notes: *** and ** denote statistical significance at 1% and 5%, respectively.

Source: Our processing using Eurostat and World Bank Data

INF has the expected influence on PEN, FEN and REN (a negative impact on primary and energy consumption and a positive impact on the energy structure to increase the share of renewable energy), with the highest influence coefficient exhibited in relation to REN (1.387), in line with Wang, et al. (2023). The level of economic development increases energy consumption and has a negative impact on the energy structure toward renewable energy, consistent with Camacho Ballesta, et al. (2022), but in contrast to Saint Akadiri, et al. (2019), Asiedu, et al. (2021), Polcyn, et al. (2022) and Saint Wu and Song (2023), suggesting that the EU has not yet been able to overcome the negative relationship between GDP and sustainability, despite the positive impact of digitalization, innovation, and environmental policies (Guaita Martínez, et al., 2022). However, the results of the study by Komarnicka and Murawska (2021) and Pejović, et al. (2021) reveal that there is no significant correlation between the level of economic development of EU countries and the share of renewable energy in total and by economic sector. Structural changes in the direction of increasing the ratio of services/industry have the opposite effect and are conducive to expanding the proportion of renewable energy (a positive significant influence coefficient of 0.343), consistent with Ren, et al. (2021).

Conclusions

The aim of this paper is to examine the impact of digitalization and innovation on the EU energy market. The current energy context in the EU must be explored due to its ambition to reduce the dependency on Russian gas and accelerate the transition to green energy. The added value of our paper is given by the holistic view of EU policy that tries to concentrate significant investments in the RD in the energy field by REPowerEU. This paper also introduces a comprehensive evaluation of the specific factors that shape energy consumption and its structure in the EU. Our main results back up recent research that points out that digitalization has a positive effect on the structure of the energy market (it is changing towards renewables) and lowering energy use. Similar findings from other studies emphasize that the positive impact depends on the application of digitalization. Thus, in the EU, the impact of digitalization is obvious in favor of reducing energy consumption and increasing renewables in the consumption structure, which is supported by EU policy investment. Our results indicate that long-term EU energy policy will lead not only to a significant decrease in overall consumption but also to a significant increase in the energy consumption structure of renewables. Even if there is not much to negotiate when speaking of decreasing energy consumption because it is directly related to economic growth (although price evolution has also had a significant impact on consumption), an improved production structure based on increasing renewable share is possible, the latest being sensitive to a larger number of factors: digitalization, innovation, industry upgrades, and technological progress.

These conclusions lead to some policy implications for achieving EU objectives. The European Union can reduce energy consumption through digitalization if it concentrates investments and research in this direction, respectively, in the green technological advance. Given the strong link to economic growth, it is unlikely that energy consumption will be reduced radically. However, our results indicate that investing in research and development will eventually increase the share of renewable energy. Our findings on the influence of ICT trade on energy further substantiate this. Exports demonstrate a significant positive impact on the share of renewable energy in final energy consumption, whereas a significant negative impact on the energy structure results from a lagging innovation that requires imports.

The current study also has some limitations. This study focuses on the impact of digitalization and innovation at the regional level in EU countries, ignoring country-wise analysis; however, the impact may be considerably different in other economies worldwide due to their different economic characteristics. Future research should extend the scope of analysis to include a broader range of economies, allowing for cross-country comparisons. Because digitalization and renewable energy consumption are relatively new issues, data collection has been limited to the use of the internet and mobile to measure digitalization in the last two decades. Future studies could use modern measures for digitalization such as robots, IoT, and artificial intelligence. Furthermore, a larger data collection can increase the study model's broadness.

References

Saint Akadiri, S., Alola, A.A., Akadiri, A.C. and Alola, U.V., 2019. Renewable energy consumption in the EU-28 countries: Policy toward pollution mitigation and economic sustainability. *Energy Policy*, 132(June), pp.803–810. https://doi.org/10.1016/j.enpol.2019.06.040.

Akram, M.W., Ahmed, D., Trunina, A., Hamid, K. and Hafeez, M., 2023. How do financial fragility and ICT penetration affect renewable energy consumption and green growth in top-polluting economies? *Environmental Science and Pollution Research*, 30(13), pp.38810–38818. https://doi.org/10.1007/s11356-022-24978-3.

Asiedu, B.A., Hassan, A.A. and Bein, M.A., 2021. Renewable energy, non-renewable energy, and economic growth: evidence from 26 European countries. *Environmental Science and Pollution Research*, 28(9), pp.11119–11128. https://doi.org/10.1007/s11356-020-11186-0.

Bano, S., Liu, L. and Khan, A., 2022. Dynamic influence of aging, industrial innovations, and ICT on tourism development and renewable energy consumption in BRICS economies. *Renewable Energy*, 192, pp.431–442. https://doi.org/10.1016/j.renene.2022.04.134.

Bergman, N. and Foxon, T.J., 2023. Drivers and effects of digitalization on energy demand in low-carbon scenarios. *Climate Policy*, 23(3), pp.329–342. https://doi.org/10.1080/14693062.2022.2145260.

Bildirici, M.E., Castanho, R.A., Kayıkçı, F. and Genç, S.Y., 2022. ICT, Energy Intensity, and CO2 Emission Nexus. *Energies*, 15(13), pp.1–15. https://doi.org/10.3390/en15134567.

Camacho Ballesta, J.A., da Silva Almeida, L. and Rodríguez, M., 2022. An analysis of the main driving factors of renewable energy consumption in the European Union. *Environmental Science and Pollution Research*, 29(23), pp.35110–35123. https://doi.org/10.1007/s11356-022-18715-z.

Dehghan Shabani, Z. and Shahnazi, R., 2019. Energy consumption, carbon dioxide emissions, information and communications technology, and gross domestic product in Iranian economic sectors: A panel causality analysis. *Energy*, 169, pp.1064–1078. https://doi.org/10.1016/j.energy.2018.11.062.

Dogan, A. and Pata, U.K., 2022. The role of ICT, R&D spending and renewable energy consumption on environmental quality: Testing the LCC hypothesis for G7 countries. *Journal of Cleaner Production*, 380(P1), p.135038. https://doi.org/10.1016/j.jclepro.2022.135038.

European Commission, 2022. *Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. REPowerEU Plan COM(2022) 230 final*. [online] Available at: < https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022DC0230&from=EN > [Accessed 8 April 2025].

European Commission, 2025. *Eurostat*. [online] Available at: < https://ec.europa.eu/eurostat/web/main/data/database > [Accessed 8 April 2025].

European Parliament, 2022. *Resolution of 14 September 2022. Amendments adopted by the European Parliament on 14 September 2022 on the proposal for a directive of the European Parliament and of the Council on energy efficiency (recast) (COM(2021)0558 – C9-0330/2021 – 2021/0203(COD))*. [online] Available at: < https://www.europarl.europa.eu/doceo/document/TA-9-2022-0315_EN.html > [Accessed 8 April 2025].

Geng, J.-B. and Ji, Q., 2016. Technological innovation and renewable energy development: Evidence based on patent counts. *International Journal of Global Environmental Issues*, 15(3), pp.217–234. https://doi.org/10.1504/IJGENVI.2016.076945.

Gerstlberger, W., Knudsen, M.P., Dachs, B. and Schröter, M., 2016. Closing the energy-efficiency technology gap in European firms? Innovation and adoption of energy efficiency technologies. *Journal of Engineering and Technology Management - JET-M*, 40(2016), pp.87–100. https://doi.org/10.1016/j.jengtecman.2016.04.004.

Guaita Martínez, J.M., Puertas, R., Martín Martín, J.M. and Ribeiro-Soriano, D., 2022. Digitalization, innovation and environmental policies aimed at achieving sustainable production. *Sustainable Production and Consumption*, 32, pp.92–100. https://doi.org/10.1016/j.spc.2022.03.035.

Hilty, L.M., Arnfalk, P., Erdmann, L., Goodman, J., Lehmann, M. and Wäger, P.A., 2006. The relevance of information and communication technologies for environmental sustainability - A prospective simulation study. *Environmental Modelling and Software*, 21(11), pp.1618–1629. https://doi.org/10.1016/j.envsoft.2006.05.007.

Husaini, D.H. and Lean, H.H., 2022. Digitalization and Energy Sustainability in ASEAN. *Resources, Conservation and Recycling*, 184(April), p.106377. https://doi.org/10.1016/j.resconrec.2022.106377.

Irandoust, M., 2018. Innovations and renewables in the Nordic countries: A panel causality approach. *Technology in Society*, 54, pp.87–92. https://doi.org/10.1016/j.techsoc.2018.03.007.

Ishida, H., 2015. The effect of ICT development on economic growth and energy consumption in Japan. *Telematics and Informatics*, 32(1), pp.79–88. https://doi.org/10.1016/j.tele.2014.04.003.

Khayyat, N.T., Lee, J. and Heo, E., 2016. How ICT investment influences energy demand in South Korea and Japan. *Energy Efficiency*, 9(2), pp.563–589. https://doi.org/10.1007/s12053-015-9384-9.

Khoshnevis Yazdi, S. and Shakouri, B., 2017. Renewable energy, nonrenewable energy consumption, and economic growth. *Energy Sources, Part B: Economics, Planning and Policy*, 12(12), pp.1038–1045. https://doi.org/10.1080/15567249.2017.1316795.

Khurshid, A., Rauf, A., Calin, A.C., Qayyum, S., Mian, A.H., Qayyum, S. and Fatima, T., 2022. Property rights in the carbon mitigation efforts. Evidence from western and Technological innovations for environmental protection : role of intellectual property rights in the carbon mitigation efforts. Evidence from western and southern Europe. *International Journal of Environmental Science and Technology*, 19(5), pp.3919–3934. https://doi.org/10.1007/s13762-021-03491-z.

Kocsis, I. and Kiss, J.T., 2014. Renewable energy consumption, R&D and GDP in European Union countries. *Environmental Engineering and Management Journal*, 13(11), pp.2825–2830. https://doi.org/10.30638/eemj.2014.316.

Komarnicka, A. and Murawska, A., 2021. Comparison of consumption and renewable sources of energy in european union countries—sectoral indicators, economic conditions and environmental impacts. *Energies*, 14(12), pp.1–24. https://doi.org/10.3390/en14123714.

Lange, S., Pohl, J. and Santarius, T., 2020. Digitalization and energy consumption. Does ICT reduce energy demand? *Ecological Economics*, 176(June), p.106760. https://doi.org/10.1016/j.ecolecon.2020.106760.

Pejović, B., Karadžić, V., Dragašević, Z. and Backović, T., 2021. Economic growth, energy consumption and CO2 emissions in the countries of the European Union and the Western Balkans. *Energy Reports*, 7, pp.2775–2783. https://doi.org/10.1016/j.egyr.2021.05.011.

Pesaran, M.H. and Shin, Y., 1999. An Autoregressive Distributed-Lag Modelling Approach to Cointegration Analysis. In: S. Strom, ed. *Econometrics and Economic Theory in the 20th Century*. [online] Cambridge: Cambridge University Press. pp.371–413. https://doi.org/10.1017/CCOL521633230.011.

Pesaran, M.H., Shin, Y. and Smith, R., 1997. Pooled Estimation of Long-run Relationships in Dynamic Heterogeneous Panels. *Department of Applied Economics University of Cambridge*. [online] Available at: < https://econpapers.repec.org/RePEc:cam:camdae:9721 > [Accessed 10 March 2025].

Polcyn, J., Us, Y., Lyulyov, O., Pimonenko, T. and Kwilinski, A., 2022. Factors influencing the renewable energy consumption in selected european countries. *Energies*, 15(1), pp.1–27. https://doi.org/10.3390/en15010108.

Ren, S., Hao, Y., Xu, L., Wu, H. and Ba, N., 2021. Digitalization and energy: How does internet development affect China's energy consumption? *Energy Economics*, 98, p.105220. https://doi.org/10.1016/j.eneco.2021.105220.

Salahuddin, M. and Alam, K., 2015. Internet usage, electricity consumption and economic growth in Australia: A time series evidence. *Telematics and Informatics*, 32(4), pp.862–878. https://doi.org/10.1016/j.tele.2015.04.011.

Salahuddin, M. and Alam, K., 2016. Information and Communication Technology, electricity consumption and economic growth in OECD countries: A panel data analysis. *International Journal of Electrical Power and Energy Systems*, 76, pp.185–193. https://doi.org/10.1016/j.ijepes.2015.11.005.

Samargandi, N., Fidrmuc, J. and Ghosh, S., 2014. Is the Relationship Between Financial Development and Economic Growth Monotonic? Evidence from a Sample of Middle-Income Countries. *Cesifo Working Paper No. 4743*. https://doi.org/10.1016/j.worlddev.2014.11.010.

Solarin, S.A., Bello, M.O. and Tiwari, A.K., 2022. The impact of technological innovation on renewable energy production: accounting for the roles of economic and environmental factors using a method of moments quantile regression. *Heliyon*, 8(7), p.e09913. https://doi.org/10.1016/j.heliyon.2022.e09913.

Takase, K. and Murota, Y., 2004. The impact of IT investment on energy: Japan and US comparison in 2010. *Energy Policy*, 32(11), pp.1291–1301. https://doi.org/10.1016/S0301-4215(03)00097-1.

Thanh, T.T., Ha, L.T., Dung, H.P. and Huong, T.T.L., 2023. Impacts of digitalization on energy security: evidence from European countries. *Environment, Development and Sustainability*. 25, pp.11599–11644. https://doi.org/10.1007/s10668-022-02545-7.

Tzeremes, P., Dogan, E. and Alavijeh, N.K., 2023. Analyzing the nexus between energy transition, environment and ICT: A step towards COP26 targets. *Journal of Environmental Management*, 326(PA), p.116598. https://doi.org/10.1016/j.jenvman.2022.116598.

Wang, H. and Wang, M., 2020. Science of the Total Environment Effects of technological innovation on energy efficiency in China : Evidence from dynamic panel of 284 cities. *Science of the Total Environment*, 709(360), p.136172. https://doi.org/10.1016/j.scitotenv.2019.136172.

Wang, L., Huang, Y., Ghafoor, A., Hafeez, M. and Salahodjaev, R., 2023. Asymmetric macroeconomic determinants of renewable energy consumption: do financial institutions and ICT trade matter? *Environmental Science and Pollution Research*, 30(4), pp.9841–9851. https://doi.org/10.1007/s11356-022-22816-0.

Wang, Z., Le Hoa Pham, T., Wang, B., Hashemizadeh, A., Bui, Q. and Nawarathna, C.L.K., 2022. The simultaneous impact of education and financial development on renewable energy consumption: an investigation of Next-11 countries. *Environmental Science and Pollution Research*, 29(56), pp.85492–85509. https://doi.org/10.1007/s11356-022-21330-7.

Wiebe, K.S., 2016. The impact of renewable energy diffusion on European consumption-based emissions†. *Economic Systems Research*, 28(2), pp.133–150. https://doi.org/10.1080/09535314.2015.1113936.

World Bank, 2025. *WDI, World Development Indicators*. [online] Available at: < https://databank.worldbank.org/source/world-development-indicators > [Accessed 11 March 2025].

Wu, D. and Song, W., 2023. Does green finance and ICT matter for sustainable development: role of government expenditure and renewable energy investment. *Environmental Science and Pollution Research*, 30(13), pp.36422–36438. https://doi.org/10.1007/s11356-022-24649-3.

Xu, Q., Zhong, M. and Li, X., 2022. How does digitalization affect energy? International evidence. *Energy Economics*, 107(March), p.105879. https://doi.org/10.1016/j.eneco.2022.105879.

Zhou, Y., Liu, Z., Wang, M., Dong, R.K. and Yue, X.G., 2023. Evaluating the impacts of education and digitalization on renewable energy demand behaviour: new evidence from Japan. *Economic Research-Ekonomska Istrazivanja*, 36(3), p.2164033. https://doi.org/10.1080/1331677X.2022.2164033.

AI Meets Academics: Ethical Dilemmas and Insights on ChatGPT from Higher Education

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Abstract

The emergence of AI tools such as ChatGPT has ignited discussions about their ethical ramifications in educational settings. This qualitative research paper studies the ethical perceptions of ChatGPT among academics from various Romanian universities. By means of conducting semi-structured interviews with academics, the study investigates academic perspectives on the role of AI tools in student life, as well as their capacity to develop critical thinking abilities in students. While students usually think that ChatGPT is a valuable educational resource, academics hold a varied opinion regarding its impact, which is reflected in the form of a lack of consensus. Some believe that it may enhance critical thinking, while others argue that it may lead to over-dependency and plagiarism. The paper also reveals a more nuanced perception of academics regarding the future incorporation of AI in classrooms, balancing its advantages against ethical challenges. These results contribute to filling the literature gap by providing a detailed perspective regarding the ethical perception of academics regarding the usage of AI tools in educational settings. Moreover, the study provides valuable insights for policymakers and academics who will contribute to establishing ethical guidelines for the usage of AI tools in education.

Keywords

Artificial Intelligence, AI tools, ChatGPT, Ethics, Perception

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Introduction

Farhi et al. (2023) argue that although ChatGPT is a relatively new AI (Artificial Intelligence) tool, it has drawn a lot of interest and been embraced by several students enrolled in higher education institutions. Susnjak and McIntosh (2024) asserts that ChatGPT, or Chat Generative Pre-Trained Transformer, is a remarkable and one of the most significant AI chatbots as it is gained immense popularity among students in such a short period of time. This, in turn, motivated several researchers to study its implication in educational settings. However, a major proportion of these research studies primarily focus on the ethical perception of AI only among students, thereby ignoring the implications that professors or academics have on learning. Moreover, many academics show skepticism towards the usage of AI tools in learning settings. This, it has a direct impact on the process of adoption of AI tools in education (Bewersdorff et al., 2023).

Besides, discussions concerning the ramifications of ChatGPT's debut have also raised ethical concerns (Farhi et al., 2023). As a result, it is crucial to study the perception of academics regarding ethical usage of ChatGPT. The paper is a qualitative study which presents the results from semi-structured interviews conducted with academics from Romanian Universities. Therefore, the main purpose of the present paper

is to discuss the ethical concerns that AI tools such as ChatGPT raise, when used for educational purposes. This research is conducted by highlighting the perception of academics as they are the primarily responsible for adopting any new educational technique. The pessimistic approach of academics toward AI tools reveals a lot about the future of AI tools like ChatGPT in education. Regardless of several benefits that AI tools offer its users, these are not deemed enough credible and are subjected to a lot of criticism.

Based on the above arguments, the research question that we attempt to answer in this paper is as follows:

- RQ: What is the ethical perception of academics regarding ChatGPT and similar AI tools?

The results reveal that the academics are not able to adopt AI tools due to their traditional perception and opinion regarding their usage for educational purposes. More precisely, majority of the professors did not have a very optimistic approach while discussing the potential of ChatGPT in education.

1. Review of the scientific literature

1.1 Advantages of incorporating AI tools in educational institutions

Hornberger, Bewersdorff and Nerdel (2023) writes that AI already has a significant impact on educational sector, transforming the research pattern of students who actively search information online. Therefore, as a result of its prevalent use, it is even more essential to address the ethical concerns that are associated with this AI tool. However, does it really have the potential to enhance learning experience of students and their academic performance? To answer the aforementioned question, several researchers like Verma et al. (2023) argue that to guarantee an extensive learning experience, ChatGPT should be integrated with conventional teaching techniques. However, careful implementation is necessary to address ethical issues and potential biases. Kohnke, Moorhouse and Zou (2023) and Kaur and Trifan (2024) assert that in recent decades, researchers, policymakers, and practitioners have started to pay more attention to AI in education because of its potential to improve education. They created AI-powered learning resources, such as recommendation and intelligent tutoring systems, which are believed to improve learning experience of the students. By offering individualized assistance, these advancements enable AI to assess and improve student learning experiences. For instance, it can identify students who are at danger of failing, diagnose their strengths, weaknesses, and knowledge gaps, and offer learning materials or pathways that are customized to meet their individual needs.

Based on the above arguments, one may argue that by providing simple interventions, AI tools can significantly lower the risk of students failing in their career. Moreover, it can act as a career guide by identifying at an early-stage strengths and weaknesses of students. Rodway and Schepman (2023) also show that in order to provide interventions for students who are at risk of low performance or non-engagement, higher education institutions can also deploy AI systems for performance tracking and future performance prediction. AI can also suggest helpful resources and educational content to students. Previous research (Rodway and Schepman, 2023) has covered a variety of teacher-facing AI roles in addition to student-facing ones, such as automated marking, professional development, and technical assistance with the implementation of instructional strategies. Consequently, AI has the potential to transform the learning experience of students in a positive way and students can really benefit from the advantages of AI tools, if used ethically. Verma et al. (2023) mention in their study that by recognizing engagement indicators in videos, an AI technology improves learning. Nevertheless, an over-reliance on AI runs the risk of undervaluing the complex, human-centered approaches to learning that are essential for encouraging student participation.

According to another study's (Yilmaz and Yilmaz, 2023) findings, students' computational thinking abilities, programming self-efficacy, as well as motivation during lessons grew significantly when ChatGPT was used during programming lessons. Farhi et al. (2023) claim that ChatGPT provides learners with a number of advantages, such as the development of intrinsic learner motivation, which facilitates a deeper comprehension of ideas and the advancement of competence. Andries and Robertson (2023) mention that positive results of using ChatGPT in classrooms including improved learning, teamwork, and trust are highlighted in a new study. Nevertheless, the usage of ChatGPT and other AI tools does not significantly increase student motivation when confronted with difficult problems. Hence, to guarantee student motivation in dealing with of difficult assignments, teachers must look for different motivational techniques (Yilmaz and Yilmaz, 2023). This shows that more research is required for reaching a conclusion on the relation between ChatGPT and the motivational level of students. However, it is of no use to encourage and educate students for using ChatGPT ethically, when the professors and academics completely condemn its usage.

1.2 Role of academics in incorporating AI tools in education

Previous researchers (Kohnke, Moorhouse and Zou, 2023) claim that AI technologies give professors new ways to improve their teaching strategies, such as learning analytics, seamless communication as well as personalized support. Furthermore, they can increase their effectiveness, encourage self-regulation in their students (Seo et al., 2021), and promote meaningful interaction and communication by effectively utilizing AI-based solutions. Many instructors have struggled to embrace AI-driven technologies in spite of these advantages. Therefore, it's critical to comprehend the challenges they may face while integrating these technologies and provide them with the digital skills necessary to enhance students' educational experiences (Kohnke, Moorhouse and Zou, 2023). According to Cheng and Wang (2023), in order to overcome challenges in integrating AI in education, digital leadership is essential and calls for comprehensive teamwork. However, clear guidelines and policies are also required for long-term positive results. Niloy et al., (2024) also claim that professors are equally responsible for effectively incorporating such AI tools as they play a major role in shaping the future of education.

Fast lesson design created by AI tools enables professors to make interesting and captivating lesson plans more quickly. Farhi et al. (2023) mention in their study that researchers who favor the use of ChatGPT in classrooms assert that it can produce individualized lesson plans and learning materials more efficiently, offer immediate learner support, produce interesting educational content, help with language acquisition, simplify test preparation, help academics evaluate/correct assignments, and dynamically modify learning environment to accommodate individual development. Furthermore, it is believed that AI chatbots can lessen students' timidity and close the perceived divide between students and teachers. Therefore, ChatGPT has the potential to improve academic performance, raise learner engagement as well as educational standards. However, one may argue that over-reliance on AI and inaccurate information may cause serious repercussions in near future.

Other advantages of teaching with the help of ChatGPT may include encouraging active learning, raising student happiness and engagement, and fostering learning communities while lowering feelings of loneliness and so on (Rodway and Schepman, 2023). Furthermore, active learning, which is stimulated by using ChatGPT, has a strong positive effect on students' higher-order thinking and performance, according to existing studies (Lai, Cheung and Chan, 2023). Additionally, chatbots can help with teamwork by mediating online encounters or serving as extra team members who participate in online discussions. However, the current limits in chatbot technology can impact their usefulness and adoption, with acceptance anticipated by the conversation's authenticity, enjoyment, and simplicity of communication (Rodway and Schepman, 2023).

1.3 Challenges of adopting AI in education and the perception of academics

The opportunities and challenges of four aspects of AI in education were recently studied by Chiu et al. (2023): (1) using AI for student learning (e.g., facilitating human-machine conversations, analyzing student work, providing feedback, promoting adaptability and interactivity); (2) using AI for teaching (e.g., creating adaptive strategies, enhancing teachers' abilities, and supporting professional development); (3) using AI for assessment (e.g., automating grading, estimating student performance); and (4) incorporating AI into educational decision-making (e.g., offering evidence-based insights and convenient, individualized services) (Kohnke, Moorhouse and Zou, 2023).

For addressing the above-mentioned challenges, educational institutions can play a major role. McGrath et al. (2023) state that universities contribute significantly in research work and technological advancements but are they quick to adopt new potential learning practices? Artificial Intelligence models have made rapid advancements in the last few years and the educational institutions are also expected to adapt as a result of this progress. As discussed earlier, professors are believed to play the most important role in changing the present educational practices and integrating AI into their teaching curriculum. But, are the key question that must be addressed here is if they are ready to adopt AI tools in educational settings?

Given the reluctance of higher educational institutions to adapt and the importance of new AI technologies, it is necessary to investigate instructors' perceptions of their ethical obligations (McGrath et al., 2023). It is crucial to highlight that academic's opinions and concern about implementing AI in education are more complex in comparison to those of students. Some people show a serious concern about being replaced because they believe AI will make their jobs less valuable. Due to this, professors may be reluctant to use AI technology since they are unaware of how AI may enhance their job value instead of replacing them. In a time when people are becoming more conscious of the ethical ramifications of technology, educators could be reluctant to use AI tools unless they know exactly how student data will be safeguarded and algorithmic biases can be minimized. Furthermore, the widespread

deployment of AI is hampered in many contexts by a lack of funding, infrastructure, and support. Finally, there may be concern and hesitation among academics who lack the technical or pedagogical skills and experience to incorporate AI-driven tools into the classroom (Kohnke, Moorhouse and Zou, 2023).

McGrath et al. (2023) claim that although many university instructors self-reported having little knowledge of AI, a sizable portion of them also believed that AI may help create a more egalitarian system of student support. From the standpoint of competency development, university professors might require instruction for better preparing them to use new technologies. McGrath et al. (2023) concludes in their study that despite their lack of knowledge of AI, university professors are optimistic about the benefits to equity and emphasize the necessity for training in order to successfully incorporate AI into the classroom. Yilmaz and Yilmaz (2023) also advise educators to acquire AI literacy skills while incorporating ChatGPT and similar tools into their lectures, particularly to help students develop prompt writing abilities. Cheng and Wang (2023) highlight that educators must first have an established knowledge and gain awareness about these ethical challenges. However, all the aforementioned arguments cannot undermine the fact that if professors are not willing to adopt the technology, AI tools cannot be easily incorporated into classrooms. Therefore, it is equally important to consider professor's attitude and opinion regarding chatbots.

2. Research Methodology

The paper is a result of an extensive review of the present literature, mainly sourced from ScienceDirect and Web of Science databases. These scholarly databases offered a more comprehensive repositories of scientific papers, assuring credibility and quality. A preference was given to more recent publications, due to the rapid evolution of artificial intelligence. The study employed a qualitative research method, concentrating on comprehending the perception and attitude of academics toward ChatGPT. The qualitative method was chosen provided the exploratory nature of the research, with a clear objective of capturing nuanced perspectives that quantitative research could ignore.

Semi-structured interviews were conducted with academics from the Economic Science Department of a prestigious Romanian University. This approach enabled flexibility in investigating emergent subjects while also assuring consistency across the main topic. The interview questions were divided in three different topics or subparts: General perception regarding using AI tools like ChatGPT; Ethics of using ChatGPT in education; Future implications and impact on critical thinking. Every interview lasted approximately 15-20 minutes and was conducted in a private setting to avoid any type of stress, pressure and shame of giving a potentially unexpected response. Before starting the interviews, the participants were explained about the purpose of the interview. This allowed them to be prepared for the interview in advance. We ensured the participants before starting the interview that their identity will remain hidden. The identity of all the academics remains anonymous to avoid any conflict of interest, to protect their privacy and also to minimize any type of potential bias.

3. Results and discussion

Table no.1 shows some information regarding the interviewed professors as well as their approach towards incorporation of AI tools in education. It is clear that majority of the professors aged above 40 years hold a somewhat pessimistic viewpoint.

Table no. 1. Profiles of the interviewees

Interviewee no.	Gender	Age	Position	Approach
1	F	46	University Lecturer	Very Optimistic
2	F	61	Full-professor	Somewhat pessimistic
3	M	45	Full-professor	Neutral
4	M	38	University Lecturer	Neutral
5	F	41	Associate Professor	Somewhat pessimistic
6	F	43	Full-professor	Somewhat pessimistic
7	F	39	University Lecturer	Optimistic
8	F	58	Full-professor	Somewhat pessimistic
9	M	30	University Lecturer	Very Optimistic
10	M	32	University Lecturer	Optimistic
11	M	42	Full-professor	Somewhat pessimistic
12	M	53	Full-professor	Neutral
13	F	30	University Lecturer	Neutral

Table no. 2. Summary of topics and relationship with the interview questions

Interview questions	Topic
Q1: How do you perceive the role of ChatGPT in academic integrity, particularly concerning students' use for assignments or research assistance?	Topic 1: General perception regarding using AI tools like ChatGPT
Q2: In your opinion, does the availability of AI tools like ChatGPT shift the purpose or expectations of traditional academic assessment? If so, how?	
Q3: What ethical responsibilities do you think educators have when it comes to advising students about the appropriate use of ChatGPT in their studies?	Topic 2: Ethics of using ChatGPT in education
Q4: What potential do you see for ChatGPT in enhancing learning experiences, and do you think this potential outweighs the ethical concerns?	
Q5: How do you believe in future ChatGPT could affect the development of critical thinking and independent learning skills in students, considering its ease of access and answers?	Topic 3: Future implications and impact on critical thinking

Table no. 2 highlights the summary of topics addressed during the interviews with academics as well as the relationship of these topics with the interview questions. Topic 1: General perception regarding using AI tools like ChatGPT: Q1: Professors' opinions on ChatGPT's potential effects on academic integrity are examined in this research question. The use of AI in education raises issues in the literature, especially in relation to plagiarism and "academic dishonesty" brought on by Generative AI. Professors are prompted by the question to consider these matters and to express any ethical worries or possible protections they may have in mind. Q2: This research question aims to find out how professors feel about their role in advising students on ChatGPT use. Educators must make moral decisions about whether and how to teach students about appropriate use of AI tools when they become more widely available. Professors can share their opinions on this function and what limits they think should be established by answering this question.

Overall, the interviewees were quite familiar with the AI tools like ChatGPT and their common usage among students for educational purposes. The interviews revealed that most of the academics think that they have an optimistic approach towards technology and AI tools. However, during the last part of the interviews, some of them realized that in reality, they do not hold a positive opinion about AI. Furthermore, some academics remained neutral and claimed that the presence of ChatGPT did not make a lot of difference in education.

Topic 2: Ethics of using ChatGPT in education: Under this topic, interviewees were expected to be more familiar with ChatGPT before responding to the questions. Questions regarding their perception of ethics were asked and all the responses were somewhat similar. Q3: This research question focuses on opinions about how ChatGPT can diminish the importance of conventional tests, such essays and exams, where critical thinking and authenticity are crucial. AI capabilities have the potential to disrupt established academic norms and affect instructors' expectations for student achievement. Q4: This research question covers the advantages and disadvantages of utilizing AI tools in the classroom. Although there is proof that AI tools can enhance engagement and facilitate individualized learning, ethical issues might make broad adoption more difficult. Scholars are able to express their opinions on this compromise.

Some participants argued that the students should realize that ChatGPT has updated its old version and that its errors have reduced in number. This results in less ethical concerns for educators as the rapid improvement in AI tools can eliminate the risk of misinformation. The participants further claimed that "it is the responsibility of professors to educate them about the ethical usage of Generative AI as their role is like that of an instructor who guides the students to choose certain paths." The interview made it clear that the professor holds very positive opinion regarding this technology and encourages all the students to use it for educational purposes, including in the classroom. According to the interviewees, "the role of professors is not to provide knowledge but to encourage the students to find solutions." Hence, it is completely ethical to use AI tools for responding in classroom. However, it is also the duty of professors to make sure that students know about the limitations of these tools, which can only happen through practice. Some other interviewees, however, holds very different opinions. According to some participants, the academic expectations are still very high from the students. However, now that students can easily copy their responses from ChatGPT, there should be a change in academic assessment. For instance, the projects and assignments given to students should be more complex. This may provoke them to also use critical thinking and not cheat the entire response generated by ChatGPT. Unlike the first few participants, the later interviews revealed that "it is not fair at all to respond in classrooms using AI tools". The respondents gave the following reason: "using ChatGPT's responses and claiming them to be

your own is unethical from the perspective of idea ownership right, but also because the responses generated by Generative AI tools are incorrect and therefore, there should be proper guidelines and rules to regulate the usage of ChatGPT." Furthermore, some academics also claimed that "once such a guideline is established by the educational institutions, it is the sole duty of the professors to explain the students regarding the repercussions they may have if they violate any of the established rules" According to some interviewees, "We should not consider level of knowledge as the criteria to evaluate students, but the ability to solve complex, real problems." Hence, in their opinion, it is not unethical to utilize AI tools for the purpose of gaining knowledge.

Topic 3: Future implications and impact on critical thinking: Q5: This research question explores how AI might affect students' cognitive development. According to some academics, depending too much on AI tools may result in the "outsourcing" of critical thinking, which could jeopardize skill development. Professors are prompted to think about the long-term effects on students' intellectual development by this question. As discussed earlier, some scholars argue that AI tools can improve critical thinking abilities. However, many researchers also oppose the aforementioned statement and claim that in reality, ChatGPT hinders critical thinking of students as they are not given the opportunity to think before getting any response. This ultimately leads to over-reliance on AI tools and in worst cases, plagiarism and cheating. During the interviews, most of the professors showed skepticism for adopting AI tools in academia because of its negative impact on critical thinking. However, there is still no consensus regarding this subject among the academics.

The findings of this paper offer valuable information regarding the perception of academics from Economics Department regarding the ethical usage of AI tools like ChatGPT and their future potential. They also provide insights into obstacles that educators face while adopting ChatGPT for educational purposes. As stated in the literature review, there is no consensus regarding the impact of ChatGPT on students' critical thinking abilities. This study confirms that some professors advocate the use of ChatGPT for developing essential skills in students, while others criticize the idea by arguing that if personal values of students do not align with the ethical guidelines, then there is no use of promoting ethical usage. The results also reveal that there are some academics who think that they are optimistic about AI tools in education. Nevertheless, their responses prove otherwise. This clearly shows that professors need to self-reflect on the topic. This will allow them to have an opinion that is backed-up by logic and reasoning. Moreover, this may help them to provide a constructive feedback to policymakers for establishing ethical guidelines. According to Hockly (2023) and Kohnke, Moorhouse and Zou (2023) the ethical use of AI tools and developing strategies to reduce their disadvantages are important factors when addressing ethical concerns. Some professors claimed during the interview that potential error/incorrect responses generated by ChatGPT is one of the biggest disadvantages of Generative AI. If such concerns are addressed, this may allow more educators to rethink their approach and change their perception regarding AI tools.

Research on the perception of professors regarding the ethical usage of AI tools is still at its initial stage and professors are still figuring out their stand point. Accordingly, before educating students, it is important to educate professors regarding how ChatGPT can be used to develop essential skills among students without threatening academic integrity. However, for this purpose, professors should be flexible and adoptive to technology. It is important to highlight the aforementioned statement because older generations are believed to be less receptive towards technological advancement. Finally, this research also indicates that it is high time to provide tailored support for developing professors' AI teaching competencies. This finding is also in line with the prior literature (Hrastinski et al., 2019; Kohnke, Moorhouse and Zou, 2023) on the subject.

Conclusions

The paper throws light on the ethical perception of ChatGPT among academics, with a clear focus on its incorporation into educational settings like classroom. The findings uncover varied opinions of academics, reflecting optimism for its usage in rare cases and apprehensions regarding its ethical ramifications. Even though AI tools like ChatGPT have become an integral part of students' life, academics struggle to fully accept and adopt them for educational purposes (possibly due to the fear of getting replaced and remain jobless). Interestingly, there is still a lack of consensus among academic community regarding the impact of ChatGPT on critical thinking abilities of students.

The interviews reveal that most academics are not very optimistic about the future potential of ChatGPT in education and express uncertainty. However, they also recognize that due to the recent technological advancements, higher education institutions need to adapt accordingly for addressing the ethical concerns

that are raised by AI tools. Besides, future studies should research the above dynamics more thoroughly for better understanding the impact of ChatGPT on classroom learning as well as critical thinking skills of students.

Based on the responses provided by the professors during the interviews, one may propose the establishment of stricter and more precise policies regarding the usage of AI tools. This may help in addressing some concerns of academics regarding the misuse of these tools. Similarly, the concerned authorities are recommended to foster a favorable atmosphere where ethical incorporation of AI tools is supported without compromising ethical integrity. Similarly, the primary limitation of this study is given by its reduced sample size, thereby, making it difficult to generalize the ethical concerns of academics. Therefore, future studies should focus on increasing the sample size for further validating the results of this research.

References

Andries, V. and Robertson, J., 2023. Alexa doesn't have that many feelings: Children's understanding of AI through interactions with smart speakers in their homes. *Computers and Education: Artificial Intelligence*, 5, p.100176. https://doi.org/10.1016/j.caeai.2023.100176.

Bewersdorff, A., Zhai, X., Roberts, J. and Nerdel, C., 2023. Myths, mis-and preconceptions of artificial intelligence: A review of the literature. *Computers and Education: Artificial Intelligence*, 4, p.100143. https://doi.org/10.1016/j.caeai.2023.100143.

Cheng, E.C.K. and Wang, T., 2023. Leading digital transformation and eliminating barriers for teachers to incorporate artificial intelligence in basic education in Hong Kong. *Computers and Education: Artificial Intelligence*, 5, p.100171. https://doi.org/10.1016/j.caeai.2023.100171.

Chiu, T.K., Xia, Q., Zhou, X., Chai, C.S. and Cheng, M., 2023. Systematic literature review on opportunities, challenges, and future research recommendations of artificial intelligence in education. *Computers and Education: Artificial Intelligence*, 4, p.100118. https://doi.org/10.1016/j.caeai.2022.100118.

Farhi, F., Jeljeli, R., Aburezeq, I., Dweikat, F.F., Al-shami, S.A. and Slamene, R., 2023. Analyzing the students' views, concerns, and perceived ethics about chat GPT usage. *Computers and Education: Artificial Intelligence*, 5, p.100180. https://doi.org/10.1016/j.caeai.2023.100180.

Hockly, N., 2023. Artificial intelligence in English language teaching: The good, the bad and the ugly. *RELC Journal*, 54(2), pp.445-451. https://doi.org/10.1177/00336882231168504.

Hornberger, M., Bewersdorff, A. and Nerdel, C., 2023. What do university students know about Artificial Intelligence? Development and validation of an AI literacy test. *Computers and Education: Artificial Intelligence*, 5, p.100165. https://doi.org/10.1016/j.caeai.2023.100165.

Hrastinski, S., Olofsson, A.D., Arkenback, C., Ekström, S., Ericsson, E., Fransson, G., Jaldemark, J., Ryberg, T., Öberg, L.M., Fuentes, A. and Gustafsson, U., 2019. Critical imaginaries and reflections on artificial intelligence and robots in postdigital K-12 education. *Postdigital Science and Education*, 1, pp.427-445. https://doi.org/10.1007/s42438-019-00046-x.

Kaur, K. and Trifan, V.A., 2024. Navigating the Double-Edged Sword of ChatGPT: Enhanced Learning vs. Ethical Issues. Ovidius University Annals, Economic Sciences Series, 24(1), pp.237-245.

Kohnke, L., Moorhouse, B.L. and Zou, D., 2023. Exploring generative artificial intelligence preparedness among university language instructors: A case study. *Computers and Education: Artificial Intelligence*, 5, p.100156. https://doi.org/10.1016/j.caeai.2023.100156.

Lai, C.Y., Cheung, K.Y. and Chan, C.S., 2023. Exploring the role of intrinsic motivation in ChatGPT adoption to support active learning: An extension of the technology acceptance model. *Computers and Education: Artificial Intelligence*, 5, p.100178. https://doi.org/10.1016/j.caeai.2023.100178.

McGrath, C., Pargman, T.C., Juth, N. and Palmgren, P.J., 2023. University teachers' perceptions of responsibility and artificial intelligence in higher education-An experimental philosophical study. *Computers and Education: Artificial Intelligence*, 4, p.100139. https://doi.org/10.1016/j.caeai.2023.100139.

Niloy, A.C., Bari, M.A., Sultana, J., Chowdhury, R., Raisa, F.M., Islam, A., Mahmud, S., Jahan, I., Sarkar, M., Akter, S. and Nishat, N., 2024. Why do students use ChatGPT? Answering through a

triangulation approach. *Computers and Education: Artificial Intelligence*, 6, p.100208. https://doi.org/10.1016/j.caeai.2024.100208.

Rodway, P. and Schepman, A., 2023. The impact of adopting AI educational technologies on projected course satisfaction in university students. *Computers and Education: Artificial Intelligence*, 5, p.100150. https://doi.org/10.1016/j.caeai.2023.100150.

Seo, K., Tang, J., Roll, I., Fels, S. and Yoon, D., 2021. The impact of artificial intelligence on learner–instructor interaction in online learning. *International journal of educational technology in higher education*, 18, pp.1-23. https://doi.org/10.1186/s41239-021-00292-9.

Susnjak, T. and McIntosh, T.R., 2024. ChatGPT: The end of online exam integrity?. *Education Sciences*, 14(6), p.656. https://doi.org/10.3390/educsci14060656.

Verma, N., Getenet, S., Dann, C. and Shaik, T., 2023. Designing an artificial intelligence tool to understand student engagement based on teacher's behaviours and movements in video conferencing. *Computers and Education: Artificial Intelligence*, 5, p.100187. https://doi.org/10.1016/j.caeai.2023.100187.

Yilmaz, R.. and Yilmaz, F.G.K., 2023. The effect of generative artificial intelligence (AI)-based tool use on students' computational thinking skills, programming self-efficacy and motivation. *Computers and Education: Artificial Intelligence*, 4, p.100147. https://doi.org/10.1016/j.caeai.2023.100147.

Generational Differences in the Perceptions and Usage of Self-Scanning and Paying Counters in Supermarkets

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Abstract

The study analyses generational differences in the perception and use of self-scanning and self-service technologies in supermarkets in Romania. Using a quantitative methodology based on an online questionnaire applied to a sample of 126 urban respondents, the research examines four hypotheses regarding generational differences. Results indicate significant discrepancies between age groups: young consumers (under 25) are more motivated to visit supermarkets with self-scanning and self-service facilities, and this motivation decreases with age. People under 35 perceive these technologies as very beneficial, while older respondents see them as moderately beneficial. In terms of ease of use, most age groups find the technologies accessible, with the exception of those over 45, who report moderate difficulties. Time efficiency is also perceived differently - younger users experience time savings, while older respondents find the time spent comparable with traditional methods. The results suggest the need for tailored strategies to improve the experience of consumers of different generations when interacting with self-service retail technologies.

Keywords
Generational differences, Self-scanning technologies, Consumer behavior, Digitalized supermarkets, Technological Perception.

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Introduction

Widespread adoption of self-scan and pay counters and electronic payment systems has substantially altered consumer purchasing behaviour. Such innovations as self-service kiosks and electronic wallets provide increased convenience while simultaneously introducing new dynamics in terms of spending habits, fiscal responsibility, and the acceptance of technology across different demographic segments. Time pressure and the desire for control are contextual factors that also impact the use of self-payment technologies. For instance, individuals aiming for fast service providers, for example, supermarkets and fast food outlets, have a greater inclination to use self-checkout machines in the interests of saving time (Kim, Kim and Lee, 2023). This behaviour is considered to be explained by the ease of use and the convenience provided by the self-payment technology, which in turn, might account for increased spending readiness, most especially for youth segment of population and individuals with advanced degrees of digital literacy (Hayrapetyan and Petrosyan, 2023; Goyal, 2024). The time-saving gains due to the reduced waiting lines of self-payment technologies represent a main driver for consumers to accept these technologies (Vakulenko, Oghazi and Hellström, 2019; Le et al., 2024). Though there are studies addressing consumer responses to digital technologies used by companies during their dealings with customers, the particular area of self-scanning and paying technologies in stores is not adequately researched. Hence, the present study attempts to

understand the attitudes and behaviour of different generations while shopping, particularly with regard to the self-scanning and self-payment technologies employed by supermarkets.

Thus, the first part of the paper analyses the various factors linked to consumer behaviour when self-paying for various services, while the second part of the paper analyses the way generations regard and behave in the presence of these technologies of self -scanning and self-paying in the physical shopping settings of supermarkets.

1. Literature review

The use of self-service cash counters is affected by a mix of technological, psychological, and environmental factors. Researchers have indicated that consumers' inclination to use various technologies is fuelled by the technologies' perceived usefulness, ease of use, and convenience (Vakulenko, Oghazi and Hellström, 2019; Kim and Lee, 2020; Le et al., 2024). Also, research about the Technology Acceptance Model (TAM), indicates that users will adopt self-pay technologies more readily if they perceive these systems as easy to use and useful (Vakulenko, Oghazi and Hellström, 2019).

Likewise, the usability of these systems, with their intuitive interfaces and reduced levels of complexity, favours greater levels of consumer willingness to use them (Vakulenko, Oghazi and Hellström, 2019; Kim and Lee, 2020). For instance, research concerning self-service kiosks indicated that control and convenience were among the variables with the highest influence in lowering consumer reluctance to these technologies (Kim and Lee, 2020).

Trust is one of the key drivers of the adoption of self-payment technologies. Consumers are more willing to use such systems if they find them secure and reliable (Le et al., 2024). Nevertheless, data security concerns and privacy issues may be obstacles to adoption, especially for the more aged consumers. Empirical findings indicate that shopping at self-service counters has both positive and negative impacts on consumer spending behaviour. On one hand, these technologies can facilitate impulse purchasing and increase the willingness to spend due to their ease of use and to reduced unpleasantness when paying (Hayrapetyan and Petrosyan, 2023; Yousef, 2024). On the other hand, based on some studies, self-pay technologies can promote financial discipline and can increase financial responsibility by providing consumers with tools to track their spending and manage their budgets. For instance, electronic wallets with spending-tracking features have proven to improve the financial management skills, particularly in the young adult population (Yousef, 2024).

The impact of self-pay technologies on consumer spending varies across generations. For example, Generation Z, as digital natives, will more likely engage in indulgent purchasing when using mobile payments, while earlier generations may exhibit more frugal spending behaviour due to security and privacy issues (Goyal, 2024; Thoumrungroje and Suprawan, 2024).

The repeated use of self-service and payment technology is determined by consumer attitudes, perceived benefits, and satisfaction with the technology. The literature indicates that favourable attitudes towards self-service payment technologies, including perceived enjoyment and satisfaction, are strong predictors of repeated usage (Vakulenko, Oghazi and Hellström, 2019; Kim and Lee, 2020; Le et al., 2024). Individuals who have enjoyed a good experience with self-service and payment technologies will tend to repeat the process in the future shopping sessions. This is also confirmed by a study on self-service kiosks which indicated that customers who found the systems to be entertaining and convenient used them more frequently (Kim and Lee, 2020). It can be concluded that perceived benefits of self-pay technology, such as time saving, convenience, and control, also significantly affect intentions to use. Consumers with favourable attitudes toward these benefits will be more likely to adopt and continue to use self-pay systems (Vakulenko, Oghazi and Hellström, 2019; Le et al., 2024).

Despite the benefits, some consumers may be hesitant to use self-payment technologies because of factors like feelings of human alienation, lack of trust, and perceived complexity (Kim and Lee, 2020; Le et al., 2024). There is a need to overcome such barriers to maximize the adoption and continued use of self-payment technologies. Organizations can enable the use of self-payment technologies by improving the user interface, ensuring security protocols, and alleviating trust and privacy concerns (Le et al., 2024). In addition, the provision of incentives, such as promotional offers and rewards, can encourage consumers to use these systems (Yousef, 2024). Policymakers in conjunction with financial institutions can play a crucial role in the responsible promotion of self-pay technologies by encouraging financial awareness and offering education on the risks involved in impulsive buying and overspending (Yousef, 2024).

Several factors moderate the relationship between self-scan and pay counters and consumer behaviour, including demographic characteristics, financial education, and psychological traits.

Age, gender, and generational differences significantly influence consumer behaviour in the context of self-pay technologies. For example, younger generations, such as Millennials and Generation Z, are more likely to adopt and use self-pay technologies due to their higher levels of digital literacy and comfort with technology (Goyal, 2024; Thoumrungroje and Suprawan, 2024). Gender also plays a role, with some studies suggesting that females may be more susceptible to overspending when using mobile payments (Goyal, 2024).

Financial awareness and education is another important moderator of consumer behaviour. Consumers with higher levels of financial literacy are more likely to use self-pay technologies responsibly, while those with lower levels may be more prone to impulsive buying and financial mismanagement (Yousef, 2024).

Psychological traits, such as self-control and risk tolerance, also influence consumer behaviour when using self-pay technologies. For example, consumers with higher levels of self-control are less likely to engage in impulsive buying, while those with lower levels may be more susceptible to the convenience and ease of use of these technologies (Karthika, Chaidir and Suprapti, 2024).

Businesses should also consider generational differences when designing and marketing self-pay technologies. For example, older generations may require more support and education to feel comfortable using these systems, while younger generations may be more responsive to innovative features and incentives (Thoumrungroje and Suprawan, 2024).

2. Methodology of research, objectives and hypotheses

This study employed a cross-sectional survey design utilizing an online questionnaire to gather data on consumer behaviour in respect with self-pay cash counters. The questionnaire was developed using Google Forms and distributed via digital channels, including social media platforms and email invitations. A non-probability, self-selection sampling technique was employed, 126 answers from participants of both genders and various ages being recorded. Consequently, the research results are limited to the particularities of the sample and may not accurately reflect the broader population, and findings should be interpreted with caution.

The main objective of the research is to analyse the way consumers of various generations respond to the introduction of digital technologies in supermarkets that allow them the self-scanning and self-paying of own shopping baskets in the physical setting of supermarkets. As such, the following research hypotheses have been set: *H1*. There is a difference between generations about being motivated to visit a supermarket that has self-scanning and paying counters. *H2.* There is a difference between generations about perceiving self-scanning and paying counters as beneficial for customers. *H3*. There is a difference between generations about the perceived ease of use self-scanning and paying at counters. *H4.* There is a difference between generations in what concerns the time spent for self-scanning and paying at counters, as compared with the time spent for traditional counters operated by human workforce.

3. Results and discussions

The sample consisted of 126 respondents of both genders and all ages, living in urban area and having access to supermarkets equipped with self-scanning and paying counters. By looking in general at the shopping behaviour of the respondents we can say that, in general, respondents shop physically in supermarkets, at least once /week or more frequent, as a result of Wilcoxon Signed test for median applied in conditions of approximate symmetry (the skewness coefficient is -0.24), the cut-off significance value being set at 0.05. Hence, their opportunities for interacting with self-scanning and paying equipment in supermarkets are numerous, creating thus the premises for answers founded on real user experience.

In terms of identifying the motivation of consumers to visit a supermarket based also on self-scan and pay counters, given the non-normal distribution of ordinal data, Mood's test has been applied, the results being shown in Table no. 1.

Table no.1. Mood's Median Test: motivation for visiting a supermarket with self-scan and pay counters cross age

Age.	Median	N < Overall Median	N >= Overall Median	Q3 – Q1	95% Median CI
1 (<25 years)	3	24	58	1.0	(3, 3)
2 (26-35 years)	2	12	10	1.0	(2, 3)
3 (36 -45 years)	1	12	2	1.0	(1, 2)
4 (>46 years)	2	6	2	1.5	(1, 3)
`Overall	3				

Test

Null hypothesis	H_0: The population medians are all equal
Alternative hypothesis	H_1: The population medians are not all equal

DF	Chi-Square	P-Value
3	21.29	0.000

The Mood test shows that the self-scan and pay counters tend to decrease as motivation to visit a supermarket with age, the youngest segment - below 25 years, being the one that appreciates the most this digital facility of self-scanning and paying the shopping basket. While young people find self-scan and pay counters as highly motivating them for visiting a supermarket, the age group 26-35 years displays an average level of motivation, while the age category 36-45 places the least level of importance on self-scanning and paying counters in choosing a supermarket to go shopping. A slight increase in median is shown in the group >46 years (average motivation). However, this result can be explained by the small number of respondents in this group category, the confidence interval of median ranging from 1-3, with a greater variability in the data (as shown by the higher interquartile range of 1.5), which makes estimates for this age group above 45 years less precise.

Overall, the p-value below 0.05 shows that there are differences between generations in terms of considering self-scanning and paying counters as motivation for visiting a supermarket, and, as such, the H1 research hypothesis is confirmed.

Next we analysed the perceived benefits of self-scanning and paying counters across generations, the results being shown in table no. 2.

Table no. 2. Mood's Median Test: the benefits of self-scanning and paying counters for customers cross age

Age	Median	N < Overall Median	N >= Overall Median	Q3 – Q1	95% Median CI
1 (<25 years)	3	13	69	0.00	(3, 3)
2 (26-35 years)	3	4	18	0.00	(3, 3)
3 (36 -45 years)	2	8	6	2.00	(1, 3)
4 (>46 years)	2	6	2	0.75	(2, 3)
Overall	3				

Test

Null hypothesis	H_0: The population medians are all equal
Alternative hypothesis	H_1: The population medians are not all equal

DF	Chi-Square	P-Value
3	22.82	0.000

Again, there is a difference between generations in what concerns how beneficial self-scanning counters are in the supermarkets, as young respondents below 35 years old consider these digital instruments benefit to a high extent, while the older respondents have a lower median of their answers, signifying a moderate beneficial equipment for customers introduced by the supermarkets. Thus, H2 research is confirmed.

Next we wanted to find out what are the main drivers for the motivation and the perception of benefits brought by this ICT technology allowing self-scanning and paying in supermarkets, and we took into

account the ease of use of these machines (results are shown in table no3) and the time spent for self operating at these counters (table no.4).

Table no. 3. Mood's Median Test: ease of use of self-scanning and paying counters cross age

Descriptive Statistics

Age	Median	N < Overall Median	N >= Overall Median	Q3 – Q1	95% Median CI
1 (<25 years)	3.0	7	75	0.00	(3, 3)
2 (26-35 years)	3.0	2	20	0.00	(3, 3)
3 (36 -45 years)	3.0	4	10	1.00	(2, 3)
4 (>46 years)	2.5	4	4	1.75	(1, 3)
Overall	3.0				

Test

Null hypothesis	H_0: The population medians are all equal
Alternative hypothesis	H_1: The population medians are not all equal

DF	Chi-Square	P-Value
3	13.95	0.003

The median test applied across generations indicates that only respondents above 45 years consider the use of self-scanning and paying counters slightly more complicated than respondents younger. While the interquartile range for this group is higher (1.75) than for the other groups, placing less confidence on the estimates, the overall result of the test with the p-value of 0.003, below the cut-off value of 0.05 indicates that there are differences among generations about the perceived ease of use, confirming thus the research hypothesis H3. At the same time, it can be inferred that a more complicated perception for the use of these self-scanning and paying tools at shopping is translated through increased self- operating times, hence the lack of interest in using these in the physical shopping process. The Spearman correlation coefficient calculated between ease of use and time spent at self-scan and pay counters as compared to traditional counters operated by human workers shows a value of -0.399, p-value<0.05. This shows only a moderate negative connection, meaning that there are other factors than ease of use that may contribute to the amount of time spent at these self-pay counters as compared to the traditional counters. Nevertheless, the same tendency is preserved across generations both at ease of use and of time spent at self-scan and pay counters (see table no. 4).

Table no. 4. Mood's Median Test: time spent at self-scan and pay counters as compared to traditional human operated counters cross age

Descriptive Statistics

Age	Median	N <= Overall Median	N > Overall Median	Q3 – Q1	95% Median CI
1 (<25 years)	1	72	10	0.0	(1, 1)
2 (26-35 years)	1	18	4	0.0	(1, 1)
3 (36 -45 years)	1	8	6	1.0	(1, 2)
4 (>46 years)	2	2	6	1.5	(1, 3)
Overall	1				

Test

Null hypothesis	H_0: The population medians are all equal
Alternative hypothesis	H_1: The population medians are not all equal

DF	Chi-Square	P-Value
3	22.31	0.000

In line with the findings of the preceding assessment in relation to perceived ease of use, it is notable that participants in the age bracket over 46 years assert that, on average, the duration they take to self-scan and pay for their shopping trolley is comparable to the amount of time they would have taken to use conventional, human-operated checkout tills. In summary, a p-value less than 0.05 suggests the existence

of statistically significant disparities among generations regarding the duration allocated to the self-scanning and payment procedures, thereby validating hypothesis H4.

Conclusions

The impact of self-pay cash counters on consumer behaviour is multidimensional and complex, driven by a variety of technological, psychological, and demographic conditions. By understanding these factors and addressing the associated challenges, businesses and policymakers can promote the adoption and responsible use of self-pay cash counters, ultimately enhancing consumer well-being and businesses resilience. The current study aimed to analyse the factor of age This study explored generational differences in consumer attitudes and behaviours toward self-scanning and self-paying technologies in supermarkets. Using an online questionnaire, data from 126 urban respondents across various age groups were analysed.

The findings reveal significant generational differences in the perceptions and usage of self-service technologies:

- **Motivation to visit supermarkets with self-scanning and paying options**. Younger consumers, particularly those under 25, are more inclined to visit supermarkets offering self-scanning and self-paying facilities, this motivation decreasing with age.

- **Perceived benefits**. Respondents under 35 perceive self-service technologies as highly beneficial, whereas older participants view them as moderately advantageous.

- **Ease of use**. While most age groups find these technologies user-friendly, those over 45 years report slightly more difficult, indicating potential usability challenges for older consumers.

- **Time efficiency**. Younger users generally experience time savings with self-scanning and paying options, as compared to traditionally human operated counters. However, older respondents often find the time spent comparable to traditional checkout methods.

The study contributes to the scientific literature on technology acceptance by providing age-specific insights into consumer behaviour toward self-service technologies, reinforcing theories such as the Technology Acceptance Model within a generational context. Moreover, it highlights age-specific patterns in motivation, perceived benefits, ease of use, and time efficiency with practical benefits for the management of service providers as it supports decision making to enhance usability and convenience for the customers.

Several limitations should be considered when interpreting these findings, given by the sampling method, since the use of a non-probability, self-selection sampling technique limits the extrapolation of the results to all population, as well as the relatively sample size in the over 46 age group and the particularities of demographics - confined to urban residents potentially excluding perspectives from rural or less technologically connected populations. Nevertheless, the study results align with existing literature suggesting that younger generations are more receptive to technological innovations in retail settings. More aged consumers may require additional support and education to enhance their comfort and efficiency with such technologies. Future directions of research may address sample and could explore how exposure and training influence consumers' acceptance of self-service technologies.

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References

Goyal, M., 2024. Impact of Cashless Payments on Impulse Buying Behaviour of Gen Z. *ShodhKosh: Journal of Visual and Performing Arts*, 5(6). https://doi.org/10.29121/shodhkosh.v5.i6.2024.2242.

Hayrapetyan, D. and Petrosyan, N., 2023. Features of Financial Behavior in Cash, Cards and Applications. *Modern Psychology*, 6(1(12)), pp.49–57. https://doi.org/10.46991/SBMP/2023.6.1.049.

Karthika, N.S., Chaidir, T. and Suprapti, I.A.P., 2024. The Influence Of E-Wallet Use on Consumptive Behavior of Mataram City Communities Moderate by Self-Control. *The Eastasouth Management and Business*, 3(1), pp.65–76. https://doi.org/10.58812/esmb.v3i1.335.

Kim, H.-J. and Lee, J.-M., 2020. Consumers' Resistance and Continued Use Intention of Self-service Kiosk. *Family and Environment Research*, 58(3), pp.401–416. https://doi.org/10.6115/fer.2020.029.

Kim, M., Kim, Y. and Lee, G., 2023. Effect of situational factors (control, convenience, time pressure, and order complexity) on customers' self-service technology choices. *Journal of Hospitality Marketing & Management*, 32(5), pp.649–669. https://doi.org/10.1080/19368623.2023.2195398.

Le, N., Mai, N.T.B., Ngo, N.T. and Dang, H.T.T., 2024. The Moderating Role of Trust in the Adoption of Self-Service Payment Systems by Consumers. *Journal of Organizations, Technology and Entrepreneurship*, 2(2), pp.65–83. https://doi.org/10.56578/jote020201.

Lee, E.M. and Oh, S., 2022. Self-service kiosks: an investigation into human need for interaction and self-efficacy. *International Journal of Mobile Communications*, 20(1), p.33. https://doi.org/10.1504/IJMC.2022.119955.

Lee, H., Fairhurst, A.E. and Lee, M., 2009. The importance of self-service kiosks in developing consumers' retail patronage intentions. *Managing Service Quality: An International Journal*, 19(6), pp.687–701. https://doi.org/10.1108/09604520911005071.

Lee, S., 2020. A study on user experience of unmanned payment kiosk system in fast food restaurants. *International Journal of Smart Business and Technology*, 8(1), pp.33–38. [online] Available at: <https://gvpress.com/journals/IJSBT/vol8_no1/4.pdf> [Accessed 2 May 2025].

Thoumrungroje, A. and Suprawan, L., 2024. Investigating M-Payment Intention across Consumer Cohorts. *Journal of Theoretical and Applied Electronic Commerce Research*, 19(1), pp.431–447. https://doi.org/10.3390/jtaer19010023.

Vakulenko, Y., Oghazi, P. and Hellström, D., 2019. Innovative framework for self-service kiosks: Integrating customer value knowledge. *Journal of Innovation & Knowledge*, 4(4), pp.262–268. https://doi.org/10.1016/j.jik.2019.06.001.

Yousef, F., 2024. The Impact of E-Wallets on Consumer Spending Behavior and Financial Management. *International Journal for Scientific Research*, 3(12), pp.429–456. https://doi.org/10.59992/IJSR.2024.v3n12p12.

Sustainable value creation for businesses and consumers through innovation, new business models and new forms of market interaction

A Moderated Mediation Analysis of the Relationship between Fixed Assets and Sales Value of the Largest Retailers in Romania

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Abstract

Driven by economic changes, digitalization, and evolving consumer preferences, the Romanian retail sector has experienced significant transformations and substantial revenue growth, despite fluctuations in the number of companies. Existing research largely concentrates on consumer behavior and market trends, leaving the economic determinants of retail performance less understood. To fill this void, this study quantitatively examines the impact of key financial indicators—fixed assets, inventories, receivables, and employee count—on the sales value of the largest Romanian retailers. Through hierarchical regression and mediation-moderation techniques, it aims to identify the relationships between financial structure and business outcomes.

Our findings reveal that fixed assets initially show a strong positive correlation with sales; however, this impact lessens when other factors are taken into account. Notably, inventories and receivables are crucial for driving sales performance, and the number of employees acts as a mediator in the relationship between asset investments and revenue generation. This article offers originality through its theoretical contributions, highlighting the interplay of financial and operational variables in retail success, as well as its practical implications, providing business managers and policymakers with actionable insights for optimizing investment strategies, enhancing workforce efficiency, and improving financial management to maintain a competitive edge.

Keywords

Retail, sales value, performance, mediation analysis, moderated analysis.

DOI: 10.24818/BASIQ/2025/11/001

Introduction

The Romanian retail sector has experienced substantial transformations in recent years due to economic dynamics, digitalization, and particularly, evolving consumer preferences. In an increasingly competitive environment among major retailers, understanding the drivers of sales performance is crucial for companies seeking to sustain and expand their market share (Hategan et al., 2021).

While current research often emphasizes consumer behavior and market trends (Busu, Vargas and Gherasim, 2020), a significant gap exists in the economic analysis of retail company performance. This study intends to address this by investigating the impact of key economic indicators—fixed assets, inventories, receivables, and employee numbers—on the revenues of Romania's leading retail firms (Ilie and Vasiu, 2022).

The significance of this study lies in its capacity to illuminate the impact of various economic factors on retail performance. The findings contribute to the academic understanding of retail success and offer practical insights for managers and decision-makers. By elucidating the relationship between asset management and sales growth, this research can guide companies in optimizing investments, refining operational processes, and enhancing profitability within an increasingly competitive market. As the Romanian retail sector navigates technological advancements and economic uncertainties, this study identifies crucial elements for developing sustainable business strategies, thereby providing a foundation for future research and strategic decisions in a dynamic retail landscape.

1. Review of the scientific literature

Current research on the Romanian retail sector predominantly investigates consumer behavior and market dynamics, with fewer studies exploring the relationship between economic performance and asset structure. Existing literature has examined various facets of the industry, including the impact of external factors, financial performance, and consumer preferences. Notably, one significant research initiative analyzes the effects of the COVID-19 pandemic on retail, emphasizing shifts in consumer demand and disruptions to supply chains (Savan, Gica and Sofica, 2022). Another study explores retailers' perceptions of safety measures and their influence on shopping behavior (Stanca, Dabija and Câmpian, 2023). Additionally, research has categorized consumers into four distinct types based on their adaptability and shopping inclinations (Stanca, Dabija and Câmpian, 2025).

Studies on the financial aspects of Romanian retail have shown an inverse relationship between capital structure and profitability in B2C e-commerce, alongside overall sector improvements in 2020 compared to 2019 (Duguleană, Duguleană and Deszke, 2024) and, conversely, a positive correlation between capital structure and profitability in other Romanian retail firms (Maxim, 2023). Research on digital food retail identifies consumer segments focused on convenience versus local and sustainable options (Alfnes, Ardebili and Viciunaite, 2024). Strategic aspects like retail network expansion in emerging economies (Teixeira et al., 2022) and the growing importance of sustainable consumer behavior in Romania within the EU Green Deal (Purcărea et al., 2022) have also been explored. A comparative analysis of Romania and Hungary highlights differences in supermarket concentration, economic indicators, and liquidity (Harangi-Rákos and Fenyves, 2021).

With Romania's retail sector on a continued growth path, projected to exceed 4.5 million sqm of modern retail space by 2024, and despite a 20% decrease in the number of retailers since 2008, the industry has seen a remarkable 216% revenue increase to 354 billion RON. Key players include Lidl and Kaufland in groceries, eMAG in e-commerce, and Profi in store network size. While e-commerce sales reached €6.3 billion in 2022, 2023 saw inflation driving price increases (+6.2%, with food at +13.9%), contrasting with a strong 25% growth in cosmetics sales.

Against this backdrop, the present study seeks to identify which factors, frequently cited in the literature as impacting firm sales performance, influence the sales value of the largest Romanian retail firms. Specifically, we examine fixed assets, inventories, receivables, liabilities, capital, expenses, and employee numbers. Our primary prediction is that each of these factors will positively and significantly correlate with sales performance, and their combined effect will be even stronger. Furthermore, we aim to investigate potential moderating and mediating effects involving fixed assets, receivables, employee numbers, and sales value.

2. Research methodology

Employing a quantitative methodology, this study investigates the key determinants of revenue among Romania's leading retail firms. The research leverages economic data obtained from industry reports, company financial statements, and public databases (Top Firme, 2024). The study uses hierarchical regression analysis via SPSS and Macro Process to explore the impact of different business metrics on company performance. A significance level of $p < 0.05$ was applied, and statistical significance was evaluated using 95% confidence intervals.

3. Results and discussions

Our analysis incorporated several variables, including sales value (SV), expenses (E), capital (C), fixed assets (FA), inventories (I), receivables (R), liabilities (L), and the number of employees (NoE), as detailed

in Table 1. We observed significant positive correlations ($p < 0.01$) among the majority of these variables. Interestingly, specific pairs—capital and receivables, fixed assets and receivables, inventories and receivables, and receivables with the number of employees—showed negligible bilateral correlation, which is consistent with our expectations. For the hierarchical regression analysis, where sales value was the dependent variable, we removed expenses due to a very strong correlation with sales value ($r = 0.997$, $p < 0.01$), as this presented a substantial multicollinearity concern.

Table no. 1. Correlations between variables

Variables	Pearson's correlation							
Sales value	1	,997**	,662**	,661**	,746**	,529**	,823**	,898**
Expenses		1	,630**	,644**	,743**	,528**	,839**	,886**
Capital			1	,960**	,528**	,133	,511**	,730**
FA				1	,573**	,042	,587**	,742**
Inventory					1	,379	,810**	,731**
Receivables						1	,664**	,318
Liabilities							1	,705**
NoE								1

** Correlation is significant at the 0.01 level (2-tailed).**
* Correlation is significant at the 0.05 level (2-tailed).*

Regression analysis was used to determine the factors influencing the sales value of the largest retail firms in Romania. Sales value served as the dependent variable, while fixed assets, inventories, receivables, and number of employees were the independent variables. The results of the hierarchical regression model are detailed in Table 2.

Table no. 2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,661[a]	,437	,413	4,28315	,437	18,613	1	24	,000
2	,798[b]	,637	,605	3,51372	,200	12,662	1	23	,002
3	,868[c]	,754	,721	2,95535	,117	10,512	1	22	,004
4	,939[d]	,882	,859	2,09671	,128	22,708	1	21	,000

a. Predictors: (Constant), Fixed Assets
b. Predictors: (Constant), Fixed Assets, Inventory
c. Predictors: (Constant), Fixed Assets, Inventory, Receivables
d. Predictors: (Constant), Fixed Assets, Inventory, Receivables, Number of Employees

As shown in Table 3, the Analysis of Variance (ANOVA) demonstrates that all four models achieved a high level of statistical significance ($p < 0.001$). The F-test results confirm this, with significance coefficients (sig.) consistently below 0.001 for the different degrees of freedom tested ($df = 1, 24$ to $df = 4, 21$).

Table no. 3. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	341,460	1	341,460	18,613	,000[b]
	Residual	440,290	24	18,345		
	Total	781,749	25			
2	Regression	497,787	2	248,893	20,160	,000[c]
	Residual	283,963	23	12,346		
	Total	781,749	25			
3	Regression	589,599	3	196,533	22,502	,000[d]
	Residual	192,150	22	8,734		
	Total	781,749	25			
4	Regression	689,430	4	172,357	39,206	,000[e]
	Residual	92,320	21	4,396		
	Total	781,749	25			

a. Dependent Variable: Sales value
b. Predictors: (Constant), Fixed Assets
c. Predictors: (Constant), Fixed Assets, Inventory
d. Predictors: (Constant), Fixed Assets, Inventory, Receivables
e. Predictors: (Constant), Fixed Assets, Inventory, Receivables, Number of Employees

Table 4 provides a concise overview of the regression analysis coefficients. Furthermore, a collinearity analysis, examining tolerance and VIF values, indicated no significant multicollinearity among the variables. Notably, with the exception of the t-test results for fixed assets and inventories in Model 4, all other variable coefficients showed statistical significance.

Table no. 4. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	3,828	1,000		3,830	,001	1,765	5,891		
	FA	1,585	,367	,661	4,314	,000	,827	2,344	1,000	1,000
2	(Constant)	1,099	1,123		,979	,338	-1,224	3,422		
	FA	,835	,368	,348	2,268	,033	,073	1,596	,671	1,490
	I	5,732	1,611	,546	3,558	,002	2,400	9,065	,671	1,490
3	(Constant)	1,100	,944		1,164	,257	-,859	3,058		
	FA	1,071	,318	,446	3,367	,003	,411	1,730	,636	1,572
	I	3,638	1,501	,346	2,424	,024	,525	6,751	,547	1,829
	R	2,427	,748	,380	3,242	,004	,874	3,979	,813	1,229
4	(Constant)	-,286	,730		-,392	,699	-1,805	1,233		
	FA	,241	,285	,100	,846	,407	-,352	,834	,399	2,509
	I	1,045	1,196	,100	,874	,392	-1,441	3,532	,434	2,306
	R	1,768	,549	,277	3,222	,004	,627	2,909	,762	1,313
	NoE	,941	,197	,663	4,765	,000	,530	1,351	,291	3,438

a. Dependent Variable: SV

The hierarchical regression analysis (Table 5) revealed the incremental impact of each variable on sales value. Initially, fixed assets alone explained a significant 44% of the variance in sales value ($R2 = 0.44$, $\Delta R2 = 0.44$, $F(1,24) = 18,61$, $p < .001$), demonstrating a significant positive effect ($\beta = 0.66$, CI = 0.83, 2.34, $p < .001$), thus confirming our initial prediction.

Subsequently, including inventory in the Model 2 significantly increased the explained variance to 64% ($R2 = 0.64$, $\Delta R2 = 0.20$, $F(2,23) = 12,66$, $p < .01$), with inventory also significantly predicting sales value ($\beta = 0.55$, CI = 2.40, 9.07, $p < .01$), supporting our prediction for this variable as well.

The addition of receivables to the model (Model 3) further improved the prediction of sales value, accounting for 75% of the variance ($R2 = 0.75$, $\Delta R2 = 0.12$, $F(3,22) = 10.51$, $p < .01$). Receivables also significantly predicted sales value ($\beta = 0.38$, CI = 0.87, 3.98, $p < .01$), indicating a significant association as predicted.

Finally, the introduction of the number of employees in Model 4 led to the largest increase in explained variance, reaching 88% ($R2 = 0.88$, $\Delta R2 = 0.13$, $F(4,21) = 22.71$, $p < .001$). The number of employees also significantly predicted sales value ($\beta = 0.66$, CI = 0.53, 1.35, $p < .001$), corroborating our prediction for this final factor.

Tabel no. 5. Results of the hierarchical regression analysis

Variables	Model 1		Model 2		Model 3		Model 4	
	β	CI: 95%	*β*	CI: 95%	*β*	CI: 95%	*β*	CI: 95%
Fixed Assets	0.66***	0.83, 2.34	0.35*	0.07, 1.60	0.45**	0.41, 1.73	0.1	-0,35, 0,83
Inventory			0.55**	2.40, 9.07	0.35*	0.53, 6.75	0.1	-1,44, 3,53
Receivables					0.38**	0.87, 3.98	0.28**	0,63, 2,91
Number of employees							0.66***	0,53, 1,35
Model fit statistics								
F-value	18.61***		12.66**		10.51**		22.71***	
R^2	.44		.64		.75		.88	
ΔR^2	.44		.20		.12		.13	

To explore the potential mediating role of the number of employees in the relationship between fixed assets and sales value, we analyzed the data presented in Tables 6 and 7 and Figure 1. The results suggest that there is no significant direct link between fixed assets and sales value (β = - 0.01, sig = 0.941). However, significant indirect effects were observed, indicating that the number of employees fully mediates the relationship between these two variables.

Table no. 6. Summary of the regression analysis and its coefficients

Path	*β*	SE	Sig
X → M	0.74	0.27	.000
X → Y (total)	0.66	0.31	.000
X → Y (direct)	-.01	0.39	.941
M → Y	0.91	0.32	.000

Legend:
- X = Fixed Assets
- Y = Sales value
- M = Number of employees

Table no. 7. Indirect (mediation) effect analysis

Path	Effect	SE	$LL_{95\%}$	$UL_{95\%}$
X → M → Y	0.67	0.16	0.36	1.05

Notes. LL = lower limit of a 95% confidence interval. UL = upper limit of 95% confidence interval.

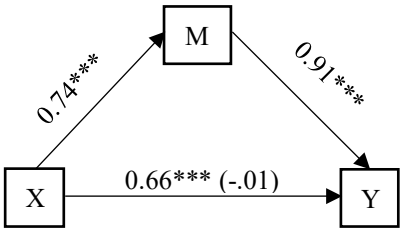

Figure no. 1. The mediation of number of employees between fixed assets and sales value

*Notes. *p < .05, **p < .01, ***p < .001. Standardized coefficients are used.*
The coefficient in parentheses reflects the direct effect (with the mediator included).

Although our analysis did not find a significant effect of receivables on the number of employees, we investigated the potential moderating role of receivables in the relationship between the number of employees and sales value. Table 8 reveals a significant interaction between the number of employees and receivables in predicting sales value, a finding visually supported by Figure 2. This indicates that receivables strengthen the positive relationship between the number of employees and sales value, with higher levels of receivables leading to a stronger association.

Table no. 8. Summary of the regression analysis and its coefficients

Predictor	*b*	SE	Sig
Number of employees	1.19	0.09	.000
Receivables	0.53	0.61	.387
Interaction	0.28	0.10	.008

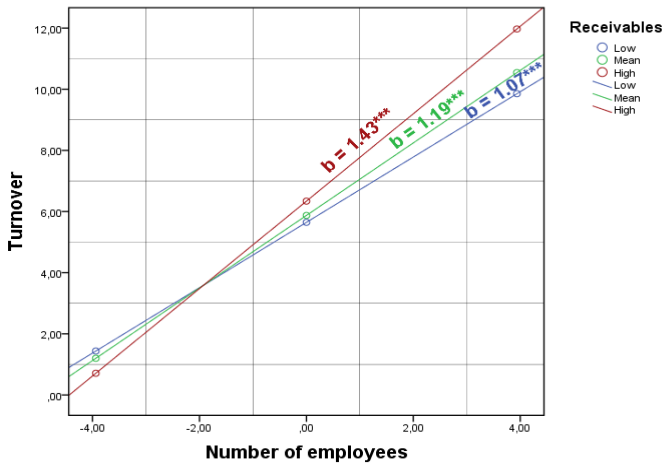

Figure no. 2. Relation between number of employees and sales value moderated by receivables

To understand a more complex relationship, we examined a moderation-mediation model where the effect of fixed assets on sales value is mediated by the number of employees and moderated by receivables (Figure 3, Tables 9 and 10). The results reveal that receivables significantly moderate the relationship between fixed assets and the number of employees. This is evidenced by a significant and negative interaction effect between fixed assets and receivables (b = -6.71, sig. = 0.000).

Table no. 9. Summary of the regression analysis and its coefficients

Predictor	*b*	SE	Sig
Fixed assets	0.11	0.23	0.64
Receivables	0.87	0.34	0.02
Interaction	-6.71	1.11	0.00

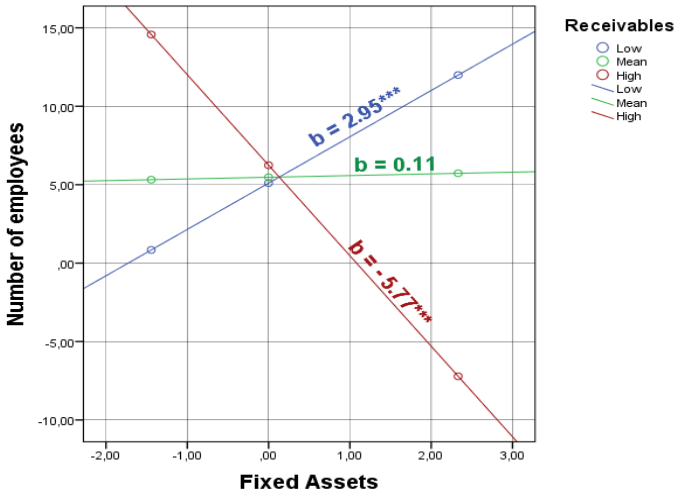

Figure no. 3. Relation between fixed assets and number of employees moderated by receivables

Our findings indicate that the level of receivables significantly influences the relationship between fixed assets and the number of employees. When receivables are low, fixed assets have a positive and significant impact on the number of employees. Conversely, high receivables are associated with a strong negative and significant effect of fixed assets on the number of employees. At the average level of receivables, the effect of fixed assets on the number of employees becomes small and statistically insignificant.

Table 10 provides a concise overview of the moderated-mediation relationship where fixed assets influence sales value through the number of employees, with receivables acting as a moderator. Regarding direct effects, we found a significant positive relationship between the number of employees and sales value, and a significant negative relationship between the interaction of fixed assets and receivables on the number of employees. However, the direct effects of fixed assets on both the number of employees and sales value were not significant. Examining indirect effects, neither the direct nor indirect paths between fixed assets,

the number of employees, and sales value were significant. The analysis of indirectly moderated relationships revealed a significant positive relationship at low levels of receivables and a non-significant strong negative relationship at high levels of receivables. The moderated mediation index was significantly negative. In conclusion, our findings suggest that the interplay of the number of employees and receivables significantly influences the relationship between fixed assets and sales value.

Table no. 10. Reporting Moderated Mediation

Direct relationships	**Unstandardized coefficient**	**t-values**	**Sig.**
Fixed assets → Number of employees	0.108	0.474	0.640
Number of employees → Sales value	1.288	4.076	0.001
Fixed assets → Sales value	-0.029	-0.075	0.941
Fixed assets x Receivables → Number of employees	-6.714	-6.040	0.000
Indirect relationships	**Direct effect**	**Indirect effect (SE)**	**Confidence interval**
Fixed assets → Number of employees → Sales value	-0.029	0.139 (1.21)	-0.83, 0.78
Probing moderated indirect relationships	**Effect**	**SE**	**Confidence interval**
Low level of Receivables	3.80	1.26	1.66, 6.49
High level of Receivables	-7.43	3.95	-13.25, 4.27
Index of moderated mediation	-8.65	3.56	-14.62, -0.001

Conclusions

To summarize, we found evidence of a moderated-mediation relationship where the effect of fixed assets (including stores, warehouses, and essential physical and online operational equipment) on sales value is contingent on both the number of employees and the level of receivables in the analyzed firms. This relationship is negative, suggesting that higher levels of employees and receivables amplify the negative impact of increased fixed assets on sales value.

This research investigated the key drivers of revenue for Romania's leading retail firms, focusing on fixed assets, inventories, receivables, and employee numbers. The findings reveal that these factors significantly account for differences in sales value, each with a distinct impact. Specifically, fixed assets initially show a strong positive effect on revenue, although this effect diminishes with the inclusion of other variables.

The study also highlights the importance of stock levels and receivables, underscoring the critical role of efficient inventory management and supporting financial liquidity for retail success. Furthermore, the number of employees acts as a mediating factor, suggesting that effective workforce management amplifies the benefits of asset utilization.

The moderated mediation analysis provides a critical insight: the level of receivables enhances the positive impact of employee numbers on sales value. This highlights the importance of maintaining financial stability as a driver of business growth. These conclusions carry notable ramifications for both theoretical models of retail performance and practical management strategies.

From a theoretical standpoint, this study contributes to the existing knowledge of retail performance by illuminating the dynamic interaction between financial and operational factors. For practitioners, it provides crucial insights for optimizing asset allocation, refining inventory control strategies, and enhancing workforce capabilities. Given the growth of the Romanian retail sector and the need to navigate economic hurdles, digitalization, and changing consumer demands, future research should prioritize investigations into digitalization's impact, evolving consumer behavior, and the influence of macroeconomic variables on retail. Sustainable growth and competitiveness in this sector depend on a holistic strategy that integrates effective asset management, human resource development, and sound financial planning.

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References

Alfnes, F., Ardebili, A.T. and Viciunaite, V., 2024. Exploring consumer segments for online food provisioning services: Online supermarkets vs. alternative food networks. *Sustainable Production and Consumption*, 47, pp.278–288. https://doi.org/10.1016/j.spc.2024.04.014.

Busu, M., Vargas, M.V. and Gherasim, I.A., 2020. An analysis of the economic performances of the retail companies in Romania. *Management & Marketing. Challenges for the Knowledge Society*, 15(1), pp.125–133. https://doi.org/10.2478/mmcks-2020-0008.

Duguleană, C., Duguleană, L. and Deszke, K.-D., 2024. Financial performance and capital structure – an econometric approach for Romanian e-commerce companies during the COVID-19 pandemic. *Economic Analysis and Policy*, 83, pp.786–812. https://doi.org/10.1016/j.eap.2024.05.024.

Harangi-Rákos, M. and Fenyves, V., 2021. Financial performance and market growth of the companies in Hungary and Romania: A study of the food retail companies. *Corporate Ownership and Control*, 18(3, special issue), pp.325–336. https://doi.org/10.22495/cocv18i3siart7.

Hategan, C.-D., Pitorac, R.-I., Hategan, V.-P. and Imbrescu, C.M., 2021. Opportunities and Challenges of Companies from the Romanian E-Commerce Market for Sustainable Competitiveness. *Sustainability*, 13(23), p.13358. https://doi.org/10.3390/su132313358.

Ilie, L. and Vasiu, D., 2022. Capital Structure and Profitability. The Case of Companies Listed in Romania. *Studies in Business and Economics*, 17(3), pp.100–112. https://doi.org/10.2478/sbe-2022-0049.

Maxim, L.G., 2023. The Influence of the Capital Structure on the Profitability: Evidence from the Romanian Retail Industry. *Bulletin of the Transilvania University of Brasov. Series V: Economic Sciences*, pp.109–120. https://doi.org/10.31926/but.es.2023.16.65.1.12.

Purcărea, T., Ioan-Franc, V., Ionescu, Ş.A., Purcărea, I.M., Purcărea, V.L., Purcărea, I., Mateescu-Soare, M.C., Platon, O.E. and Orzan, A.O., 2022. Major Shifts in Sustainable Consumer Behavior in Romania and Retailers' Priorities in Agilely Adapting to It. *Sustainability (Switzerland)*, 14(3). https://doi.org/10.3390/su14031627.

Savan, E.-E., Gica, O. and Sofica, A., 2022. Retail Demand Forecasting for Small-Medium Enterprises During COVID-19 Pandemic: Case Studies Based on Romanian Convenience Stores. In: S.L. Fotea, I.Ş. Fotea and S. Văduva, eds. *Navigating Through the Crisis – A special Issue on the Covid 19 Crises*. [online] Cham: Springer International Publishing. pp.101–131. https://doi.org/10.1007/978-3-030-82755-7_7.

Stanca, L., Dabija, D.-C. and Câmpian, V., 2023. Qualitative analysis of customer behavior in the retail industry during the COVID-19 pandemic: A word-cloud and sentiment analysis approach. *Journal of Retailing and Consumer Services*, 75, p.103543. https://doi.org/10.1016/j.jretconser.2023.103543.

Stanca, L., Dabija, D.-C. and Câmpian, V., 2025. Adaptation and resilience in retail: Exploring consumer clusters in the new normal. *Journal of Retailing and Consumer Services*, 82, p.104112. https://doi.org/10.1016/j.jretconser.2024.104112.

Statista Research Department, 2024. *Retail market in Romania - statistics & facts*. [online] Available at: <https://www.statista.com/topics/12213/retail-market-in-romania/#topicOverview> [Accessed 10 February 2025].

Teixeira, R., Duarte, A.L. de C.M., Macau, F.R. and de Oliveira, F.M., 2022. Assessing the moderating effect of brick-and-mortar store on omnichannel retailing. *International Journal of Retail & Distribution Management*, 50(10), pp.1259–1280. https://doi.org/10.1108/IJRDM-03-2021-0139.

Top firme, 2024. *Top firme din Romania dupa cifra de afaceri*, [online] Available at: <https://www.top-firme.com/cifra-de-afaceri/> [Accessed 10 February 2025].

Integrating Battery Recycling Into the Circular Economy: A Sustainable Business Model for LI-Ion Battery Waste in Romania

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Abstract

This article aims to develop a sustainable and economically viable business model for a national-scale lithium-ion (Li-ion) battery recycling facility in Romania, in response to the escalating challenges of battery waste management. In line with the European Union's targets for net-zero greenhouse gas emissions by 2050, the phase-out of combustion engines by 2035, and regulatory requirements for domestic battery waste processing, the development of structured recycling systems is imperative. Furthermore, EU Regulation 2023/1542 stipulates that, by 2031, industrial, electric vehicle, and SLI batteries incorporate a minimum of 16% recycled cobalt, 6% recycled lithium, and 6% recycled nickel, with progressively stricter thresholds through 2040. The study examines how such a facility could mitigate environmental impacts, recover critical raw materials, and advance the circular economy. The research adopts a qualitative methodology based on semi-structured interviews with the president of the National Battery Recycling System (SNRB) in Romania, complemented by extensive desk research. The findings confirm that establishing a domestic recycling facility is both technically feasible and financially viable. The proposed plant, with an investment of €1.24 million, is projected to achieve a return on investment within three to six years, depending on funding sources. It will enable efficient recovery of critical raw materials, reduce dependence on raw extraction, and mitigate environmental hazards associated with battery waste. This study offers a business framework tailored to Romania's specific market needs, aligning with EU environmental goals while addressing infrastructure gaps. It highlights the importance of regulatory frameworks and public-private partnerships in fostering sustainable recycling ecosystems. The implementation of this model can guide policymakers, investors, and industry stakeholders towards building scalable recycling infrastructure, promoting environmental responsibility, and advancing Romania's transition to a circular economy.

Keywords

Li-ion battery, battery recycling, sustainable business, circular economy, rare metals, Green Deal, repurposing.

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Introduction

There are several elements that indicate the need for a change in the way we look at the battery waste market in general and automotive waste in particular, and the actions needed to manage what is expected to be a significant influx of batteries in the future without neglecting the environmental impact and of course, the financial one:

1. EU is aiming for net-zero greenhouse gas emissions by 2050, and electric vehicles do not emit greenhouse gas emissions (European Commission, 2018).
2. All battery types must be fully collected and recycled using advanced methods to recover key materials like cobalt, lithium, nickel, and lead. High recovery rates protect the environment, support future battery innovation, and lessen reliance on raw material extraction (European Commission, 2020).
3. EU intends to end sales of combustion engines by 2035 and the significant increase in sales of electric vehicles and scooters/tricycles in recent years will create major challenges in the future regarding the recycling of Li-ion batteries (Euractiv, 2022).
4. EU Regulation 2023/1542 requires that by 2031, industrial, electric vehicle, and SLI batteries incorporate a minimum of 16% recycled cobalt, 6% recycled lithium, and 6% recycled nickel, with progressively higher targets set for 2036 and beyond.

Furthermore, the European Commission has recently proposed that Member States retain waste batteries within their country of origin, introducing a dedicated hazardous waste code for lithium batteries, particularly from separately collected municipal waste streams. While intended to enhance management oversight, this requirement may challenge states lacking adequate treatment and recycling infrastructure. The proposal aligns with Regulation (EU) 2024/1157 on waste shipments, which strengthens restrictions on the export of strategic waste streams, including batteries, beyond the European Union (European Commission, 2025).

Lithium-ion batteries outperform conventional types with higher energy density, lower self-discharge, and longer life. Their temperature resilience makes them ideal for plug-in and hybrid EVs, aligning with projected global sales of nearly 100 million units annually by 2045 (Paul et al., 2024).

Back in 2010, in Romania, Pleşea and Vişan (2010), wrote that the collection of car accumulators was done properly, according to the law, but when it came to the collection of batteries, he said that it was done from time to time, existing a very low number of traders that were really in the process of recycling these products.

O'Neill (2021) argues that while scaling EV battery recycling is conceptually simple, significant commercial and technical challenges remain. Olsson et al. (2018) highlight the potential for second-life Li-ion batteries to enhance circularity across the battery value chain.

The paper finds that while stakeholders recognize the potential of second life, organizational and cognitive barriers exist, and suggests that actors in the battery value chain should form new collaborations to seize business opportunities and develop new models.

At the international level, there are a lot of studies focused on the Li-ion batteries recycling process or second life usage, proposing business models (Wrålsen et al., 2021; Popescu et al., 2022; Shahjalal et al., 2022), while, when it comes to Romania, the subject is almost untouched. Thus, the authors found a gap in the literature and came up with the present paper, which aims to demonstrate that there is a solution for a sustainable and profitable business model in Romania. Establishing national-scale battery recycling facilities could significantly reduce unusable waste streams and enhance the circularity of battery components.

The paper is structured in five chapters, starting with the introduction and continuing with a review of the scientific literature, methodology, and a business model for battery recycling. In the last chapter, the conclusions are presented.

1. Review of the scientific literature

Li-ion batteries contain a mixture of materials (black mass) that could be recovered from spent batteries through a process that generally involves three main methods: pyrometallurgy, hydrometallurgy, and direct recycling (Paul et al., 2024). But, before that, several steps are required, such a pretreatment processes (storage, diagnosis, sorting and cell discharge methods) and mechanical dismantling, through techniques like: crushing, sieving, and both sequential and automated segregation (Bhar et al., 2023). A battery consists mainly of active cathode and anode materials, which contain valuable metals and compounds, found in finite quantities in nature: lithium (Li), cobalt (Co), nickel (Ni) and manganese (Mn), serving as an "urban mine" (Ran et al., 2024). Among them, cobalt (Co) and lithium (Li) are the most important in terms of scarcity and cost (International Energy Agency, 2024).

- *Cobalt (Co):* the most valuable and rare, approximately 70% of global production is extracted from the Democratic Republic of Congo. Cobalt mining raises ethical concerns (labor exploitation, environmental impact), thus making it crucial to recycle due to its value and the difficulties of extraction.

Cobalt supply projections highlight strong dependence on global production trends and policy effectiveness. Under a business-as-usual scenario, supply meets conservative demand, while an optimistic scenario shows a slight surplus but still falls short of Net Zero needs. A pessimistic view warns of significant shortages, stressing the need for strategic policies and long-term investment to secure supply for climate goals.

- *Lithium (Li):* essential (the key element of the battery), but not extremely rare is extracted from Australia, China and Chile. The extraction process is polluting and consumes water in significant quantities.

Lithium supply projections show a consistent shortfall across all scenarios. The pessimistic case highlights risks from tech delays and limited investment, while even the optimistic scenario fails to meet Net Zero goals. This gap underscores the urgent need for policies to boost investment, advance technology, and scale recycling to support electrification and sustainable energy. (Shannak, Cochrane and Bobarykina, 2024).

Cui et al. (2024) proposed three business models referring to repurposing, recycling, and circular production for lithium-ion batteries, arguing that a circular economy for automotive battery recycling is achievable without government subsidies if all stakeholders act in the community's interest. Conversely, Lima et al. (2022) developed a recycling business model for Brazil, highlighting that economic viability depends largely on tax exemptions, regulatory incentives, and technological maturity. Lithium-ion batteries, which never fully discharge, require multi-step treatment processes at end-of-life, typically after about ten years (Yu et al., 2024).

Batteries constitute 20–30% of a vehicle's weight, with small electric cars (40–50 kWh) carrying batteries of 250–350 kg and larger vehicles up to 1.500 kg, posing a substantial environmental burden. Recycling is further complicated by storage risks due to lithium's high reactivity and flammability, necessitating strict safety measures (Shukla and Shankul, 2024). A major barrier remains the inconsistent and inadequate volume of collected batteries, compounded by the absence of public data on annual collection rates in Romania and the need for stronger legislative and public engagement.

Table no. 1. Batteries put on market in Romania

	Put on market 2022		**Put on market 2023**		**Put on market 2024**	
	tons	***number***	***tons***	***number***	***tons***	***number***
Total	**5,385.54**	**97,784,341**	**7,031.08**	**97,958,188**	**9,447.11**	**92,835,369**
of which, Li-ion batteries and related	1,200.53	164,507	2,358.20	293,009	4,040.01	976,351

Source: National Battery Recycling System (SNRB)

Table no. 2. Batteries collected in Romania by one of the largest organizations in the field

	Collected 2022		**Collected 2023**		**Collected 2024**	
	tons	***number***	***tons***	***number***	***tons***	***number***
Total	**883.35**	**2,245,488**	**1,060.62**	**2,896,261**	**1,036.65**	**2,940,539**
of which, Li-ion batteries and related	632.72	2,002,094	149.52	2,147,462	262.48	2,535,470

Source: National Battery Recycling System (SNRB)

2. Research methodology

The objective of this article is to develop a business model for a battery recycling facility, given the absence of such infrastructure in Romania. Consequently, a qualitative research approach, based on a semi-structured interview, was deemed the most appropriate method for this study.

The discussions were conducted with the president of the National Battery Recycling System (SNRB), one of the largest non-governmental organizations in Romania, and a founding member of EUCOBAT (European Compliance Organization for Batteries). SNRB's mission is to assume the responsibilities of battery and accumulator manufacturers and importers, by establishing an efficient system for the collection and recycling of waste batteries and accumulators (SNRB, 2025). The interview was guided by a structured framework consisting of targeted questions designed to keep the conversation focused on the research objectives and to ensure the collection of accurate and relevant information. The structured interview framework guided three online meetings, each lasting approximately 90 minutes.

In addition to the primary data collection, desk research was undertaken, which involved the review of various documents, press releases, public reports, and market analyses pertaining to the battery sector in Romania and across Europe, as: Grand View Research, 2025 for Battery Market Overview 2024-2028 and in Lithium-Ion Battery Market Overview 2024-2028 in Europe, as well as for Battery Market Overview 2024-2028 in Romania. The majority of the data collected through interviews and secondary sources was qualitative in nature. However, quantitative data was also incorporated, specifically from the organization's internal reports and financial records, providing a more comprehensive understanding of the topic.

3. Business model for battery recycling facility

This study proposes the development of a dedicated battery recycling facility, designed to integrate environmental stewardship with economic viability. The facility will adopt a closed-loop recycling model aimed at minimizing waste, recovering strategic materials, and supporting the circular economy in alignment with the objectives set forth in Regulation (EU) 2023/1542.

- *Location and Target Market:* The facility will be in an industrial park near a major urban center to optimize logistics, strategically located near the transportation infrastructure for easy access to collection points and distribution networks, targeting battery manufacturers, retailers, and end consumers by providing recycled materials and eco-friendly disposal solutions.
- *Investment and Financial Objectives:* The initial investment is projected at €1,240,000, with a payback period of six years. EU funding could accelerate the return on investment to approximately three years.
- *Expected Environmental and Economic Benefits:* The facility will reduce battery waste, lessen dependence on raw material extraction, and mitigate disposal risks, while fostering long-term profitability and strengthening corporate social responsibility initiatives.

The *market analysis* includes the following:

- *Market Trends:* The global demand for battery recycling solutions is growing rapidly, driven by stricter environmental regulations, increasing public awareness of sustainability, and the broader transition toward a circular economy aimed at reducing dependence on virgin resources.
- *Market Segmentation:* The primary market for battery recycling comprises battery manufacturers seeking recycled materials to meet production and sustainability goals, electronics retailers responsible for collecting spent batteries from devices and EVs, and end consumers who serve as key suppliers within the recycling chain.
- *Demand:* The European battery recycling market is projected to reach $3.5 billion by 2027, driven by robust regulatory support and sustainability goals (Grand View Research, 2025a).
- *Competitors:* While established firms such as Umicore and Redwood Materials dominate internationally, Romania presents a market gap for authorized lithium-ion recyclers, offering opportunities for new entrants.
- *Regulations:* Battery recycling is regulated by EU directives like Directive 2006/66/EC and Regulation No. 1542/2023, which aim to reduce environmental impact and improve recycling rates. Com-

pliance with these regulations is essential for the facility's success (European Environment Agency, 2020-2025).

The *operational plan* includes the following:

- *Facility Requirements:* The facility will occupy 1,000 m², with distinct zones for collection, processing, and storage, designed to meet safety and environmental standards.
- *Required Equipment:* The facility will require a range of specialized equipment including collection vehicles, sorting machinery, and processing units for shredding and extracting materials like lithium, cobalt, and lead.
- *Logistics:* Partnerships with transportation providers specializing in hazardous waste handling will ensure regulatory compliance and safe transportation.
- *Operational processes:* include battery collection via retailers, safe transportation to the facility, sorting and storage, followed by processing using advanced machinery to recover valuable materials.
- *Safety Regulations:* The facility will follow comprehensive safety protocols, ensuring the proper handling and storage of hazardous materials, with staff trained in safety procedures.
- *Technologies Used:* Modern technologies will be employed to extract critical raw materials, supporting the transition to a circular economy and reducing reliance on virgin resources.

Regarding the *organizational structure*, the business will operate as a Limited Liability Company (LLC), with defined roles to ensure effective governance and operations. The General Director will oversee strategic and financial management, while the Operations Manager will supervise daily activities and safety protocols. The Sales and Marketing Manager will manage outreach and client relations, and the Environmental and Safety Specialist will ensure regulatory compliance. Production staff will be responsible for battery collection, sorting, and processing.

Regarding the *financial plan*, the initial investment and revenue projections are presented in the following tables:

Table no. 3. Initial Investment

Component	Estimated Cost (EUR)	Details
Facility Construction	700.000	Main building, offices, storage, processing areas
Equipment & Machinery	470.000	Battery shredder: 150.000 EUR; Sorting system: 100.000 EUR; Metal recovery system: 200.000 EUR; Safety equipment: 20.000 EUR
Licenses & Permits	50.000	Environmental and regulatory fees
Marketing and launch costs	20.000	
Total Initial Costs	**1.240.000**	

Table no. 4. Revenue Forecast

Revenue Source	Quantity / Year	Unit Price (EUR)	Total Revenue (EUR)
Recycled Battery Sales	250 tons	2.000	500.000
Partner Contracts*	-	-	50.000
Total Annual Revenue			**550.000**

** Agreements for the collection and recycling of used batteries from manufacturers and retailers.*

Revenue estimation is based on the average selling price for recovered metals and potential contracts with partners. Sales projections may fluctuate in response to changes in secondary raw material market prices. The European Union has set a target for 15% of the materials used in new batteries to be sourced from recycling by 2030.

Revenues are projected to grow by 10% annually, while expenses are expected to increase by 5% per year.

Table no. 5. Financial Projections

Year	Revenues (EUR)	Expenses (EUR)	Net Profit (EUR)
1	550.000	429.000	121.000
2	605.000	450.450	154.550
3	665.500	472.973	192.527

Table no. 6. Breakeven Point Calculation

Cost Type	Annual Cost (EUR)
Fixed Costs	264.000
Variable Costs	165.000
Total Annual Costs	429.000
Indicator	**Value**
Contribution Margin (EUR/ton)	1.340
Breakeven Point (tons)	197

- *Determining Fixed and Variable Cost:* Fixed costs, essential for facility operation, total €264.000 annually. These include employee salaries (€150.000), equipment maintenance (€10.000), depreciation of equipment and construction (€64.000), marketing (€20.000), and other administrative expenses (€20.000). Variable costs, which fluctuate with production volume, total €165.000. These include processing costs (€100.000), utilities (€15.000), and logistics (€50.000).
- *Revenue Calculation:* Revenue is generated by selling recycled materials at €2.000 per ton.
- *Contribution Margin:* The contribution margin per ton is calculated as the selling price minus the variable cost per ton.
- *Break-even Point:* The break-even point is reached when total revenues equal total costs. It is calculated as: Total Fixed Costs / Contribution Margin

The facility must process and sell approximately 197 tons annually to cover both fixed and variable costs, with any additional volume contributing to profitability.

- *Funding Sources:* Funding strategies include traditional bank financing to support initial capital and operational costs; European Union funding, notably through the LIFE Programme, to align with environmental policy objectives; venture capital investment targeting green technologies; public-private partnerships with municipalities to secure financial support and long-term contracts; and crowdfunding to engage environmentally conscious individuals while enhancing public visibility and support.

The *primary marketing objective* is to raise public awareness of the environmental importance of lithium-ion battery recycling, aiming to increase collection rates and support the facility's sustainable operation.

- *Marketing Strategies* - A multi-faceted marketing strategy will include educational campaigns targeting local communities and stakeholders, a comprehensive digital presence leveraging social media and SEO, and strategic partnerships with electronics retailers and automotive service centers to expand collection networks.
- *Sales Channels* - Sales efforts will focus on securing long-term contracts with companies in the electronics, automotive, and renewable energy sectors, offering tailored recycling service packages to ensure a consistent supply of recyclable materials.

Regarding *environmental impact*, it is important to mention the ecological benefits and regulatory compliance.

- *Ecological Benefits* - The facility will reduce hazardous waste by diverting end-of-life batteries from landfills and recovering valuable raw materials, thus strengthening sustainable waste management. It will contribute to natural resource conservation by reclaiming critical elements like lithium, cobalt, and nickel, supporting circular economy principles and reducing the environmental impacts of mining. Proper recycling practices will prevent the release of toxic substances, safeguarding soil, groundwater, and air quality.
- *Regulatory Compliance* - Operations will fully comply with local, national, and international environmental regulations, including Directive 2006/66/EC of the European Parliament on waste batteries and accumulators, as well as Regulation (EU) 2023/1542, which governs the sustainable management of batteries and associated waste streams. Compliance with these legal frameworks ensures not only environmental protection but also the alignment of the facility's operations with broader EU sustainability and climate policy objectives.

Conclusions

An updated regulatory framework, aligned with the current challenges of the lithium-ion battery sector, is essential for establishing a functional recycling system. Such a framework would directly influence public policy by creating favorable conditions for market development through the establishment of standardized pricing and quality benchmarks for battery recycling. These measures would enhance transparency and efficiency, supporting both private and public sector efforts to achieve environmental objectives.

Beyond regulatory measures, investment in human capital and the promotion of innovation through applied research are critical for advancing sustainable technologies. Partnerships with universities can foster technological improvements in recycling processes, leading to more efficient and environmentally friendly solutions and reinforcing circular economy principles (Chigbu, 2024).

A regulatory environment that supports research and innovation can significantly shape public policy, encouraging both private and public investments in sustainable recycling technologies. In this context, public policy plays a vital role in enabling the transition toward a circular economy, enhancing environmental protection, and reducing reliance on finite resources.

This business plan, underpinned by a robust legislative framework, comprehensive market analysis, a clear operational model, and a viable financial strategy, provides a strong foundation for establishing a lithium-ion battery recycling facility. The project has the potential to drive both profitability and sustainable development, while contributing meaningfully to the expansion of the circular economy.

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References

Bhar, M., Ghosh, S., Krishnamurthy, S., Kaliprasad, Y. and Martha, S.K., 2023. A review on spent lithium-ion battery recycling: from collection to black mass recovery. *RSC Sustainability*, [online] 1(5), pp.1150–1167. https://doi.org/10.1039/D3SU00086A.

Chigbu, B.I., 2024. Advancing sustainable development through circular economy and skill development in EV lithium-ion battery recycling: a comprehensive review. *Frontiers in Sustainability*, [online] 5, p.1409498. https://doi.org/10.3389/frsus.2024.1409498.

Cui, Y., Teah, H.Y., Dou, Y., Kanematsu, Y., Yamaki, A., Yonetsuka, T., Chang, I.-S., Wu, J. and Kikuchi, Y., 2024. Design and assessment of sustainable spent automobile lithium-ion battery industries in Japan: A system dynamic business model approach. *Journal of Cleaner Production*, [online] 479, p.144078. https://doi.org/10.1016/j.jclepro.2024.144078.

Euractiv, 2022. *EU countries approve end to combustion engine sales by 2035*. [online] Available at: <https://www.euractiv.com/section/transport/news/eu-countries-approve-end-to-combustion-engine-sales-by-2035/> [Accessed 20 March 2025].

European Commission, 2018. *2050 long-term strategy*. [online] Available at: >https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2050-long-term-strategy_en> [Accessed 6 April 2025].

European Commission, 2020. *Stepping up Europe's 2030 climate ambition: Investing in a climate-neutral future for the benefit of our people.* [online] Available at: <https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2312> [Accessed 20 March 2025].

European Commission, 2025. *Commission Delegated Decision (EU) of 5 March 2025 amending Decision 2000/532/EC as regards the update of the list of waste in the case of waste related to batteries.* [online] Available at: <https://eur-lex.europa.eu/resource.html?uri=cellar:37477e90-f9af-11ef-b7db-01aa75ed71a1.0007.02/DOC_1&format=PDF> [Accessed 20 March 2025].

European Environment Agency, 2020-2025. *Legislative guides - Romania.* [online] Available at: <https://www.eea.europa.eu/en/countries/eea-member-countries/romania> [Accessed 1 April 2025].

Grand View Research, 2025a. *Europe Battery Market Overview 2024-2028.* [online] Available at: <https://www.grandviewresearch.com/industry-analysis/battery-market> [Accessed 2 April 2025].

Grand View Research, 2025b. *Europe Lithium-Ion Battery Market Overview 2024-2028.* [online] Available at: <https://www.grandviewresearch.com/industry-analysis/lithium-ion-battery-market-europe> [Accessed 2 April 2025].

Grand View Research, 2025c. *Romania Battery Market Overview 2024-2028.* [online] Available at: <https://www.grandviewresearch.com/industry-analysis/battery-market-romania> [Accessed 2 April 2025].

International Energy Agency (IEA), 2024. *Critical Minerals Data Explorer.* [online] Available at: <https://www.iea.org/data-and-statistics/data-tools/critical-minerals-data-explorer> [Accessed 6 April 2025].

Lima, M.C.C., Pontes, L.P., Vasconcelos, A.S.M., De Araujo Silva Junior, W. and Wu, K., 2022. Economic Aspects for Recycling of Used Lithium-Ion Batteries from Electric Vehicles. *Energies*, [online] 15(6), p.2203. https://doi.org/10.3390/en15062203.

O'Neill, S., 2021. Battery Recycling Challenge Looms as Electric Vehicle Business Booms. *Engineering*, [online] 7(12), pp.1657–1660. https://doi.org/10.1016/j.eng.2021.11.009.

Olsson, L., Fallahi, S., Schnurr, M., Diener, D. and Van Loon, P., 2018. Circular Business Models for Extended EV Battery Life. *Batteries*, [online] 4(4), p.57. https://doi.org/10.3390/batteries4040057.

Paul, A., Lizhen, Prof.G., Recheal, T. and Ali, S., 2024. Sustainable Lithium and Cobalt Recovery from Spent Lithium-ion Batteries: Best Practices for the Future. A review. *Journal of Analytical Techniques and Research*, 06(02). https://doi.org/10.26502/jatr.44.

Pleșea, D.A. and Vișan, S., 2010. Good Practices Regarding Solid Waste Management Recycling. *Amfiteatru Economic.* 12(27), pp.228–241.

Popescu, I.A., Dorneanu, S.A., Truță, R.M. and Ilea, P., 2022. Recent research related to li-ion battery recycling processes – a review. *Studia Universitatis Babes-Bolyai Chemia*, 67(1), pp.257–280. https://doi.org/10.24193/subbchem.2022.1.17.

Ran, Y., Yoon, S., Jöckel, D.M., Meles Neguse, S., Baek, S., Widenmeyer, M., Balke-Grünewald, B. and Weidenkaff, A., 2024. Reviving spent lithium-ion batteries: The advancements and challenges of sustainable black mass recovery. *Battery Energy*, [online] 3(3), p.20230059. https://doi.org/10.1002/bte2.20230059.

Shahjalal, M., Roy, P.K., Shams, T., Fly, A., Chowdhury, J.I., Ahmed, Md.R. and Liu, K., 2022. A review on second-life of Li-ion batteries: prospects, challenges, and issues. *Energy*, [online] 241, p.122881. https://doi.org/10.1016/j.energy.2021.122881.

Shannak, S., Cochrane, L. and Bobarykina, D., 2024. Strategic analysis of metal dependency in the transition to low-carbon energy: A critical examination of nickel, cobalt, lithium, graphite, and copper scarcity using IEA future scenarios. *Energy Research & Social Science*, [online] 118, p.103773. https://doi.org/10.1016/j.erss.2024.103773.

Shukla, D. and Shankul, V., 2024. Risk Management Safety Assessment Over the Life Cycle of Lithium-Ion Batteries in EV. *International Journal of Recent Engineering Science*, [online] 11(3), pp.32–47. https://doi.org/10.14445/23497157/IJRES-V11I3P104.

SNRB, n.d. Home. [online] SNRB | Sistemul Național De Reciclare Al Bateriilor. Available at: <https://snrb.org/> [Accessed: 25 March 2025].

Wrålsen, B., Prieto-Sandoval, V., Mejia-Villa, A., O'Born, R., Hellström, M. and Faessler, B., 2021. Circular business models for lithium-ion batteries - Stakeholders, barriers, and drivers. *Journal of Cleaner Production*, [online] 317, p.128393. https://doi.org/10.1016/j.jclepro.2021.128393.

Yu, L., Bai, Y., Polzin, B. and Belharouak, I., 2024. Unlocking the value of recycling scrap from Li-ion battery manufacturing: Challenges and outlook. *Journal of Power Sources*, [online] 593, p.233955. https://doi.org/10.1016/j.jpowsour.2023.233955.

An Overview on Current Sustainable Practices in the Tire Industry. Focus on Environmental Orientations

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Abstract

The tire industry is responsible for significant environmental and health risks across its entire lifecycle, by consuming high amounts of fossil fuels, water and other natural resources, and by releasing volatile organic compounds and radioactive byproducts. Based on desk research, this paper investigates corporate sustainability reports, integrated annual reports and environment, social, and governance disclosures published by Michelin, Bridgestone, Goodyear, Continental, and Pirelli, which are among the most important players in the global tire market. The purpose of this paper is to identify current sustainable practices, environmental-oriented, in the tire industry, where sustainability is neither a destination nor a checkbox but a relentless, uneven journey. Michelin and Pirelli emerge as frontrunners, leveraging systemic governance and biodiversity stewardship to align innovation with planetary boundaries, while their reliance on premium pricing and fragmented carbon emissions (Scope 3) accountability exposes vulnerabilities in scaling solutions. Contrastingly, while advancing fleet-centric innovations and compliance-driven reporting, Goodyear and Continental grapple with cost barriers and blurred circular economy metrics. Bridgestone's ambiguous stance, which balances futuristic research and development with vague disclosures, exemplifies the sector's struggle to reconcile legacy practices with emergent sustainability imperatives. Across all firms, material bottlenecks (e.g., 10% sustainable rubber adoption) and stalled recycling rates (30% global average) underscore systemic inertia, despite incremental bio-material breakthroughs. Legislative pressures are accelerating standardization, while increasing disparities in transparency. At the same time, consumer and investor demands for a clearer accountability system are reshaping priorities. The analysis over the sustainable paths taken by the five companies outlines important information aimed at redefining the ecological legacy of the tire industry.

Keywords

Sustainability, "green" practices, circular economy, tire industry, environment, entrepreneurship

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Introduction

Sustainability has emerged as a cornerstone of global governance and corporate strategy, driven by escalating regulatory frameworks and societal demands. In 2025, the European Union's (EU) Corporate Sustainability Reporting Directive (CSRD) mandates rigorous environmental, social, and governance (ESG) disclosures, compelling companies to align operations with climate mitigation goals, such as limiting global warming to 1.5°C, compared to pre-industrial levels (Davies and Huber, 2025). In such a context, ESG reporting is not a trend anymore, but it becomes an integral part of firms' economic activity (Belas et al., 2024; Sichigea et al., 2025). However, there are still different contradictory debates on the compliance with all the sustainability-related requirements in current business practice (The Economist, 2025). In

addition, various challenges like greenwashing practices or fluctuating political support have led different companies to not consider sustainability a priority anymore. On the contrary, other companies became more aware of their actions and switched to circular economy models (Institute of Sustainability Studies, 2025). Of topical importance, circular economy principles are redefining the way entrepreneurs committed to the environment are doing business leading to a strong orientation towards the implementation of "green" practices (Amicarelli et al., 2021; Grosu, 2024).

The tire industry, a fundamental component of global transportation systems, poses substantial environmental and public health risks throughout its lifecycle. For decades, tire industry's growth was tethered to resource-intensive practices – synthetic rubber production, fossil fuel-dependent logistics, and linear material flows (Araujo-Morera et al., 2021; Bowles and Fowler, 2022). Furthermore, post-consumer tire disposal intensifies environmental concerns; 75% of used tires are deposited in landfills, where they leach toxic substances into the environment (Mayer et al., 2024).

However, the tire industry is navigating an era of unprecedented transformation, and, in current society, the paradigm is shifting. Important players on the market are orienting themselves towards the implementation of more sustainable practices. Starting from this practical issue, an important question arises: What sustainable practices are companies active in the tire industry implementing, with a particular focus on environment-related orientations? The present paper aims to provide coherent answers to this question by investigating current sustainable practices implemented by Michelin, Bridgestone, Goodyear, Continental, and Pirelli, which are among the most important players in the global tire market (Chicu, Prioteasa and Deaconu, 2020; Tyre Industry Publications Ltd., 2024). This research investigates corporate sustainability reports, integrated annual reports and ESG disclosures published by these five companies. In such a context, the paper is structured in five main sections, introduction included. Section 1 of the paper briefly outlines a review of the literature related to sustainability in the tire industry, whereas Section 2 includes the presentation of the research methodology. Section 3 presents the main research results and discussions. The paper ends with a series of final considerations, systematically presented in the conclusions section.

1. A brief outline of the scientific literature on sustainability in the tire industry

Nowadays, the tire industry is considered an important polluter, and scholars' concerns for its environmental sustainability has sharply increased in the last decade. It can be observed that many studies belong to more technical areas and mainly focus on materials' investigation from sustainable-related perspectives (Das et al., 2021; Shoul et al., 2022; Deng et al., 2023). Approaches are diverse, ranging from broad outlines, like in the cases of Das et al. (2021) or Deng et al. (2023) who investigate the sustainability of tire materials, to more specific analyses like in the case of Shoul et al. (2022), that focus on the use of green silica in the green tire industry. Waste tires recycling technologies or end-of-life tire management, along with their potential for valorisation, especially through byproducts development, are also frequently studied in the scientific literature (Dabic-Miletic, Simic and Karagoz, 2021; Formela, 2021; Martinez, 2021; Abdullah, 2024; Hu et al., 2024). In these cases, approaches vary from being mainly technical to being more interdisciplinary, especially in connection to various aspects related to the circular economy (Symeonides, Loizia and Zorpas, 2019; Araujo-Morera et al., 2021). Furthermore, from a more business-oriented approach, sustainability in the tire industry is tackled in the scientific literature, in studies that focus on its assessment (Dewi, Febrianti and Utama, 2023), on its relationship with supply chains (Mavi et al., 2023), or on the green productivity (Marimin et al., 2018) and the twin transition, approaching the link between companies' digitalization and environmental orientation (Tota et al., 2024).

This paper aims at bringing a novel approach in the scientific literature on the sustainability of the tire industry, especially in terms of its business-related perspectives. Thus, following the research methodology adopted by Amicarelli et al. (2021) or Grosu (2024), this paper aims at analysing the sustainability of the most important players in the industry, by focusing on their environment-oriented practices as outlined in their official documents (i.e., corporate sustainability reports, integrated annual reports and ESG disclosures). This way, this paper adds an extra step to the scientific literature, by offering interesting insights over sustainable practices in the tire industry, analysed from a different perspective, at the same time providing useful information for practitioners active in the industry.

2. Research methodology

Starting from a practical problem, of societal importance, this paper addresses a topical research question: What sustainable practices are companies active in the tire industry implementing, with a particular focus on environment-related orientations? Targeting a coherent answer to the research question, the paper aims

at investigating current sustainable practices implemented by Michelin, Bridgestone, Goodyear, Continental, and Pirelli, world's largest tiremakers, according to their 2023 sales (Tyre Industry Publications Ltd., 2024). To do this in a clear way, desk research was carried out in the second half of April 2025, by systematically analysing the most recent corporate sustainability reports, integrated annual reports and ESG disclosures of these five companies. The official website of each company was accessed to collect information for the study. The analysed documents are outlined in table no. 1.

Table no. 1. The investigated companies and their associated data sources

Name of the company/ Country, Continent	2023 sales (mil. Euro) / tire value and share *	Accessed website, focusing on sustainability-related information	Mainly analysed document
Michelin / France, Europe	28,343 / 26,727 - 94.3%	https://www.michelin.com/ https://www.michelin.com/en/sustainability/company (Accessed 21 April 2025)	2024 Sustainability Statement
Bridgestone / Japan, Asia	27,594.2 / 25,690.2 - 93.1%	https://www.bridgestone.com/regional/europe_cis/ https://www.bridgestone.com/responsibilities/ (Accessed 21 April 2025)	Bridgestone 3.0 Journey Report (2024 Integrated Report)
Goodyear / The United States of America (U.S.A./U.S.), America	18,159.3 / 18,159.3 – 100%	https://www.goodyear.com/ https://corporate.goodyear.com/us/en/commitments/reports-and-policies.html# (Accessed 21 April 2025)	2023 Corporate Responsibility Report
Continental / Germany, Europe	41,420.5 / 13,958 – 33.7%	https://www.continental.com/en/ https://www.continental.com/en/sustainability/ (Accessed 21 April 2025)	2024 Sustainability Report
Pirelli / Italy, Europe	6,650.1 / 6,650.1 – 100%	https://www.pirelli.com/global/en-ww/homepage/ https://corporate.pirelli.com/corporate/en-ww/sustainability/sustainability (Accessed 21 April 2025)	2023 Annual Report

Notes: * according to Tyre Industry Publications Ltd., 2024

Source: developed by the authors

The reports were manually checked for sustainability-related information, with a focus on environmental metrics (especially, Scope 1–3 emissions and renewable energy adoption) and circular economy claims, framed in the governance structure. According to McKinsey & Company (2024), Scope 1, Scope 2 and Scope 3 emissions categorise the greenhouse gases that are released across an organization's entire value chain. Scope 1 refers to direct emissions from sources that are owned or directly controlled by the organization, while Scope 2 encompasses indirect emissions resulting from purchasing energy, including electricity, heating, and cooling. Scope 3 is the most extensive and complex category of emissions, encompassing all indirect greenhouse gas emissions that arise beyond an organization's immediate operational boundaries, both up and downstream. Content analysis was preformed over the collected information, mainly focusing on quantitative key performance indicators (KPIs) (e.g., emissions reductions, renewable energy adoption) and qualitative claims (e.g., circular economy pledges). The main outcomes of the analysis are put forward, in a concise way, by the next section of the paper. Their presentation reflects the specificities of each company, followed by general aspects related to their joint approach, broadly outlining strengths, weaknesses, opportunities and challenges.

3. Results and discussions

Michelin, Pirelli, Goodyear, Continental, and Bridgestone are redefining their roles in a world where sustainability is no longer optional but existential. Their strategies, as revealed in their latest reports and initiatives, reflect a complex interplay of innovation, regulation, and market pragmatism. Yet beneath the glossy sustainability pledges lie stark contrasts in vision, execution, and transparency – a tapestry of ambition and compromise that reveals as much about the industry's future as its past.

Michelin's approach is the most audacious. The company has long positioned itself as a sustainability vanguard, and its 2024 strategy strengthens this identity. Central to its ethos is the concept of systemic circularity, articulated through the "4Rs" framework: Reduce, Reuse, Recycle, Renew. This is not mere rhetoric. Michelin's innovations – such as the VISION concept tire with biodegradable tread and Movin'On, a global coalition of over 300 stakeholders – aim to decouple growth from resource depletion. Michelin's governance framework, which includes cross-functional corporate social responsibility (CSR) committees and a dedicated ethics board, integrates sustainability considerations throughout its decision-making processes. Financially, the company capitalizes on its premium market positioning to support these sustainability initiatives; despite a global decline in tire volumes, its operating income increased to 3.4 billion euros in 2024, driven by high-margin offerings such as energy-efficient truck tires. However, this premium-oriented strategy presents a potential drawback. While it facilitates substantial investment in research and development (R&D), it may also limit accessibility in price-sensitive markets, particularly in developing countries where lower-cost, less sustainable tire alternatives remain prevalent.

Unlike Michelin, Pirelli differentiates itself through a strong emphasis on biodiversity conservation and innovative financial mechanisms. The company's implementation of the TNFD LEAP framework – a comprehensive approach to evaluating nature-related risks (TNFD, 2025) – positions it as a leader in ecological accountability. This commitment is exemplified by its Hutan Harapan rainforest conservation initiative, carried out in collaboration with BMW and BirdLife International, which addresses deforestation in Sumatra while securing sustainable rubber sourcing. Financially, Pirelli's issuance of a 600-million-euro sustainability-linked bond in 2024 – the first of its kind in the industry – demonstrates the integration of environmental targets with investor interests. Even more, the company's reliance on Forest Stewardship Council (FSC)-certified natural rubber and rice husk silica (10% of total usage) signals material innovation. Yet, these remain incremental steps in a sector demanding systemic overhauls. In addition, Pirelli's sustainability trajectory remains uneven. Although it has achieved a 51% reduction in Scope 1 and 2 emissions since 2015 – outpacing industry peers – its lack of disclosure regarding Scope 3 emissions, which comprise approximately 70% of its total carbon footprint, reveals a significant shortcoming.

Goodyear's strategy is defined by its attempt to reconcile sustainability with market accessibility. The company's 2024 Sustainable Reality Survey, which polled over 1,000 fleet operators, reveals a paradox: while 93% prioritize sustainability, 63% view costs as prohibitive. Goodyear's response is the EQMAX tire line, which blends 55% sustainable materials (soybean oil, rice husk ash) with a 20% mileage improvement. This 'better performance, lower cost' pitch targets fleet operators seeking to balance ESG mandates with profitability. Yet Goodyear's broader trajectory is less assured. Its Scope 1-2 emissions reductions lag at 21.9% (vs. a 2019 baseline), and its Scope 3 reporting lacks the granularity of Michelin or Pirelli. Partnerships like Tree-Nation, which planted over 7,000 trees since 2020, feel symbolic against the scale of decarbonization required. The company's "Better Future" framework, aiming for 100% sustainable materials by 2030, hinges on scaling niche innovations – a gamble in an industry where bio-material costs remain volatile.

Continental's journey is marked by 'compliance-driven pragmatism'. The German manufacturer's 2024 Sustainability Report, structured around the EU's CSRD, prioritizes transparency in gender diversity (27% female executives) and workplace safety (1.69 accidents per million hours). These metrics, while laudable, skirt deeper environmental challenges. Continental's circular economy strategy, for instance, lacks the specificity of Michelin's 4Rs, offering vague commitments to "reduce waste" without quantifiable targets. The company's recent spin-off of its Automotive division aims to sharpen focus on tire innovation, particularly in electric mobility – a sector where it holds over 500 electric vehicles (EV)-specific tire approvals. However, this strategic shift is not without risks. Continental's "glocal" production approach – marked by the expansion of manufacturing sites in locations such as Hefei, China – enhances supply chain efficiency and supports market responsiveness, yet introduces complexity in emissions monitoring. The carbon footprint of decentralized production, while advantageous for circumventing tariffs and achieving geographic proximity to key markets, may jeopardize the company's commitment to its net-zero emissions target.

Bridgestone's sustainability-related strategic direction remains among the opaquest, amid the analysed companies. Bridgestone's "E8 Commitment" – encompassing Energy, Ecology, Efficiency, Extension, Economy, Emotion, Ease, and Empowerment – reveals an ambitious future, including innovations such as airless tires and collaborative lunar rover projects with the National Aeronautics and Space Administration (NASA). Yet, its 2024 sustainability disclosures lack substantive detail, offering generalized assertions about "sustainable solutions" while omitting specific metrics. The firm's mid-term strategy (2024–2026) sets a modest target of using 40% recycled and renewable materials in its tires – a figure already exceeded by competitors, such as Goodyear's EcoReady line, which incorporates recycled and renewable materials

in proportion of 70%. Bridgestone's "glocal" approach, which balances regional product adaptation with centralized R&D, affords operational agility but complicates transparency and accountability. For example, its Ecopia line, marketed as environmentally friendly, continues to utilize conventional synthetic rubber compounds in emerging markets.

An illustrative summary of all the above-mentioned information about sustainable practices, focused on environmental orientations, specific to all five investigated companies is depicted in figure no. 1.

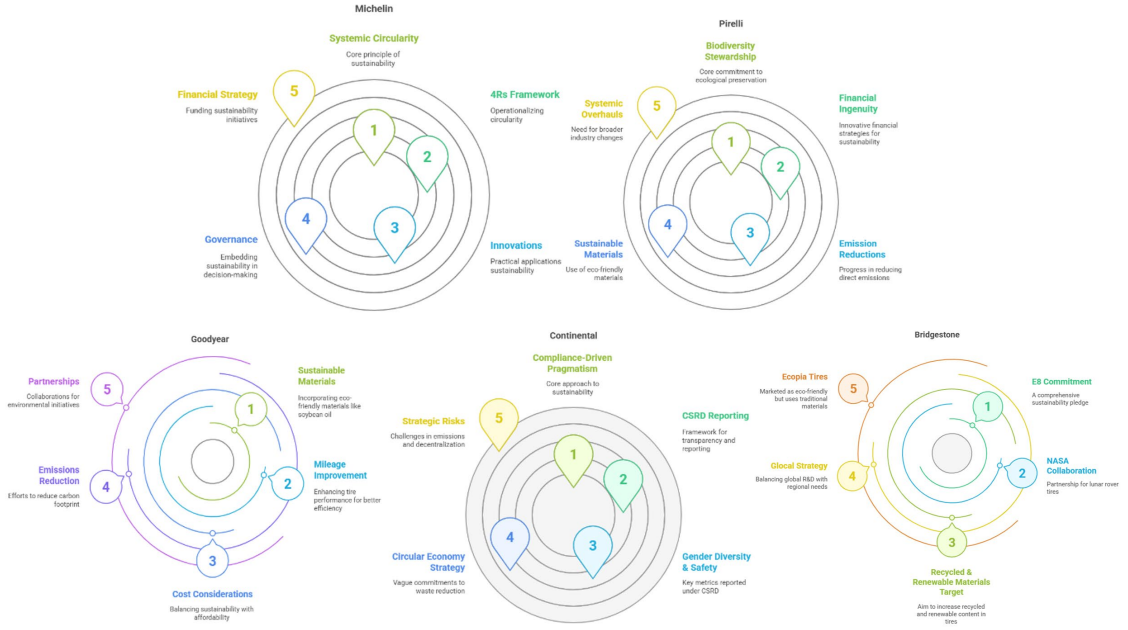

Figure no. 1. Current sustainability orientations, environmental focused, outlined by the analysed companies

Source: developed by the authors based on figures generated with Napkin AI, 2025

Jointly approaching the investigated companies, it can be observed that, beneath the divergent strategies specific to each of them lie common threads. All five companies have pledged net-zero emissions by 2050, with Michelin and Pirelli leading renewable energy adoption (80-100% in key regions). Material innovation unites them: Michelin's bio-sourced polymers, Pirelli's FSC rubber, Goodyear's soybean oil composites, and Bridgestone's guayule experiments all target the same goal – breaking free from fossil-derived materials. Collaborative governance, too, is a hallmark. Michelin's Movin'On, Pirelli's BMW partnership, and the cross-industry Tire Industry Project (TIP) reflect a recognition that systemic challenges – tire wear particles, supply chain deforestation – demand collective action.

Yet the cracks in this unity are revealing. Transparency varies wildly. Michelin and Pirelli publish detailed emissions breakdowns and third-party audits. Continental and Bridgestone obscure key metrics behind broad declarations. Legislative pressures amplify these disparities. The EU's CSRD, which mandates granular ESG disclosures, has forced Continental to overhaul its reporting – a move yet to be mirrored by Bridgestone. In the U.S.A., the U.S. Tire Manufacturers Association (USTMA) advocates for circular infrastructure, pushing members like Goodyear to invest in retreading technologies. However, the absence of federal mandates akin to the CSRD creates a regulatory patchwork, allowing laggards to hide behind voluntary initiatives.

Material costs complicate the landscape. Sustainable alternatives like silica from rice husks or rubber from dandelions remain 2-3 times costlier than conventional inputs. Michelin and Pirelli, with their premium market positions, absorb these costs through higher pricing – a luxury Goodyear and Bridgestone, competing in mass markets, cannot afford. This economic imbalance threatens to split the tire industry into two distinct segments: a premium segment capable of advancing sustainability through innovation, and a mass-market segment hindered by cost constraints.

The most striking divergence between the analysed tire manufacturers lies in the treatment of Scope 3 emissions. Michelin and Pirelli have acknowledged Scope 3 emissions as their most significant challenge. Michelin is investing in pyrolysis technologies to recycle end-of-life tires, while Pirelli is auditing natural rubber supply chains to address deforestation. In contrast, Goodyear and Continental continue to focus primarily on Scope 1 and 2 emissions, prioritizing internal operational efficiencies over broader lifecycle

impacts. In what regards Bridgestone, although its E8 Commitment refers to "energy-efficient logistics," it lacks specific Scope 3 reduction targets.

This inconsistency is reinforced by regulatory disparities. For example, the EU's CSRD mandates Scope 3 disclosures, whereas the U.S. currently imposes no comparable requirements. As a result, corporate sustainability narratives often centre on incremental achievements – such as renewable energy adoption in factories, recycled water usage, etc. – while neglecting the dominant contributor to tire-related emissions: approximately 80% of a tire's environmental impact occurs during its use and post-consumer disposal.

The push toward sustainable tires has produced both genuine innovation and superficial branding. Michelin's VISION tire, which features a 3D-printed, biodegradable tread, represents a substantive leap forward. Similarly, Pirelli's Cyber Tire integrates digital sensors to enhance pressure control and reduce tread wear, connecting sustainability with digitalization. Conversely, many products marketed as "eco-friendly" merely repurpose existing technologies. Bridgestone's Ecopia line, for example, still relies on silica-based compounds introduced in the 1990s, while Continental's EcoContact series relies on minor tread design tweaks.

This dichotomy underscores a deeper tension: R&D cycles in the tire industry span decades, clashing with the urgency of climate deadlines. However, collaborations might offer a partial solution. Michelin's partnership with Swedish startup Enviro to scale pyrolysis-based recycling exemplifies open innovation. Goodyear's joint venture with BP to produce bio-isoprene – a synthetic rubber alternative – aims to disrupt supply chains. Yet, such alliances are fragile. The collapse of Bridgestone's guayule rubber project with Yulex in 2023, citing scalability issues, highlights the risks of dependency on nascent technologies.

As the industry marches toward 2030 – a critical checkpoint for many net-zero pledges – its trajectory will hinge on three factors: (i) legislative coercion; (ii) consumer demand; and (iii) material scalability. The EU's CSRD and U.S. Inflation Reduction Act incentives are already reshaping priorities, pushing firms to quantify once-nebulous goals. Consumer sentiment, particularly in Europe and North America, increasingly ties brand loyalty to sustainability credentials – a shift Michelin and Pirelli exploit through aggressive "green" marketing.

Yet material bottlenecks persist. Sustainable rubber covers less than 10% of global demand, and recycling rates for end-of-life tires stagnate at 30% in most regions (World Business Council for Sustainable Development (WBCSD), 2023). Bridgestone's experiments with recycled carbon black and Michelin's bio-butadiene projects hint at solutions, but commercialization remains distant.

In this fractured landscape, the tire giants are not just competing for market share but for the very soul of their industry. Michelin and Pirelli, with their holistic visions and financial agility, are charting a course toward systemic sustainability. Goodyear and Continental, tethered to cost realities, walk a tightrope between innovation and imitation. Bridgestone, meanwhile, straddles past and future – a titan struggling to shed its skin.

Conclusions

The tire industry's sustainability efforts reveal a landscape of asymmetrical progress, marked by stark contrasts between aspirational pledges and operational realities. Michelin and Pirelli emerge as frontrunners, leveraging systemic governance (e.g., Michelin's '4Rs' framework) and biodiversity stewardship (e.g., Pirelli's TNFD LEAP adoption) to align innovation with planetary boundaries. However, their reliance on premium pricing and fragmented Scope 3 accountability exposes vulnerabilities in scaling solutions. Goodyear and Continental, while advancing fleet-centric innovations (e.g., EQMAX tires) and compliance-driven reporting, grapple with cost barriers and opaque circular economy metrics. Bridgestone's ambiguous stance – balancing futuristic R&D (e.g., airless tires) with vague disclosures – epitomizes the sector's struggle to reconcile legacy practices with emergent sustainability imperatives. Across all firms, material bottlenecks (e.g., 10% sustainable rubber adoption) and stalled recycling rates (30% global average) underscore systemic inertia, despite incremental bio-material breakthroughs.

Legislative pressures, particularly the EU's CSRD and U.S. state-level mandates, are accelerating standardization but also increasing disparities in transparency. While Michelin and Pirelli exploit green financing (e.g., sustainability-linked bonds) to fund decarbonization, laggards like Bridgestone risk alienating ESG-focused investors through opaque reporting. Consumers' and investors' demand for clearer accountability standards are reshaping priorities, yet geopolitical fragmentation – such as the EU's stringent regulations versus U.S. federal inaction – creates a compliance maze. The industry's collective failure to address Scope 3 emissions (70–80% of total footprints) remains its most critical hotspot, with even leaders

like Pirelli delaying concrete roadmaps for supply chain decarbonization. Ultimately, the tire industry's sustainability journey is less a linear path than a contested evolution. Michelin and Pirelli's holistic strategies set benchmarks but rely on unsustainable market privileges (e.g., premium pricing). Conversely, Goodyear and Continental's pragmatic, cost-conscious approaches highlight the tension between innovation and accessibility. Bridgestone's duality – futurism anchored to convention – mirrors the sector's broader identity crisis. As climate deadlines loom, the industry's ecological legacy will hinge on bridging this divide: scaling affordable, circular solutions while dismantling the regulatory and economic barriers that perpetuate fossil-fuel dependency. Sustainability is not a fixed goal but a dynamic reckoning – one demanding radical collaboration, equitable policies, and a reimagining of mobility itself.

Albeit the analysis put forward in this paper outlines diverse perspectives on sustainable practices implemented by top tire manufacturers, with a particular focus on environmental orientations, its limitations might lead to different biases. These might refer to briefly analysing environmental-related data only from the most recent available reports specific to the leading five tire manufacturers. To get a more detailed overview of the tire industry's sustainability and circularity more in-depth research is necessary on a longer period and on more manufactures. However, the present paper sets its premises.

References

Abdullah, Z.T., 2024. Remanufactured waste tire by-product valorization: Quantitative–qualitative sustainability-based assessment. *Results in Engineering*, [e-journal], 22, article no. 102229. https://doi.org/10.1016/j.rineng.2024.102229.

Amicarelli, V., Lagioia, G., Patruno, A., Grosu, R.M. and Bux, C., 2021. Enhancing the Sustainability of the Aviation Industry: Airlines' Commitment to "Green" Practices. *Amfiteatru Economic*, [e-journal] 23(Special Issue No. 15), pp.934-947. DOI: 10.24818/EA/2021/S15/934.

Araujo-Morera, J., Verdejo, R., López-Manchado, M.A. and Hernández Santana, M., 2021. Sustainable mobility: The route of tires through the circular economy model. *Waste Management*, [e-journal] 126, pp.309-322. https://doi.org/10.1016/j.wasman.2021.03.025.

Belas, J., Balcerzak, A.P., Dvorsky, J. and Streimikis, J., 2024. Influencing ESG Perception in SMEs through CSR, Business Ethics, and HRM: An Empirical Study in V4 Countries. *Amfiteatru Economic*, [e-journal] 26(66), pp. 532-549. https://doi.org/10.24818/EA/2024/66/532.

Bowles, A.J. and Fowler, G.D., 2022. Assessing the impacts of feedstock and process control on pyrolysis outputs for tyre recycling. *Resources, Conservation and Recycling*, [e-journal] 182, article no. 106277. https://doi.org/10.1016/j.resconrec.2022.106277.

Chicu, N., Prioteasa, A.L., Deaconu, A., 2020. Current trends and perspectives in tyre industry. *Studia Universitatis "Vasile Goldis" Arad. Economics Series*, [e-journal] 30(Special Issue 2/2020), pp.36-56. DOI: 10.2478/sues-2020-0011.

Dabic-Miletic, S., Simic, V. and Karagoz, S., 2021. End-of-life tire management: a critical review. *Environmental Science and Pollution Research*, [e-journal] 28, pp.68053-68070. https://doi.org/10.1007/s11356-021-16263-6.

Das, S., Satpathi, H., Roopa, S., Das Gupta, S., 2021. Sustainability of the Tire Industry: Through a Material Approach. In: N. Kanwar Rawat, T.G. Volova and A.K. Haghi, eds. 2021. *Applied Biopolymer Technology and Bioplastics*. New York.: Apple Academic Press. ch.4.

Davies, P. and Huber, B., 2025. *ESG and Sustainability Insights: 10 Things That Should Be Top of Mind in 2025*. [online] Available at: <https://corpgov.law.harvard.edu/2025/01/18/esg-and-sustainability-insights-10-things-that-should-be-top-of-mind-in-2025/> [Accessed 27 April 2025].

Deng, S., Chen, R., Duan, S., Jia, Q., Hao, X. and Zhang, L., 2023. Research progress on sustainability of key tire materials. *SusMat*, [e-journal] 3(5), pp.581-608. https://doi.org/10.1002/sus2.159.

Dewi, S.K., Febrianti, R. and Utama, D.M., 2023. An Integrated method for manufacturing Sustainability assessment in tire industry: a case study in Indonesian. *International Journal of Sustainable Engineering*, [e-journal] 16(1), pp.1–12. https://doi.org/10.1080/19397038.2023.2276936.

European Commission, Directorate-General for Financial Stability, Financial Services and Capital Markets Union, n.d. *Corporate sustainability reporting*. [online] Available at: <https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en> [Accessed 17 April 2025].

Formela, K., 2021. Sustainable development of waste tires recycling technologies – recent advances, challenges and future trends. *Advanced Industrial and Engineering Polymer Research*, [e-journal] 4(3), pp.209-222. https://doi.org/10.1016/j.aiepr.2021.06.004.

Grosu, R.M., 2024. "Green" practices in the food retail sector: evidence from the Romanian market. *British Food Journal*, [e-journal] 126(1), pp.173-190. https://doi.org/10.1108/BFJ-12-2022-1119.

Hu, Y., Yu, X., Ren, J., Zeng, Z. and Qian, Q., 2024. Waste tire valorization: Advanced technologies, process simulation, system optimization, and sustainability. *Science of The Total Environment*, [e-journal], 942, article no. 173561. https://doi.org/10.1016/j.scitotenv.2024.173561.

Institute of Sustainability Studies, 2025. *Sustainability trends 2025 shaping the future of business*. [online] Available at: <https://instituteofsustainabilitystudies.com/insights/lexicon/sustainability-trends-2025-shaping-the-future-of-business/> [Accessed 25 April 2025].

Marimin, Darmawan, M.A., Widhiarti, R.P. and Teniwut, Y.K., 2018. Green productivity improvement and sustainability assessment of the motorcycle tire production process: A case study. *Journal of Cleaner Production*, [e-journal], 191, pp.273-282. https://doi.org/10.1016/j.jclepro.2018.04.228.

Martinez, J.D., 2021. An overview of the end-of-life tires status in some Latin American countries: Proposing pyrolysis for a circular economy. *Renewable and Sustainable Energy Reviews*, [e-journal] 144, article no. 111032. https://doi.org/10.1016/j.rser.2021.111032.

Mavi, R.K., Shekarabi, S.A.H., Mavi, N.K., Arisian, S. and Moghdani, R., 2023. Multi-objective optimisation of sustainable closed-loop supply chain networks in the tire industry. *Engineering Applications of Artificial Intelligence*, [e-journal] 126, Part D, article no. 107116. https://doi.org/10.1016/j.engappai.2023.107116.

Mayer, P., Moran, K, Miller, E., Brander, S., Harper, S., Garcia-Jaramillo, M., Carrasco-Navarro, V., Ho, K., Burgess, R., Thornton Hampton, L., Granek, E., McCauley, M., McIntyre, J., Kolodziej, E., Hu, X., Williams, A., Beckingham, B., Jackson, M., Smith, R., Fender, C., King, G., Bollman, M., Kaushal, S., Cunningham, B., Hutton, S., Lang, J., Goss, H., Siddiqui, S., Sutton, R., Lin, D. and Mendez, M., 2024. Where the Rubber Meets the Road: Emerging Environmental Impacts of Tire Wear Particles and Their Chemical Cocktails. *Science of The Total Environment*, [e-journal] 927, article no. 171153. https://doi.org/10.1016/j.scitotenv.2024.171153.

McKinsey & Company, 2024. *What are Scope 1, 2, and 3 emissions?*. [online] Available at: <https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-are-scope-1-2-and-3-emissions> [Accessed 24 April 2025].

Napkin AI, 2025. *Napkin AI*. [online] Available at: <https://www.napkin.ai/> [Accessed 26 April 2025].

Shoul, B., Marfavi, Y., Sadeghi, B., Kowsari, E., Sadeghi, P. and Ramakrishna, S., 2022. Investigating the potential of sustainable use of green silica in the green tire industry: a review. *Environmental Science and Pollution Research*, [e-journal] 29, pp.51298-51317. https://doi.org/10.1007/s11356-022-20894-8.

Sichigea, M., Vasilescu, L., Mihai, L. and Sitnikov, C., 2025. Modelling ESG Relationships with the Employability-Operational Growth-Profitability Trilogy in the European Food System. *Amfiteatru Economic*, [e-journal] 27(69), pp.329-350. https://doi.org/10.24818/EA/2025/69/329.

Symeonides, D., Loizia, P. and Zorpas, A.A., 2019. Tire waste management system in Cyprus in the framework of circular economy strategy. *Environmental Science and Pollution Research*, [e-journal] 26, pp.35445-35460. https://doi.org/10.1007/s11356-019-05131-z.

The Economist, 2025. *Legislation and circularity will make business greener*. [online] Available at: <https://impact.economist.com/sustainability/net-zero-and-energy/sustainability-trends-for-2025> [Accessed 25 April 2025].

TNFD, 2025. *Guidance on the identification and assessment of nature-related issues: the LEAP approach*. [online] Available at: <https://tnfd.global/publication/additional-guidance-on-assessment-of-nature-related-issues-the-leap-approach/> [Accessed 25 April 2025].

Tota, R., Facchini, F., Pio Iavagnilio, R., Mossa, G. and Sassanelli, C., 2024. Digital twin supporting environmental performance evaluation according to ISO certification: an application case in the tire industry. *Production & Manufacturing Research*, [e-journal] 12(1), article no. 2351839. https://doi.org/10.1080/21693277.2024.2351839.

Tyre Industry Publications Ltd., 2024. *The world's largest tyremakers by sales*. [online] Available at: < https://www.tyrepress.com/leading-tyre-manufacturers/> [Accessed 3 May 2025].

World Business Council for Sustainable Development (WBCSD), 2023. *Tire Industry CEOs commit to ambitious sustainability workplan*. [online] Available at: <https://www.wbcsd.org/news/tire-industry-ceos-commit-to-ambitious-sustainability-workplan/> [Accessed 29 April 2025].

Economic Barriers and Incentives in the Energy Transition: A Comparative Analysis of Policy Frameworks and Market Responses

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Abstract

The shift to green energy is not merely a technological challenge but a multifaceted economic upheaval. In numerous countries, the process remains precarious, influenced by regional constraints, shifting political climates, and the need to balance cost, long-term outcomes, and energy independence. This article examines how economic mechanisms—specifically carbon pricing, subsidies, and green finance—affect investment trends in renewable energy across various policy environments.

The research used a comparative methodology, examining the cases of the European Union, the United States, and South Korea. It integrates policy research with quantitative techniques, such as panel data regression and correlation analysis, to evaluate the effects of carbon pricing and government subsidies on private-sector investments in renewable energy. Findings indicate that effectively structured carbon pricing mechanisms and consistent regulatory frameworks are essential catalysts for investment in renewable technology. Capital expenditure-based subsidies are effective in initial market development, but operational expenditure-based incentives promote long-term efficiency. The data reveals a strong positive association between government subsidies and private-sector investment, especially in nations with open regulatory frameworks. Green finance instruments, including green bonds, are becoming vital facilitators but necessitate more alignment with public policy.

This research enhances the literature by providing a comprehensive economic analysis of energy transition programs, connecting public incentives with private sector responses. It offers a mostly overlooked viewpoint on nations such as South Korea, emphasising the impact of varied institutional environments on policy efficacy. The results provide evidence-based suggestions for policymakers: promote stable carbon prices, align subsidies with performance metrics, and enhance green finance markets. These insights facilitate the development of economically robust, investor-attractive energy markets that support an equitable and sustainable transition, particularly relevant to Romania and other OECD nations undergoing the shift to renewable energy.

Keywords

Energy transition, economic incentives, carbon pricing, green finance, renewable investment, policy design, energy markets

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Introduction

Among today's challenges of the developed world, few rival the scale, urgency, and economic implications of the climate crisis—particularly as it reshapes the way societies produce and consume energy. With rising temperatures, intensifying weather extremes, and growing geopolitical tensions over resources, the urgency

to decarbonise our economies is no longer a distant objective—it is a politically charged present necessity that must be placed at the forefront of economic and policy agendas.

Energy is the predominant contributor to global greenhouse gas emissions and concurrently the most powerful mechanism for systemic transformation. Transitioning from fossil fuels to renewable energy is not simply a matter of technology adoption—it is a deep economic restructuring that tests the resilience of markets, the foresight of policymakers, and the confidence of investors (Stiglitz et al., 2017; Carley and Konisky, 2020; Aklin and Urpelainen, 2013). While advancements in renewable technologies have made green energy increasingly cost-competitive, the pace and effectiveness of the transition depend heavily on the financial and regulatory environment.

Numerous studies have highlighted the importance of policy tools such as carbon pricing, feed-in tariffs, tax incentives, and green bonds in mobilising capital toward green investments (Zhao et al., 2022; Verdolini, Vona and Popp, 2018). However, the effectiveness of these instruments varies significantly across different national and institutional contexts. For instance, the European Union's Emissions Trading System (EU ETS) has provided a relatively successful framework for pricing carbon, creating long-term signals for investment in renewables. In contrast, Australia's carbon pricing initiative—introduced in 2012 and repealed just two years later—suffered from political instability and regulatory uncertainty, which undermined investor confidence and disrupted capital flows into green energy (Jotzo, 2012; Newell and Raimi, 2022).

This paper explores the economic levers that accelerate or impede renewable energy investment, focusing on three highly influencing OECD economies, but with diverse policy approaches and varying stages of energy transition: the European Union, the United States, and South Korea.

The European Union stand as an example of a highly institutionalised regional framework with a mature carbon market (EU ETS) and a tradition of renewable energy support schemes.

The United States on the other hand, while lacking a unified national carbon price, offers insight into market-driven transitions supported by tax incentives and decentralised state-level programs.

South Korea, in its turn, reflects a more controlled emerging model, where industrial policy and government-led investment shape the energy transition. Together, these cases provide a geographically and institutionally diverse perspective through which to examine how economic tools perform under different regulatory, political, and market conditions.

The research specifically examines how carbon pricing and government subsidies affect private-sector investment behaviour, using a comparative framework supported by econometric analysis and secondary data.

The structure of the paper is as follows: Section 2 reviews the scientific literature on the economic mechanisms of the energy transition. Section 3 outlines the research methodology and data sources. Section 4 presents and discusses the results. Section 5 concludes with policy recommendations for facilitating a just and effective green energy transition.

1. Review of the Scientific Literature

1.1 Carbon Pricing and Market-Based Mechanisms

A large body of literature supports the role of carbon pricing as a cornerstone in the economic transition to low-carbon energy systems. Stiglitz et al. (2017) argue that carbon pricing is essential for correcting market failures associated with negative environmental externalities, and they emphasise that a predictable and sufficiently high carbon price can act as a long-term signal for investors. Their report recommends a global carbon price of USD 40–80 per ton of CO_2 by 2020, rising thereafter, to align with the Paris Agreement targets. However, as of March 2025, actual carbon prices remain below these levels in many regions.

The global average direct carbon price in 2023 was only $23.20 per metric ton of CO_2 equivalent (Statista, 2024). In contrast, the California carbon market is projected to average $46 per ton in 2025, up from $42 in 2024 (BloombergNEF, 2025), while prices under the European Union Emissions Trading System

(EU ETS) have experienced a recent decline of €4.20, or approximately 5.75%, since the beginning of 2025 (Trading Economics, 2025). These variations underscore the disparity between policy ambition and market reality, and highlight the need for stronger, more consistent price signals to guide investment decisions.

Empirical studies further demonstrate the effectiveness of carbon pricing mechanisms—particularly cap-and-trade systems and carbon taxes—in reducing emissions and shifting investment toward renewables.

For example, Fell and Kaffine (2018) use econometric modeling to assess the impact of both fuel prices and renewable policies on the U.S. power sector. Their results show that carbon pricing, when applied through cap-and-trade systems, can significantly reduce emissions and influence capital flows toward clean energy—especially when fossil fuel prices are low.

The European Union's Emissions Trading System (EU ETS) is often cited as a successful model. Zhao et al. (2022) highlight that the EU ETS has contributed to increasing investment in renewables by making emissions-intensive alternatives less attractive economically. Nonetheless, the system has not been without flaws. In its early phases, overallocation of permits led to a surplus of allowances, which caused prices to collapse—falling below €1 per ton in 2007—and introduced significant volatility (Newell, Raimi and Aldana, 2021). The absence of a price floor and delayed policy adjustments created a climate of regulatory uncertainty. These factors made it difficult for investors to forecast long-term carbon costs, ultimately weakening the incentive to shift capital from fossil fuels to renewables. As Wüstenhagen and Menichetti (2012) note, such uncertainty plays a key role in shaping risk perceptions in renewable energy markets, particularly for projects requiring high upfront capital.

Australia's short-lived carbon pricing initiative further illustrates the consequences of policy instability. Introduced in 2012 and repealed in 2014, the policy's reversal created a period of heightened uncertainty. As Jotzo (2012) and BloombergNEF (2015) show, this led to a sharp decline in clean energy investment, delays or cancellations of several wind and solar projects, and a rise in perceived regulatory risk. Industry surveys conducted at the time reported a significant erosion of investor confidence, with Australia increasingly viewed as a high-risk environment for low-carbon investment. These reactions underscore that while carbon pricing mechanisms can be powerful tools, their success is heavily dependent on political stability and regulatory credibility.

1.2 The Role of Subsidies: Capex and Opex

While carbon pricing seeks to internalise environmental costs, subsidies—both capital expenditure (capex)-based and operational expenditure (opex)-based—are often used to directly stimulate investment in renewable energy by reducing financial barriers, particularly in the early stages of market development.

Capex-based subsidies, such as investment grants, rebates, and upfront tax credits, aim to reduce the high upfront cost of renewable energy technologies, making them more accessible to both individuals and developers. While each instrument operates differently, they have proven effective in emerging markets and early-stage technologies, where capital scarcity often prevents project initiation. For instance, in the United States, many states offer solar rebates to incentivise small-scale solar deployment. California's Self-Generation Incentive Program (SGIP) provides rebates for battery storage installations, while other utilities offer fixed payments per kilowatt of installed solar capacity—effectively lowering the initial investment barrier for households and small businesses. Moreover, Verdolini, Vona and Popp (2018) argue that such capex-based support mechanisms are especially useful for lowering the perceived risk of entry, encouraging developers to invest in solar and wind projects even in uncertain markets, such as India and South Africa, where regulatory frameworks have historically been inconsistent and grid access limited.

In contrast, opex-based subsidies—such as feed-in tariffs (FiTs), production tax credits, and contracts-for-difference—provide ongoing payments tied to electricity generation. These mechanisms incentivize not only deployment but also long-term performance and operational efficiency. Wüstenhagen and Menichetti (2012) emphasise that opex-based subsidies align more closely with market outcomes, encouraging cost-effective technologies while ensuring returns over time.

Empirical studies show that the design of subsidy schemes greatly influences investor behaviour. Zhao et al. (2020) found that in China, a combination of capex-based grants and performance-linked FiTs generated a strong multiplier effect, particularly in the wind energy sector. However, the effectiveness of subsidies can vary depending on the broader regulatory context. In the United States, Popp, Vona and Marin (2020) found that subsidy effectiveness was significantly enhanced when paired with transparent policy frameworks and stable permitting environments.

Even though these financial mechanisms stimulate investment and trust in renewable energy, subsidy dependency also presents potential downsides. Sudden reductions or retroactive changes can trigger market slowdowns, as seen in Spain's solar sector after the government slashed FiTs in 2013. This case underscores the importance of clear phase-out plans and transition mechanisms when reforming support policies (Carley and Konisky, 2020).

Overall, both capex and opex-based subsidies play critical roles in accelerating the energy transition, but their impact depends on careful policy design, predictability, and alignment with broader market reforms.

1.3 Green Finance and Investor Behaviour

According to Wüstenhagen and Menichetti (2012), perceived regulatory and market risks, as well as expected rewards, shape investment decisions in renewable energy. Besides direct government subsidies and carbon pricing, the growth of green finance has become an essential booster of the energy change. Green bonds, sustainability-linked loans, climate-aligned funds, and other vehicles envisioned of by financial institutions are meant to lower financing costs, lower risk perceptions and generally direct private capital into low-carbon technology and infrastructure.

In order to influence investor behaviour into aligning portfolios with climate objectives, the standardised green finance products help address concerns of transparency, reduced volatility, and alignment with ESG (Environmental, Social, and Governance) frameworks. Moreover, green bonds often attract lower interest rates— a concept known as "greenium", referring to the yield differential between green and conventional bonds. Bachelet, Becchetti and Manfredonia (2019), indicated that investors are ready to accept lower returns, especially among certified bonds, in exchange for environmental effect and alignment with ESG values, therefore reflecting this phenomena in the European markets.

Recent patterns, however, point to unpredictability in the greenium. For example in 2024, it diminished significantly, averaging around 1 basis point in the Euro green bond market by year's end (AXA Investment Managers, 2025). Given that interest rates are expected to decline in 2025, the greenium might move toward longer-dated bonds, as investors seek for sustainable assets at reasonable rates.

The market for green bonds continues to expand somewhat steadily. The volume of green, social, sustainability, and sustainability-linked (GSS+) debt matched Climate Bonds Methodologies in 2024 came to USD 1.1 trillion, therefore bringing the overall total to USD 5.7 trillion (Climate Bonds Initiative, 2025). This increase emphasises how capable the market is to direct large financial resources toward solutions for climate change. Looking ahead, forecasts suggest that sustainable bond issuance will remain steady at around USD 1 trillion in 2025, maintaining its share in the overall bond market (S&P Global Ratings, 2025).

Despite their expansion, green financial markets remain inconsistently developed. In emerging economies, limited access to international capital markets, underdeveloped regulatory frameworks, and lower investor confidence restrict the ability to scale the green finance solutions. Popp, Vona and Marin (2020), for instance, underline how institutional investors are reluctant to participate in long-term renewable energy projects in less developed markets, in the absence of complimentary state guarantees or risk-sharing mechanisms.

Empirical studies also show that market confidence is strongly shaped by the credibility of national climate policy frameworks. Countries with unified long-term renewable energy programs are more likely to draw continuous private investment, according to Aklin and Urpelainen (2013). In contrast, fragmented or frequently changing policies—even in high-income countries—can deter investors regardless of financial incentives.

Unlocking private finance at scale will need a mix of policy stability, innovative financial mechanisms, and more robust public-private partnerships as the worldwide financial industry starts to line up with climate objectives. Green financing is becoming increasingly significant in determining investor behaviour and accelerating the deployment of renewable energy infrastructure even if it cannot replace structural changes or direct subsidies.

2. Research Methodology

This study uses a comparative, mixed-methods research approach to assess the effects of carbon pricing and subsidies on renewable energy investment in various policy contexts. The methodology integrates quantitative research, including trend comparison and correlation analysis, with qualitative policy review, based on three relevant case studies: the European Union, the United States, and South Korea.

2.1 Research Objectives and Approach

The objective of this section is to examine how carbon pricing and government subsidies affect private-sector investment in renewable energy. The research is structured around three guiding questions to determine how context influences the use and performance of economic instruments in practice:

- How does carbon pricing influence investment behaviour?
- What is the impact of capital expenditure and operational expenditure subsidies on the deployment of renewable energy?
- What political or institutional factors influence the effectiveness of these tools?

2.2 Data Collection and Sources

Data were collected for selected OECD and G20 countries over the period 2010–2023, focusing on the following indicators:

- Carbon pricing levels (USD/ton CO_2)
- Renewable energy investment volumes (USD billion)
- Public subsidy flows (national budgets and incentives)

The main data sources include:

- World Bank Carbon Pricing Dashboard
- IRENA (International Renewable Energy Agency)
- OECD Green Growth Indicators
- BloombergNEF
- IMF Energy Subsidies Database
- Qualitative insights on national frameworks, policy stability, and investor behaviour were drawn from:
- National energy strategy documents
- Reports by the IEA, Climate Bonds Initiative, and Climate Policy Initiative

2.3 Comparative and Correlation Analysis

The study applies descriptive and comparative analysis across the selected countries to identify key trends and differences in policy performance. In addition to the qualitative review, a Pearson correlation analysis was used to assess the relationship between government subsidies and private investment levels.

This statistical method measures the strength and direction of a relationship between two variables—generating a coefficient between –1 and +1. A positive value indicates that higher subsidies are generally associated with higher levels of private investment, while a negative value suggests the opposite. Although correlation does not imply causation, the analysis helps identify whether public support mechanisms tend to motivate or displace private capital in the renewable energy sector.

These methods aim to provide a balanced understanding of how different policy mixes and market structures influence renewable energy investment, with a focus on developed economies.

3. Results

This section presents the main findings from the comparison and correlation analyses carried out across the European Union, the United States, and South Korea. It examines the effects of carbon pricing and subsidy programs on renewable energy investment, emphasising both facilitating elements and structural constraints. The discussion is organised into two main areas: carbon pricing and subsidy effectiveness, followed by cross-country insights into policy design and institutional frameworks.

3.1 Carbon Pricing and Investment Signals

Among the three countries analysed, the European Union is set apart by its comparatively advanced Emissions Trading System (EU ETS). Following a phase of diminished and inconsistent prices, recent changes have strengthened market confidence, resulting in elevated carbon prices and more reliable long-term signals for investors. This stabilisation has corresponded with a substantial rise in renewable energy investment throughout EU member states.

This relationship is illustrated in Figure no. 1, which shows the parallel upward trends in EU carbon prices and renewable energy investment from 2010 to 2023. Although causation cannot be directly inferred, the

data suggest that price stability and regulatory maturity have contributed to increased investor engagement in renewables.

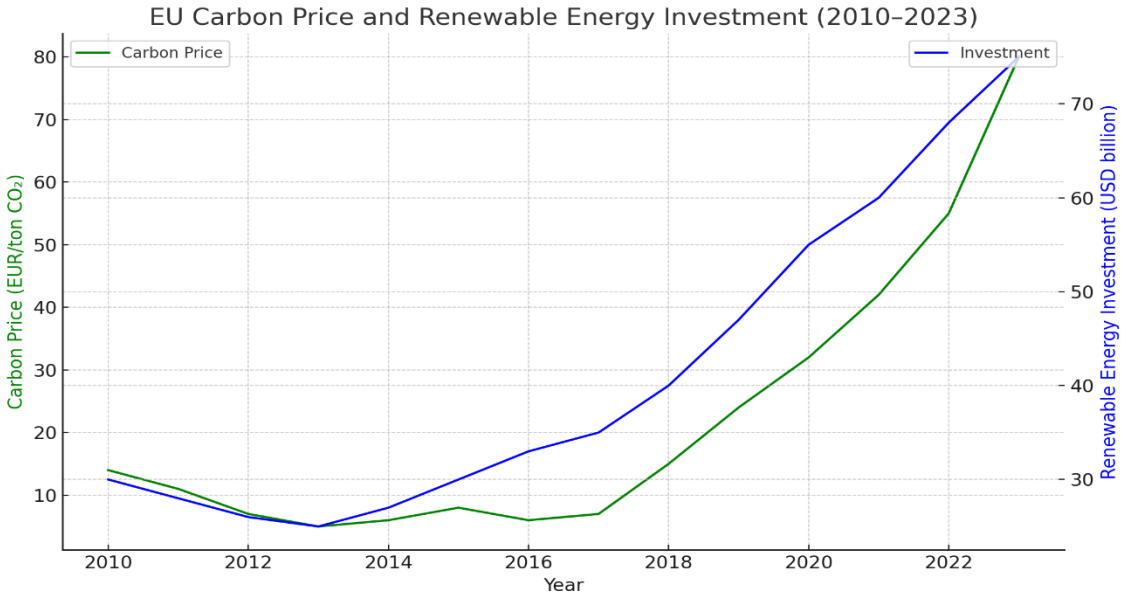

Figure no. 1. EU Carbon Price and Renewable Energy Investment (2010–2023)
Source: Simulated data based on trend analysis and public databases from the World Bank (2023), BloombergNEF(2023), and IRENA (2023).

Conversely, the United States does not have a unified national carbon pricing framework. Instead, it depends on regional programs like the Regional Greenhouse Gas Initiative (RGGI) in the Northeast and California's cap-and-trade program. Although these initiatives have shown beneficial local effects, their restricted geographic scope and policy fragmentation diminish their overall influence on national investment flows.

In its turn, South Korea, which instituted a cap-and-trade system in 2015, has encountered difficulties over the overallocation of permits and relatively low carbon pricing. While the system has enhanced institutional capacity, its impact on renewable investment is limited, indicative of a conservative regulatory approach and a comparatively brief implementation period relative to the EU.

These findings highlight that while carbon pricing has significant potential, its effectiveness depends heavily on price level, stability, geographic scope, and the political credibility of the system in the eyes of investors.

3.2 Subsidy Performance and Private Investment

The second essential aspect examined is the significance of government subsidies—both capital expenditure (capex) and operational expenditure (opex)—in stimulating private-sector investment in renewable energy. In all three case studies, governmental financial support was fundamental in reducing entry barriers and enhancing investor confidence, while the design and execution of these subsidies differed significantly in breadth and efficacy.

In the European Union, a combination of capital expenditure-based investment subsidies and operational expenditure-based feed-in tariffs (FiTs) has historically supported the rise of renewable energy, especially in nations like Germany and Denmark. The EU has progressively transitioned to market-oriented mechanisms such as auctions and contracts-for-difference (CfDs), which ensure renewable energy producers receive a fixed price by compensating them when market prices dip below a predetermined threshold. The enduring legacy of stable and predictable support frameworks fostered investor confidence and stimulated private capital inflows during the 2010s. Nonetheless, retroactive alterations in certain member states—exemplified by Spain's sudden decrease of FiTs in 2013—temporarily eroded market confidence and underscore the significance of policy stability.

In the United States, the mix of federal Investment Tax Credits (ITC) and Production Tax Credits (PTC)—both capital expenditure and operational expenditure instruments—has continually empowered the solar

and wind sectors. These schemes have fostered significant investment momentum, especially when combined with state-level incentives and renewable portfolio mandates. Nonetheless, ambiguity over the renewal and termination of these subsidies has occasionally resulted in investment delay, emphasising the necessity for enduring policy transparency.

By contrast, South Korea has predominantly utilised capital expenditure-based grants and low-interest loans to facilitate its energy transformation. Although these instruments have prompted the initiation of many large-scale renewable projects, the country's constrained use of performance-based incentives has hindered the evolution of a competitive and varied investment environment. Furthermore, comparatively low power prices and restricted grid access have further limited the viability of renewable energy sources, diminishing the crowding-in effect of state subsidies.

Table no. 1. Comparison of Subsidy Mechanisms by Country

Country	Capex-Based Subsidies	Opex-Based Subsidies	Main Challenges
EU	Investment grants, upfront tax credit	Feed-in tariffs, CfDs	Retroactive changes (e.g., Spain)
USA	ITC, state-level rebates	Production Tax Credit (PTC)	Uncertainty over extensions
S Korea	Grants, low-interest loans	Limited use, feed-in tariffs	Low grid access, electricity prices

Source: Compiled by the author based on public policy reports and academic literature

These findings align with the conclusions of Wüstenhagen and Menichetti (2012), who emphasised that policy predictability significantly shapes investor risk perception—particularly in capital-intensive sectors like renewable energy. In their comparative study of European markets, they showed that stable, long-term support frameworks such as Germany's Feed-in Tariffs (FiTs) were instrumental in attracting private capital, whereas abrupt policy changes, as seen in Spain, eroded investor confidence. Similarly, in the United States, the continuation of federal tax credits has been a key determinant of investment momentum.

By situating the comparative analysis of this study within this conceptual framework, the correlation results presented here further reinforce the argument that subsidy volume alone is insufficient. The structure, credibility, and consistency of support mechanisms play a decisive role in mobilising private investment across diverse institutional environments.

The correlation analysis across all three scenarios indicates a positive relationship between state subsidies and private-sector investment levels. This indicates that effectively structured support mechanisms— especially when they are predictable, transparent, and aligned with long-term policy frameworks—can efficiently utilise government funds to attract private capital. The efficacy of these systems is evidently influenced by institutional variables, including regulation uniformity, administrative efficiency, and general investor attitude.

Conclusions

As the world moves toward decarbonisation, this study highlights that policy design matters just as much as policy ambition. In their effort to align with centralised regulations and accelerate the green transition for environmental reasons, governments must carefully consider not only what instruments to deploy, but also how and where to implement them.

Using a comparative, mixed-method approach, this paper explored the role of economic tools—specifically carbon pricing and subsidies—in three distinct policy environments: the European Union, the United States, and South Korea. The analysis revealed that while financial incentives are crucial for boosting private-sector investment in renewable energy, their impact depends heavily on the predictability, design, and institutional context in which they are applied. The European Union's Emissions Trading System (EU ETS) stands as a benchmark for reforms that reduced volatility and strengthened investor confidence. Conversely,

weaker or fragmented systems—such as those seen in South Korea and parts of the U.S.—struggle to deliver comparable impact.

Carbon pricing can serve as a powerful investment signal when prices are stable, sufficiently high, and embedded in credible policy frameworks. Subsidy schemes, both capex- and opex-based, have proven effective in lowering upfront costs and managing investment risk—but their success depends on transparency, consistency, and alignment with broader energy strategies. Correlation analysis confirms a positive relationship between public support and private investment, while also showing that subsidies alone are not enough: they must be integrated into mature and policy-aligned ecosystems.

The three case studies show that hybrid approaches—combining market-based mechanisms with targeted subsidies—tend to outperform standalone policies. The most important interventions combined long-term carbon pricing signals with predictable, well-structured subsidies. Also, from a policy design perspective, long-term credibility and institutional capacity are often the determining factors in whether economic tools lead to real-world infrastructure development.

This cross-country analysis holds particular relevance for Romania, a member of the EU with strong renewable energy potential, but still challenged by an aging energy infrastructure and regulatory uncertainty. While Romania is under pressure to align with European climate regulations, it continues to rely on fossil fuels such as gas and coal, which remain important natural resources and could, in theory, support energy independence. Currently, Romania lacks a comprehensive national carbon pricing mechanism beyond its participation in the EU ETS, and while it benefits from EU structural funds, the use of support instruments such as green auctions or contracts-for-difference remains limited.

In light of the findings in this paper, Romania could improve investment outcomes by enhancing policy predictability, streamlining licensing procedures, and aligning subsidies with long-term grid modernisation goals. In particular, aligning green bond programs with long-term decarbonisation targets can offer new path ways to sustainability. Both institutional capacity and improving transparency in energy governance will be essential for attracting both public and private investment—positioning Romania as a key player in the green development strategies.

As countries accelerate toward global decarbonisation goals, the alignment of economic tools with political and institutional realities will be the defining factor in the success of the energy transition.

Abbreviations and Acronyms

CO_2 – Carbon Dioxide
CfD – Contract-for-Difference
ETS – Emissions Trading System
EU – European Union
FiT – Feed-in Tariff
GSS+ – Green, Social, Sustainability, and Sustainability-linked
IEA – International Energy Agency
IMF – International Monetary Fund
IRENA – International Renewable Energy Agency
ITC – Investment Tax Credit
OECD – Organisation for Economic Co-operation and Development
PTC – Production Tax Credit
RGGI – Regional Greenhouse Gas Initiative
USD – United States Dollar

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References

Aklin, M. and Urpelainen, J., 2013. Political competition, path dependence, and the strategy of sustainable energy transitions. *American Journal of Political Science*, 57(3), pp.643–658. https://doi.org/10.1111/ajps.12002

AXA Investment Managers, 2025. *The good, the bad and the opportunities in green bonds*. [online] Available at: <https://www.axa-im.com/sustainability/insights/good-bad-opportunities-green-bonds-2025> [Accessed 30 March 2025].

Bachelet, M.J., Becchetti, L. and Manfredonia, S., 2019. The green bonds premium puzzle: The role of issuer characteristics and third-party verification. *Sustainability*, 11(4), p.1098. https://doi.org/10.3390/su11041098.

BloombergNEF, 2015. Clean Energy Investment - Q3 2015 fast pack [online] Available at: <https://about.bnef.com> [Accessed 30 March 2025].

BloombergNEF, 2023. Global Low-Carbon Energy Technology Investment Surges Past $1 Trillion for the First Time[online] Available at: <https://about.bnef.com> [Accessed 30 March 2025].

BloombergNEF, 2025. *Clean Energy Investment Trends*. [online] Available at: <https://about.bnef.com> [Accessed 30 March 2025].

Carley, S. and Konisky, D.M., 2020. The justice and equity implications of the clean energy transition. *Nature Energy*, 5(8), pp.569–577. https://doi.org/10.1038/s41560-020-0641-6

Climate Bonds Initiative, 2025. *Climate Bonds publishes provisional 2024 numbers and key factors for 2025 market evolution*. [online] Available at: <https://www.climatebonds.net/resources/press-releases/2025/01/climate-bonds-publishes-provisional-2024-numbers-and-key-factors> [Accessed 30 March 2025].

Fell, H. and Kaffine, P.T., 2018. The fall of coal: Joint impacts of fuel prices and renewables on generation and emissions. *American Economic Journal: Economic Policy*, 10(2), pp.90–116. http://doi.org/10.3886/E114658V1.

IRENA (2023) *Renewable Capacity Statistics 2023*. Abu Dhabi: International Renewable Energy Agency. [online] Available at: https://www.irena.org/Statistics [Accessed: 30 March 2025].

Jotzo, F., 2012. Australia's carbon price. *Nature Climate Change*, 2(7), pp.475–476. https://doi.org/10.1038/487038b

Newell, R.G. and Raimi, D., 2022. Global energy outlooks comparison: methods and key results. *Energy Policy*, 156, p.112425. https://media.rff.org/documents/Report_22-05.pdf

OECD, 2022. *Green Growth Indicators 2022*. [online] Available at: <https://www.oecd.org/greengrowth/indicators/> [Accessed 30 March 2025].

Popp, D., Vona, F. and Marin, G., 2020. The employment impact of green fiscal push: Evidence from the American Recovery and Reinvestment Act. *Brookings Papers on Economic Activity*, Fall 2020, pp.53–132.

S&P Global Ratings, 2025. *Sustainability Insights: Sustainable Bond Outlook 2025 – Global Issuance to Reach $1 Trillion*. [online] Available at: <https://www.spglobal.com/ratings/en/research/articles/250226-sustainability-insights-sustainable-bond-outlook-2025-global-issuance-to-reach-1-trillion-13420279> [Accessed 30 March 2025].

Statista, 2024. *Global average carbon price 2023*. [online] Available at: <https://www.statista.com/statistics/1474902/global-average-carbon-prices-targets/> [Accessed 30 March 2025].

Stiglitz, J.E., Stern, N., Duan, M., Edenhofer, O., Giraud, G., Heal, G.M., la Rovere, E.L., Morris, A., Moyer, E., Pangestu, M., Shukla, P.R., Sokona, Y. and Winkler, H., 2017. *Report of the High-Level Commission on Carbon Prices.* International Bank for Reconstruction and Development and International Development Association/The World Bank., 9(4), pp.205–212. https://doi.org/10.7916/d8-w2nc-4103.

Trading Economics, 2025. *EU Carbon Permits*. [online] Available at: <https://tradingeconomics.com/commodity/carbon> [Accessed 30 March 2025].

Verdolini, E., Vona, F. and Popp, D., 2018. Bridging the gap: Do fast-reacting fossil technologies facilitate renewable energy diffusion? *Energy Policy*, 123, pp.488–498. https://doi.org/10.1016/j.enpol.2018.01.058

World Bank (2023) Carbon Pricing Dashboard.[online] Available at: https://carbonpricingdashboard.worldbank.org [Accessed: 30 March 2025].

Wüstenhagen, R. and Menichetti, E., 2012. Strategic choices for renewable energy investment: Conceptual framework and opportunities for further research. Energy Policy, 40, pp.1–10. https://doi.org/10.1016/j.enpol.2011.06.050.

Zhao, F., Bai, F., Liu, X., and Liu, Z., 2022. A Review on Renewable Energy Transition under China's Carbon Neutrality Target. Sustainability, 14(22), p.15006. https://doi.org/10.3390/su142215006.

Organisational Context Analysis Integration with Stakeholder Requirements and Risk-based Planning for Improvement of Energy Management System Effectiveness

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Abstract

This study investigates the effectiveness of strategic analytical components within corporate energy management, based on a case study analysis of 19 organisations operating in energy-intensive sectors. The central hypothesis posits that the systematic and context-specific integration of context analysis, stakeholder requirements, and risk-based planning significantly enhances the performance of energy management systems (EnMS) in accordance with ISO 50001:2018.

The empirical findings demonstrate that organisations that embed these analytical elements methodically and coherently into their decision-making and control structures achieve demonstrably enhanced system performance than those with predominantly formal or isolated implementations. Particularly critical are the integration of strategic assessment components, the rigorous prioritisation of measures, and the consistent derivation of energy performance improvements. The study underscores the pivotal role of strategic system integration as a key determinant for effective and sustainable corporate energy management and concludes with practice-oriented recommendations to support implementation.

Keywords

Energy management system (EnMS), ISO 50001:2018, Organisational Context Analysis, Stakeholder Requirements, Risk-based Planning.

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Introduction

In recent years, corporate energy management has evolved into an integral component of organisational sustainability strategies (Bensouda et al., 2024). It no longer serves merely to fulfil regulatory requirements or achieve short-term optimisation of energy consumption. Rather, it increasingly supports the systematic integration of energy-related considerations into corporate governance structures (Zatonatska et al., 2024; Ali et al., 2023). A fundamental prerequisite for this integration is a structured understanding of the organisational context, relevant stakeholders, and the internal and external factors influencing energy performance (Karltorp & Vico, 2024).

The legal obligation to implement an energy management system (EnMS) arises primarily from the European Energy Efficiency Directive and its transposition into national law through the German Energy Efficiency Act (Kurth et al., 2018; European Parliament and Council of the European Union, 2023). These regulatory frameworks require companies above a certain size threshold to systematically record, assess, and control their energy consumption (Bundesgesetzblatt, 2023). Against this backdrop, numerous organi-

sations have established an EnMS in accordance with ISO 50001:2018 within a short period of time (Barbosa, 2023).

The effectiveness of such systems largely depends on the extent to which key analytical and control elements are functionally integrated into the organisation's decision-making processes beyond mere compliance with normative requirements. This study examines whether the consistent and context-sensitive implementation of strategic analytical elements - particularly context analysis, stakeholder integration, and risk assessment - leads to significantly greater effectiveness of energy management systems.

1. Review of scientific literature

The standard ISO 50001:2018 is an international standard that sets out the requirements for an effective energy management system (EMS). The standard aims to help organisations calculate and improve energy efficiency, reduce costs and greenhouse gas emissions, and promote sustainable energy-related practices (Barbosa, 2023). The ISO 50001 standard consists of 10 sections: Scope, Normative references: shows the references, Terms and definitions, Context of the organisation, Leadership, Planning, Support, Operation, Performance Evaluation, Improvement.

The international standard ISO 50001:2018 explicitly requires a context-specific and risk-based design of the energy management system (Deutsches Institut für Normung, 2018). In this regard, particular importance is attached to the analysis of the organisational environment (Understanding the organisation and its context, Section 4.1), the consideration of relevant stakeholders (Understanding the needs and expectations of interested parties, Section 4.2), and the evaluation of risks and opportunities (Actions to address risks and opportunities, Section 6.1).

Analysis of the organisational environment: The organisation is required to identify both external and internal issues as well as the needs and expectations of stakeholders and interested parties, and to demonstrate how value is created. In some cases, the concept of value creation is also explicitly addressed. The term "issue" in this context refers not only to problems or potential problems, but also to key aspects the system must take into account, such as changing circumstances, legal requirements, and other obligations. Furthermore, the scope of the energy management system is intended to clearly define the boundaries and applicability of the EnMS.

Consideration of interested internal and external parties: customers, employees, regulatory bodies, owners, shareholders, suppliers, certifiers, trade associations, certifiers (NQA Global, 2019).

Assessment of Risks and Opportunities: The consideration of risks and opportunities forms an integral part of strategic decision-making at the highest level within an organisation. By identifying risks and opportunities during the planning phase of the EnMS, an organisation can anticipate potential scenarios and consequences and detect undesirable impacts at an early stage. Likewise, favourable aspects or circumstances that offer potential benefits or positive outcomes can be identified and systematically pursued.

The effectiveness of an EnMS is therefore not primarily measured by the formal fulfilment of standard requirements, but by the degree to which these strategic elements are integrated into corporate governance along the PDCA cycle (Plan-Do-Check-Act) (Damasceno et al., 2024).

The isolated documentation of individual requirements - such as a static legal register - is insufficient to meet these demands. Instead, a systemic perspective is required that consolidates normative obligations, stakeholder requirements, and internal influencing factors into a coherent analytical model (Kurth et al., 2018). Within the framework of the present study, a purpose-designed analytical tool is employed to systematically link the relevant standard requirements. The aim is to ensure that the identification, evaluation, and prioritisation of requirements are not merely formal, but strategically effective.

2. Research methodology

The study follows a qualitative comparative research approach. It analyses 19 organisations from various energy-intensive sectors that implemented an energy management system in accordance with ISO 50001:2018 as a response to regulatory requirements. The objective was to identify differences in system effectiveness depending on the implementation of strategic elements - namely, context analysis, stakeholder integration, and risk-based planning.

2.1 Hypothesis

Organisations that implement strategic elements - such as context analysis, stakeholder integration, and risk-based planning - in a systematic and context-specific manner demonstrate higher effectiveness in their energy management systems compared to organisations that primarily pursue formal implementation.

2.2 Research Design and Case Selection

The accompanying data collection process extended over a period of eight months. The case organisations were differentiated into two distinct implementation types:

- **Group A:** Organisations with a primarily formal implementation (isolated documentation of the organisation's context, stakeholders, and risks).
- **Group B:** Organisations with a strategically integrated implementation of context analysis, stakeholder integration, and risk-based planning, based on a methodologically consolidated analysis tool.

The analysis tool incorporates legal, strategic, and financial dimensions and enables a context-specific prioritisation of action areas. Table 1 provides an overview of the sectors, the German Classification of Economic Activities (Klassifikation der Wirtschaftszweige - WZ), employee structure, and energy-related relevance (Significant Energy Use - SEU) of the organisations examined.

Table no. 1: Overview of the Analysed Organisations: Industry Classification, Employee Structure, and Energy Relevance (SEUs)

No.	Group	Sector	Classification according to WZ-2008	Number of Employees	Energy-Effective Staff in 2024	SEUs
1	A1	Public Road Transport	49.31	853	9 (1,1 %)	Fossil fuels
2	A2	Freight Forwarding	49.41	927	10 (1,1 %)	Fossil fuels
3	A3	Furniture Retail with Fleet	47.59	841	8 (1,0 %)	Fossil fuels
4	A4	Combined Transport Logistics	49.21	1.052	12 (1,1 %)	Fossil fuels
5	A5	In-House Transport Wholesale	46.90	881	9 (1,0 %)	Fossil fuels
6	B1	Regional Bus Operations	49.31	868	9 (1,0 %)	Fossil fuels
7	B2	Courier Services with Fleet	53.20	820	8 (1,0 %)	Fossil fuels
8	B3	Furniture and Kitchen Logistics	47.59	849	7 (0,8 %)	Fossil fuels
9	A6	Banking Institution	64.19	598	9 (1,5 %)	HVAC[1]
10	A7	Retail (Non-Food Branches)	47.19	612	8 (1,3 %)	HVAC[1]
11	A8	Retail (Food Branches)	47.11	583	8 (1,4 %)	HVAC[1]
12	B4	Bank Branch Operations	64.19	605	9 (1,5 %)	HVAC[1]
13	B5	Municipal Administration	84.11	597	8 (1,3 %)	HVAC[1]
14	B6	Retail (Non-Food)	47.19	602	7 (1,2 %)	HVAC[1]
15	A9	Swimming Pool Operations	93.11	187	7 (3,7 %)	Electric Drives
16	A10	Water Supply	35.30	143	6 (4,2 %)	Electric Drives
17	B7	Leisure Pool & Spa	93.11	275	9 (3,3 %)	Electric Drives
18	B8	Leisure Pool/Wellness Centre	93.11	328	8 (2,4 %)	Electric Drives
19	B9	Public Utility Company	35.11	176	7 (4,0 %)	Electric Drives

Source: Author's own depiction based on anonymised data provided by participating organisations
[1]Heating, Ventilation, and Air Conditioning

For a more detailed characterisation, the annual total energy consumption (GWh, TJ), the number of energy carriers used, and the primary energy carriers (covering 80% of total consumption) were recorded. Table 2 presents these energy-related characteristics and illustrates the heterogeneity of the energy systems. All organisations examined exceed the threshold of 7.5 GWh set by the German Energy Efficiency Act (EnEfG) and are therefore subject to the obligation to implement an energy management system (EnMS).

Table no. 2: Overview of the Analysed Organisations: Energy Consumption, Energy Carrier Diversity, and Primary Energy Carrier Structure

No. and Group		Total Energy Consumption in 2024		Number of Energy Carriers and Primary Energy Carriers in 2024		Primary Energy Carrier(s)
1	A1	143,04 GWh	514,94 TJ	5	1	Diesel / HVO[2]
2	A2	98,01 GWh	352,84 TJ	6	1	Diesel / HVO[2]
3	A3	65,03 GWh	234,11 TJ	6	1	Diesel / HVO[2]
4	A4	84,04 GWh	302,54 TJ	6	1	Diesel / HVO[2]
5	A5	45,02 GWh	162,07 TJ	5	1	Diesel / HVO[2]
6	B1	50,01 GWh	180,04 TJ	6	1	Diesel / HVO[2]
7	B2	35,02 GWh	126,07 TJ	6	1	Diesel / HVO[2]
8	B3	30,03 GWh	108,11 TJ	6	1	Natural Gas
9	A6	15,03 GWh	54,11 TJ	4	2	Natural Gas, Electricity
10	A7	14,02 GWh	50,47 TJ	4	2	Natural Gas, Electricity
11	A8	16,02 GWh	57,67 TJ	4	1	Natural Gas
12	B4	15,03 GWh	54,11 TJ	3	2	Biogas, Electricity
13	B5	14,04 GWh	50,54 TJ	3	2	Natural Gas, Electricity
14	B6	13,03 GWh	46,91 TJ	3	2	Natural Gas, Electricity
15	A9	8,54 GWh	30,74 TJ	3	2	District Heating, Electricity
16	A10	7,82 GWh	28,15 TJ	4	1	Electricity
17	B7	9,52 GWh	34,27 TJ	4	1	District Heating, Electricity
18	B8	8,2 GWh	29,52 TJ	3	2	District Heating, Electricity
19	B9	12,05 GWh	43,38 TJ	3	1	Biomass, Electricity

Source: Author's own depiction based on anonymised data provided by participating organisations
[2]Hydrotreated Vegetable Oil

2.3 Data Collection, Analysis and Evaluation

Data collection was carried out through interviews with project managers, analysis of relevant EnMS documentation, and ongoing project observations. Particular attention was paid to the design of the context analysis, the quality of the stakeholder assessment, and the integration of binding obligations into risk and action planning.

The evaluation was based on a deductively developed category structure. In addition, qualitative indicators of system effectiveness were taken into account, including:

- Clarity and quality of implemented measures;
- Strategic alignment;
- Audit findings;
- Observable performance improvement.

A standardised assessment instrument supported the analysis of the relevance of requirements and the evaluation of risks and opportunities based on the probability of occurrence and potential impact.

3. Results and discussion

Based on the data collection and evaluation methodology described above, this section presents the key observations from the case studies examined. The focus lies on the depth of implementation of strategic EnMS elements and their impact on overall system effectiveness. The findings are first presented by group, followed by a comparative evaluation.

3.1 Observations on the Implementation in Group A

Organisations in Group A exhibited a predominantly formal implementation of the standard requirements. Context analysis, stakeholder requirements and risk-based planning were typically carried out in isolation and oriented toward documentation, without a systemic integration into strategic decision-making processes.

Quote 4-1: Stakeholder requirements as an audit obligation

„We created the stakeholder list for the certification audit, but it plays no operational role." – Interviewee,

Organisation A3

Actions were primarily prioritised based on technical considerations, with no discernible derivation from a strategic context or risk assessment.

Quote 4-2: Risk Assessment without Impact

„The risk assessment was more of a formality – we filled out the table, but nothing concrete resulted from it." – Energy Manager, Organisation A2

3.2 Observations on the Implementation in Group B

Organisations in Group B demonstrated a consolidated and strategically integrated implementation of the normative requirements. Context analysis, stakeholder requirements evaluation, risk-based planning and compliance obligations were methodically interlinked and systematically assessed.

Quote 4-3: Multidimensional Assessment Creates Clarity

„Jointly evaluating legal, strategic, and financial relevance finally brings clarity to the classification of requirements." – Project Manager, Organisation B2

Quote 4-4: Structured Analysis Tool Provides Clarity

„The Excel matrix provides us with a structured overview of which requirements are relevant – and on what basis this assessment is made." – Operations Manager, Organisation B5

The action planning in these organisations was characterised by greater traceability, improved prioritisation, and stronger strategic alignment.

3.3 Comparative Evaluation: Group A vs. Group B

The comparative analysis reveals significant differences in energy management system effectiveness. Group B achieved notably better results in terms of transparency, strategic integration, and the implementability of EnMS-relevant processes. Table 3 presents a comparison of the implementation depth of the key EnMS elements.

Table no. 3: Comparative Table – Comparative Evaluation of EnMS Implementation: Group A vs. Group B (Scale 1–5)

Evaluation Criteria	Group A	Group B
Depth of Context Analysis	2,1	4,2
Stakeholder Requirements Evaluation	1,8	4,0
Integration of Legal Requirements	2,3	4,5
Risk-based Planning with Traceable Assessment	1,5	4,1
Action for Improvement	2,0	4,3

Source: Author's own depiction based on anonymised data provided by participating organisations

3.4 Results of the Case Analysis

The systematic evaluation of the case studies highlights that the manner in which strategic elements of the EnMS are implemented has a significant impact on system effectiveness. Organisations that embedded context analysis, stakeholder evaluation, and risk assessment in a methodically consistent and structured way demonstrated measurably higher effectiveness across multiple dimensions compared to organisations that adopted a primarily formal implementation approach.

In detail, the following key findings can be highlighted:

- **Integrated System Implementation:** Organisations in Group B established a consistent linkage between context analysis, stakeholder requirements, and action planning. This methodological coherence significantly enhanced the alignment of energy-related control processes with overarching corporate strategies.
- **Systematic Prioritisation and Derivation of Measures:** In Group B, identified risks and opportunities systematically formed the basis for deriving energy-related measures. In contrast, organisations in Group A often defined actions without a strategic analytical foundation, which significantly reduced overall system effectiveness.

- **Integrated Risk Analysis:** Risk assessments in Group B were closely linked to both context and stakeholder analyses. Rather than being considered in isolation, risks were systematically assigned to business-relevant action areas, thereby facilitating targeted resource allocation.
- **Measurable Improvement of Energy Performance:** Even without the explicit use of specific EnPIs, it became evident that organisations in Group B identified and documented improvements in energy performance more consistently and transparently. The derivation of objectives and measures was based on context-driven analysis and enabled demonstrable performance enhancement.

The findings of this study confirm the initially stated hypothesis and clearly demonstrate that mere compliance with formal requirements - such as the creation of context analyses or stakeholder lists without functional integration—is insufficient to achieve a substantial improvement in energy performance. Only through the systematic and consistent integration of these strategic elements into both operational and strategic decision-making processes can the full effectiveness potential of an energy management system in accordance with ISO 50001:2018 be realised. Figure 1 illustrates, by way of example, the differences between the organisations under study with regard to the integration of context analysis and the strategic derivation of actions.

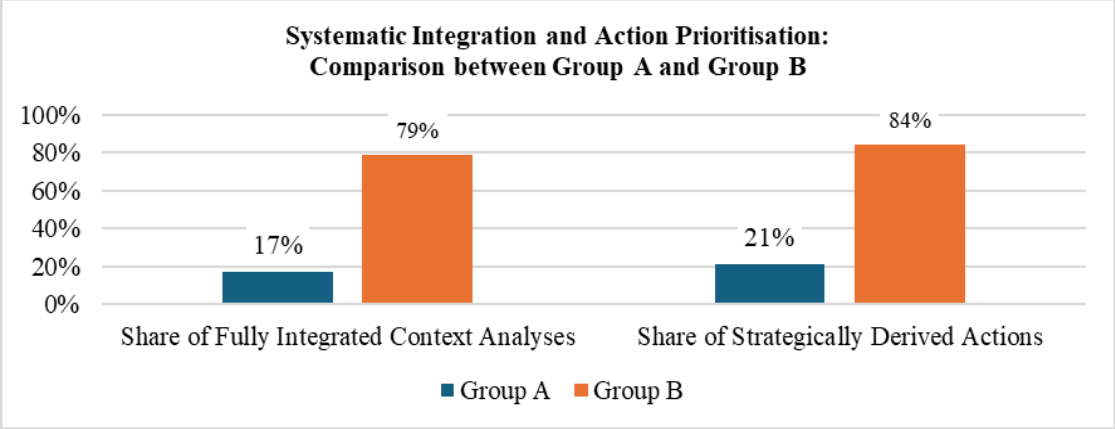

Figure no. 1: Comparison of the Systematic Integration of Strategic Elements (Context Analysis, Stakeholder Requirements Evaluation, Risk-based Planning) and Prioritisation of Actions between Group A and Group B

Source: Author's own depiction

The differences illustrated in Figure 1 further emphasise the central role of strategic integration in determining the effectiveness of corporate energy management systems and form the basis for the subsequent conclusions.

Conclusions

The present analysis clearly demonstrates that the effectiveness of corporate energy management systems is largely determined by the manner in which strategic elements are implemented. The case study analysis confirms that organisations which systematically and consistently integrate context analysis, stakeholder evaluation, and risk assessment into their decision-making processes achieve significantly higher system effectiveness than those with primarily formal implementation.

Key success factors include the systematic linkage of strategic analysis components, a robust prioritisation of measures, and the consistent consideration of risks and opportunities in relation to overarching corporate strategic domains. Only through such an integrated approach can an energy management system realise its full potential for the continuous improvement of energy performance.

The mere creation of documents—such as context analyses or stakeholder lists—without their functional integration into operational and strategic processes remains largely ineffective and results in increased bureaucratic effort without delivering meaningful control benefits.

From a practical perspective, this leads to a clear recommendation: when implementing and further developing energy management systems, organisations should go beyond mere formal compliance with standards and place strategic integration consistently at the forefront. Particular attention should be given

to the coherent linkage of context analysis, stakeholder requirements, risk assessment, and action planning.

Overall, the findings of this study confirm that a sound strategic analysis is not merely a supplementary component but a critical success factor for effective and sustainable energy management.

References

Ali, E.K., Bouyahrouzi, E.M., Sehli, L., Embarki, S. and El Kihel, B., 2023. Development of a real-time ANN algorithm based performance management strategy for energy generation system in the context of Energy 4.0. *Institute of Electrical and Electronics Engineers*, pp.782–786. Available at: https://doi.org/10.1109/IDAACS58523.2023.10348924 [Accessed 5 May 2025].

Barbosa, J., 2023. Engineering assessment for ISO 50001 implementation. *Universidad Ciencia y Tecnología*, Special Issue, pp.81–89. Available at: https://doi.org/10.47460/uct.v2023iSpecial.739 [Accessed 5 May 2025].

Bensouda, M., Benali, M. and Zizi, Y., 2024. Enhancing corporate sustainability and competitiveness through energy efficiency: a literature review. *Procedia Computer Science*, 241, pp.266–271. Available at: https://doi.org/10.1016/j.procs.2024.08.036 [Accessed 5 May 2025].

Bundesgesetzblatt, 2023. *Gesetz zur Steigerung der Energieeffizienz und zur Änderung des Energiedienstleistungsgesetzes: Nr. 309 BGBl. 2023 I.* [online] Available at: https://www.recht.bund.de/eli/bund/bgbl-1/2023/309 [Accessed 5 May 2025].

Damasceno, A., J., S., Cavaliero, C.,K., N., Souza, R., C., R., 2024. The Evolution Of Organizational Energy Management: Developed Methodologies And The ISO 50001 Standard, *IOSR Journal of Business and Management (IOSR-JBM)* Volume 26, Issue 11. Ser. 2, pp 10-18, Available at: https://www.iosrjournals.org/iosr-jbm/papers/Vol26-issue11/Ser-2/B2611021018.pdf [Accessed 5 May 2025].

Deutsches Institut für Normung, 2018. *DIN EN ISO 50001:2018-12 – Energiemanagementsysteme – Anforderungen mit Anleitung zur Anwendung (ISO 50001:2018); Deutsche Fassung EN ISO 50001:2018*. Berlin: Beuth Verlag GmbH. Available at: https://dx.doi.org/10.31030/2852891 [Accessed 5 May 2025].

European Parliament and Council of the European Union, 2023. *Directive (EU) 2023/1791 on energy efficiency and amending Regulation (EU) 2023/955 (recast)*. [online] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023L1791 [Accessed 5 May 2025].

International Organization for Standardization, 2018. *ISO 50001: Energy management systems – Requirements with guidance for use*. [online] Available at: https://www.iso.org/standard/69426.html [Accessed 5 May 2025].

International Organization for Standardization, 2020. *ISO 50004:2020 – Energy management systems – Guidance for the implementation, maintenance and improvement of an ISO 50001 energy management system*. [online] Available at: https://www.iso.org/standard/74863.html [Accessed 5 May 2025].

International Organization for Standardization, 2023. *ISO/TS 50011:2023 – Energy management systems – Assessing energy management using ISO 50001:2018*. [online] Available at: https://www.iso.org/obp/ui/en/#iso:std:iso:ts:50011:ed-1:v1:en [Accessed 5 May 2025].

Karltorp, K. and Perez Vico, E., 2024. Factors influencing incumbent energy firms' radical innovations implementation – A review. *Renewable and Sustainable Energy Reviews*, 210, p.115256. Available at: https://doi.org/10.1016/j.rser.2024.115256 [Accessed 5 May 2025].

Kurth, B.L., Maftei, M., Ilie, C. and Fogoros, T., 2019. Study on SMEs interest in energy efficiency in Germany. In: Pamfilie, R., Dinu, V., Tăchiciu, L., Pleșea, D. and Vasiliu, C., eds. *BASIQ 2019 International Conference – New Trends in Sustainable Business and Consumption*. Bari, Italy, 30 May – 1 June 2019. Bucharest: ASE Publishing, pp.724–729. Available at: https://www.webofscience.com/wos/woscc/full-record/WOS:000478861800092 [Accessed 5 May 2025].

Kurth, B.L., Maftei, M., Maier, D. and Maier, A., 2018. A study of the knowledge of the legal obligation of public authorities to serve as a model in the field of energy efficiency. In: Pamfilie, R., Dinu, V., Tăchiciu, L., Pleșea, D. and Vasiliu, C., eds. *BASIQ 2018 International Conference – New Trends in Sustainable Business and Consumption*. Heidelberg, Germany, 11–13 June 2018. Bucharest: ASE Publishing, pp.490–497. Available at: https://www.webofscience.com/wos/woscc/full-record/WOS:000462608500060 [Accessed 5 May 2025].

NQA Global, 2019. *ISO 50001:2018 Energy management system implementation guide*. [online] Available at: https://www.nqa.com/medialibraries/NQA/NQA-Media-Library/PDFs/NQA-ISO-50001-Implementation-Guide.pdf [Accessed 5 May 2025].

Zatonatska, T., Soboliev, O., Zatonatskiy, D., Dluhopolska, T., Rutkowski, M. and Rak, N., 2024. A comprehensive analysis of the best practices in applying environmental, social, and governance criteria within the energy sector. *Energies*, 17(12), p.2950. Available at: https://doi.org/10.3390/en17122950 [Accessed 5 May 2025].

Green Hospitality 2030: Enhancing Guest Experience through Sustainable Innovation and the European Green Deal

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Abstract

This paper explores the evolution of academic research in green hospitality, with a focus on how sustainability, innovation, and guest experience converge under the guiding framework of the European Green Deal (EGD). Through a bibliometric analysis of 181 peer-reviewed articles published between 2019 and 2025 and indexed in the Scopus database, the study provides a comprehensive overview of global research trends in sustainable hospitality. Using VOSviewer and Biblioshiny, the analysis identified key thematic clusters—sustainability, hotel industry, and corporate social responsibility—alongside the most prolific countries, authors, and journals contributing to the field. The United States, China, Saudi Arabia, India, and the United Kingdom emerged as top contributors, while Sustainability (Switzerland) and the International Journal of Hospitality Management were highlighted as leading publication sources. Authors such as Han, who has focused extensively on green consumer behavior and sustainable tourism decision-making, Fayyad, recognized for his work on strategic sustainability practices in hospitality, and Azazz, noted for his contributions to green marketing and authenticity in hotels, were recognized for their influential work. The findings reveal a growing academic and industry-wide interest in integrating green practices and innovative strategies to enhance guest experience and operational performance. This research is one of the few to systematically align bibliometric insights with the priorities of the EGD, thereby adding original value to both academic literature and practical decision-making. The study's results offer meaningful guidance for hospitality managers, policymakers, and researchers by identifying strategic areas for investment and collaboration in sustainable innovation. It underscores the importance of aligning green practices with guest satisfaction and long-term value creation in the hospitality sector.

Keywords

Green hospitality, sustainable innovation, European Green Deal, smart tourism, green human resource management.

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Introduction

The hospitality industry is increasingly under pressure to adopt environmentally sustainable practices, not only to align with global sustainability agendas such as the European Green Deal (EGD), but also to meet evolving consumer expectations. Sustainability has become a core determinant of value creation for both businesses and consumers, particularly in industries such as tourism and hospitality that have significant ecological footprints (Preziosi et al., 2022). Sustainable innovation, green human resource practices, and green technologies are emerging as strategic levers to enhance guest experiences while achieving long-term ecological and economic goals (Yoo, 2024).

Recent studies confirm the growing strategic importance of sustainability in hospitality. For instance, Singh et al. (2024) conducted a bibliometric review emphasizing the role of digital tools and corporate responsibility in sustainable hospitality transitions. Similarly, Wahjono and Rahmanita (2024) highlighted the increasing scholarly attention toward green hotel operations in tourism destinations, while Fauzi et al. (2024) examined the dynamics of green certifications and their influence on customer loyalty. These contributions collectively demonstrate the expanding academic landscape that underpins the intersection of green innovation and consumer behavior in hospitality.

While existing research underscores the relevance of sustainability, innovation, and guest experience within green hospitality, the academic landscape remains fragmented. Despite numerous studies addressing individual components—such as green technologies, HRM, and transport—there is limited synthesis on how scholarly attention is evolving across geographies, authorship, and publication venues. To support evidence-based policymaking and academic advancement aligned with the European Green Deal, it is crucial to map the intellectual structure of the field and identify key thematic clusters.Accordingly, this article applies bibliometric analysis to the current body of literature to uncover emerging patterns and research trends. In particular, it addresses the following research questions:

- RQ1: Which keywords frequently occur in combination?
- RQ2: Which countries have contributed the most publications to this research area?
- RQ3: Which are the most relevant sources in Scopus for this research area?
- RQ4: Who are the most relevant authors in the field in terms of the number of papers?

By answering these questions, the study aims to contribute a structured overview of the research domain, thereby facilitating more targeted and impactful future investigations into Green Hospitality 2030.

The paper consists of five sections, beginning with an introduction, followed by an examination of scientific literature, a description of the methodology, and a section dedicated to results and discussions. The final section includes the conclusions.

1. Review of the scientific literature

1.1. The European Green Deal and Its Strategic Influence on Hospitality

The European Green Deal (EGD) outlines an ambitious roadmap toward carbon neutrality by 2050, affecting all sectors of the economy, including tourism and hospitality. As a key strategic policy, the EGD mandates improvements in energy use, circular economy practices, and sustainable innovation (Granat and Kozak, 2021). Within the hospitality industry, these directives are not simply regulatory impositions but catalysts for transformative innovation that enhance both operational efficiency and guest experience (D'Adamo and Rossi, 2024). Hotels and resorts are increasingly adopting measures such as renewable energy integration, sustainable building designs, and advanced waste reduction systems that align with both EGD goals and consumer expectations for environmental responsibility.

Importantly, the EGD aligns with global benchmarks such as the United Nations Sustainable Development Goals (SDGs), particularly SDG 7 (clean energy), SDG 9 (industry innovation), and SDG 12 (responsible consumption and production) (D'Adamo et al., 2024; Tan and Wright, 2022). Hospitality firms pursuing compliance with these goals are not only advancing environmental outcomes but also strategically positioning themselves to appeal to a growing segment of environmentally conscious travelers (Purcărea et al., 2022). This integration of sustainability and guest-centric value creation lies at the core of the *Green Hospitality 2030* vision.

1.2. Sustainable Mobility as a Pillar of Guest Satisfaction

Sustainable transport options—ranging from electric vehicle charging stations to carbon-offset travel packages—are emerging as essential components of the eco-hospitality value proposition. Increasingly, guests associate low-carbon travel options with high-quality, meaningful experiences (Baquero, 2024). These options contribute to both environmental goals and the perceived service quality, reinforcing the competitive advantage of establishments that incorporate green mobility into their offerings (Zarifis, 2024).

Whether through shuttle services, e-bike rentals, or partnerships with clean transportation networks, sustainable mobility is expanding the definition of hospitality beyond the property itself. This shift is particularly relevant for eco-resorts and rural accommodations that seek to balance accessibility with

environmental stewardship. By integrating transportation innovations into the guest journey, hospitality firms enhance the overall experience while reinforcing their commitment to sustainable practices.

1.3. Innovation and Smart Technologies in Green Hospitality

Innovation serves as a bridge between sustainability goals and experiential value creation. Emerging business models in hospitality increasingly reflect a dual focus on technological advancement and environmental performance. Concepts such as green ambidexterity—the simultaneous pursuit of explorative and exploitative innovation—have been shown to positively impact competitiveness and sustainability outcomes (Alsheref et al., 2024). Smart technologies, including IoT-enabled devices, real-time energy management systems, and personalized digital interfaces, enable hotels to optimize operations while offering greater guest control and comfort (Tan and Wright, 2022).

Beyond operational efficiency, these digital tools foster transparent communication of sustainability practices. Whether through mobile apps that show real-time energy savings or in-room systems that adjust usage based on occupancy, technology empowers guests to participate actively in sustainability efforts. Certifications and ecolabels further enhance credibility, although concerns about greenwashing underscore the importance of third-party validation and clear sustainability communication (Alyahia et al., 2024; Preziosi et al., 2022).

1.4. Human Capital and Organizational Commitment to Green Goals

The internal capabilities of hospitality organizations are crucial to embedding sustainability in a way that resonates with guests. Green Human Resource Management (GHRM) practices—such as eco-focused recruitment, training, and performance appraisals—have a demonstrated impact on employee engagement and service delivery (Yoo, 2024; Nisar et al., 2023). Employees empowered through GHRM initiatives often act as ambassadors of sustainability, thereby enriching the guest experience through authentic, value-driven service (Mughal et al., 2023).

Moreover, leadership and internal marketing play critical roles in translating strategic green objectives into everyday practices. Leaders who model sustainability and leverage digital transformation tools help align organizational goals with employee values and stakeholder expectations (Alsheref et al., 2024). These efforts collectively contribute to a cohesive sustainability culture that supports both innovation and customer satisfaction.

1.5. Changing Consumer Behavior and the Role of Market Interaction

Modern travelers increasingly seek accommodations that reflect their values, particularly in terms of environmental responsibility. Studies from Romania and Ireland reveal a growing preference for hotels that exhibit ethical sourcing, sustainable operations, and transparent communication (Purcărea et al., 2022; Tan and Wright, 2022). This shift is most pronounced among younger demographics, who prioritize sustainability and expect digital, interactive touchpoints that reinforce these values.

“Smart and green” hotel models, which integrate ecological design with personalized digital experiences, are well-positioned to meet this evolving demand. Social media, review platforms, and mobile apps enable guests to both influence and be influenced by sustainability narratives. Features such as carbon calculators, digital sustainability badges, and green loyalty programs enhance brand engagement and perceived authenticity.

2. Research Methodology

A bibliometric analysis was used for this study because it was the most suitable approach to find answers to the formulated research questions, as it offers a comprehensive overview regarding the most important papers and relevant academic research in a particular discipline. Additionally, a bibliometrics approach can be used to assess the impact of academic publications and their role in spreading information (Ellegaard and Wallin, 2015).

The conducted research aims to investigate the trends and transformations in the hospitality industry and the movement to green hospitality. The analysis focused on publications from 2019 to 2025 to enclose the evolution of hospitality and the most important and new trends in the area.

To answer to the formulated research questions, the following secondary objectives were formulated:

- O1: To identify the most frequently co-occurring keywords within the selected body of literature.

• O2: To determine the geographical distribution of scientific output by identifying the countries that have contributed the highest number of publications in the research area.

• O3: To identify the most relevant scientific sources indexed in Scopus, based on the volume and relevance of publications related to the field.

• O4: To analyze the most influential authors in the domain, based on the number of published articles, in order to outline the key contributors to the field.

The database used for this study was Scopus, using the following search string of words in the title, abstract, and keywords: "Green" AND "Deal" OR "Sustainability" AND "Hospitality". The first result indicated 356 articles and to refine the search some filters were applied such as language "English", publication stage "Final" and document type "Article", resulting in 202 documents. The next step was to limit the documents only to some specific subject areas and filter also the keywords only to the ones important for the current subject, concluding with 181 papers which represents the dataset that will be examined (Figure no. 1).

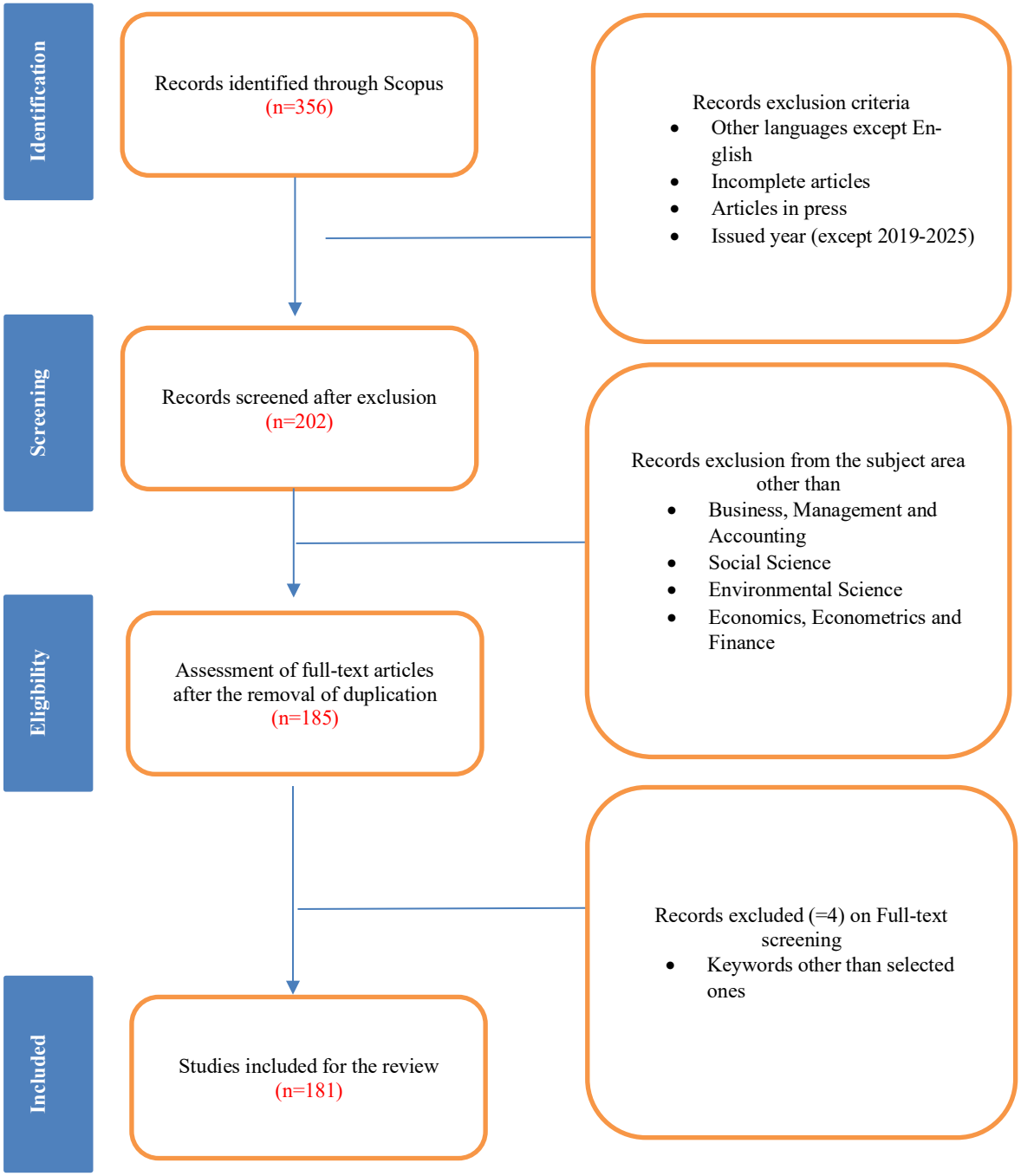

Figure no. 1. PRISMA Flowchart
Source: Adapted from Moher et al., 2009

The analysis was conducted using two tools. Firstly, VOSviewer version 1.6.20 was used to analyze the keywords co-occurrences and to identify the countries with the highest number of publications in the green hospitality area. Secondly, the authors used Biblioshiny to identify the most relevant sources and authors based on published papers in the field.

3. Results and discussion

To obtain the co-occurrence keywords network map (Figure no. 2), the following settings were used in the VOSviewer tool: the type of analysis used was "co-occurrence", the unit of analysis was "all keywords", and also, the "full counting" method was in place for the analysis. The minimum number of occurrences of a keyword was set to 10, resulting in 20 items, forming 3 clusters, generating 155 links with a total link strength of 623.

The first cluster, the green one, refers to sustainability, suggesting the importance of it and its applicability in hospitality, having in its area of interest also keywords such as "hospitality industry" or "green economy". The second cluster, formed in red, has the hotel industry as the main keyword, while the last cluster, formed in blue, refers to corporate social responsibility. The results match the ones from Wahjono and Rahmanita (2024) and Fauzi et al. (2024), identifying some common keywords such as "sustainability", "green hotels", "sustainable tourism", "hospitality", "tourism" and so on.

The entire map reveals strong connections among the three clusters, as well as within each cluster and among different keywords from various clusters. This serves as evidence of a synergistic map, emphasizing the role of sustainability in the hospitality industry while also highlighting the evolution of articles in the field, the points of interest, and the transformation of this industry.

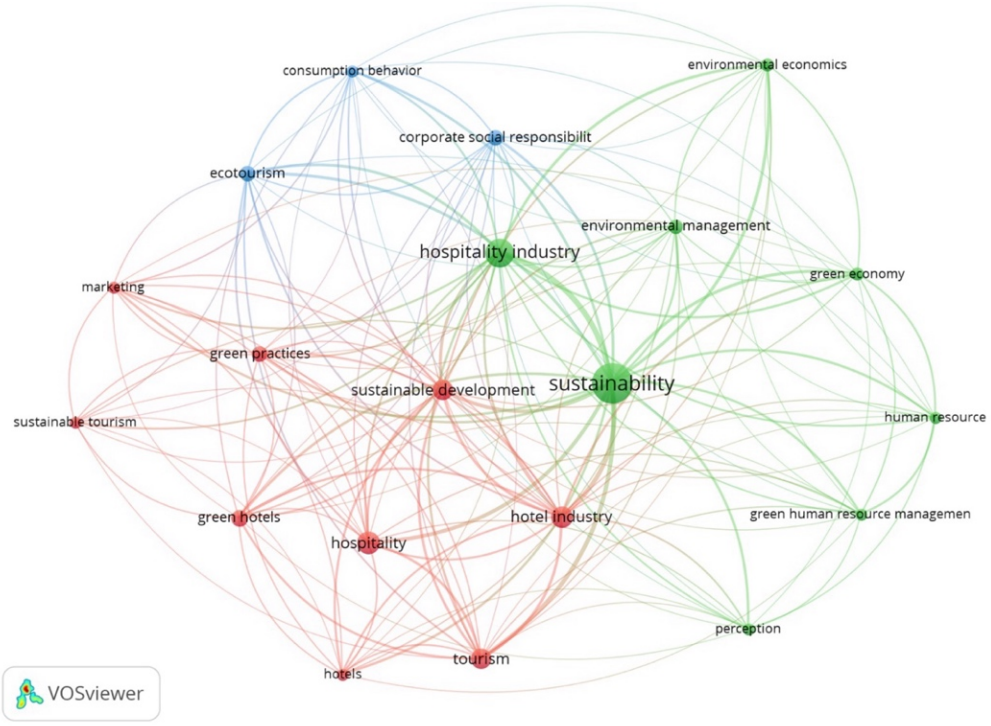

Figure no. 2. All keywords in the co-occurrence network map

To generate the network map of countries with the highest publication, a series of conditions were set in VOSviewer: the type of analysis was "co-authorship", the unit selected for the analysis was set to "countries" and the method used was the "full counting". The minimum number of papers in a specific country was set to 5, and the results show 5 clusters formed, summing 20 items with 75 links and a total link strength of 140 (Figure no. 3).

Figure no. 3 represents the countries with the highest number of publications in the area of green hospitality, highlighting the importance of the subject, the different or common perspectives of the countries regarding

this subject, and last but not least, the strong calibration of the same purpose worldwide. Some of the most active countries when it comes to the number of paper publications are: the United States, China, Saudi Arabia, India, Pakistan, Malaysia, and the United Kingdom. These results confirm the ones from Kalıpçı and Şimşek (2023) paper, finding the USA, China, and the UK as the most active countries in this research field.

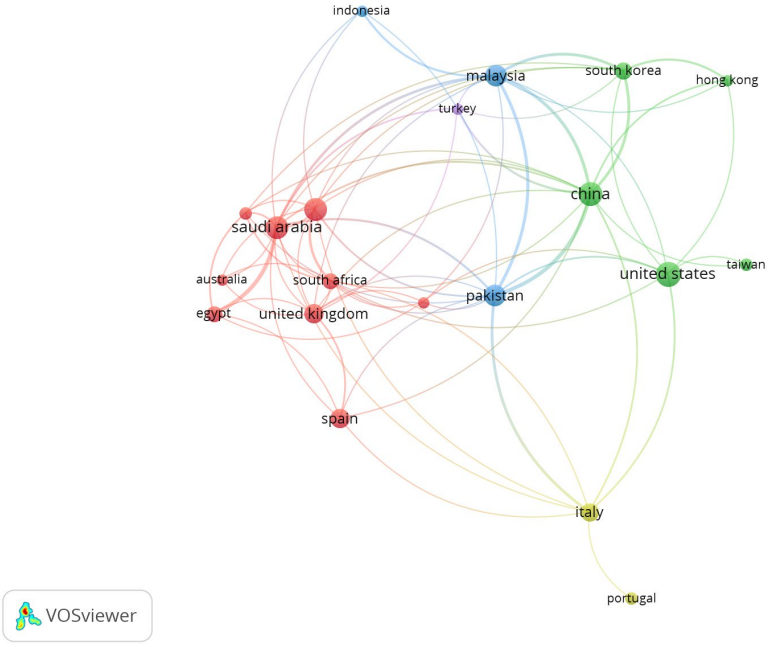

Figure no. 3. Countries with the highest publication output

Figure no. 4 represents the top ten most important sources in Scopus for the green hospitality area. The most valuable journal with the highest number of papers published was "Sustainability (Switzerland)" having a number of 27 papers, followed by the "International Journal of Hospitality Management", "International Journal of Contemporary Hospitality" and "Journal of Sustainable Tourism", supporting also the results obtained by Singh et al. (2024). Out of 181 articles included in the analysis, 78 were published only by the top ten journals.

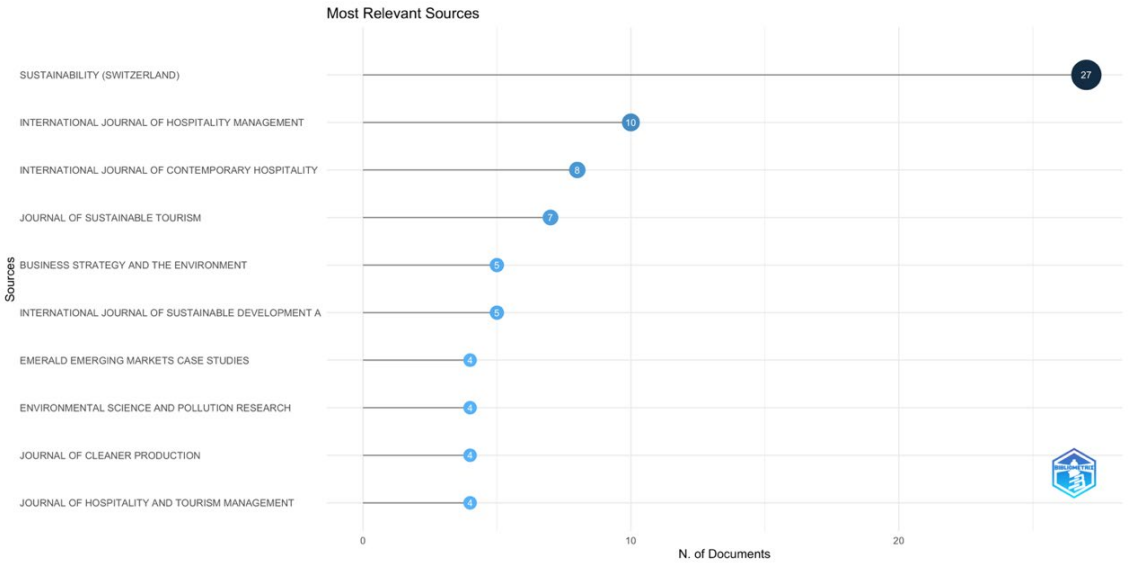

Figure no. 4. Most Relevant Sources

When it comes to the most relevant authors in the field from the number of publications perspective, the most remarkable author is Han with 7 papers, followed by Fayyad with 6 papers and Azazz and Elshaer with 5 papers each (Figure no. 5). Han was also found as the most active author in the field in the research conducted by Fauzi et al. (2024).

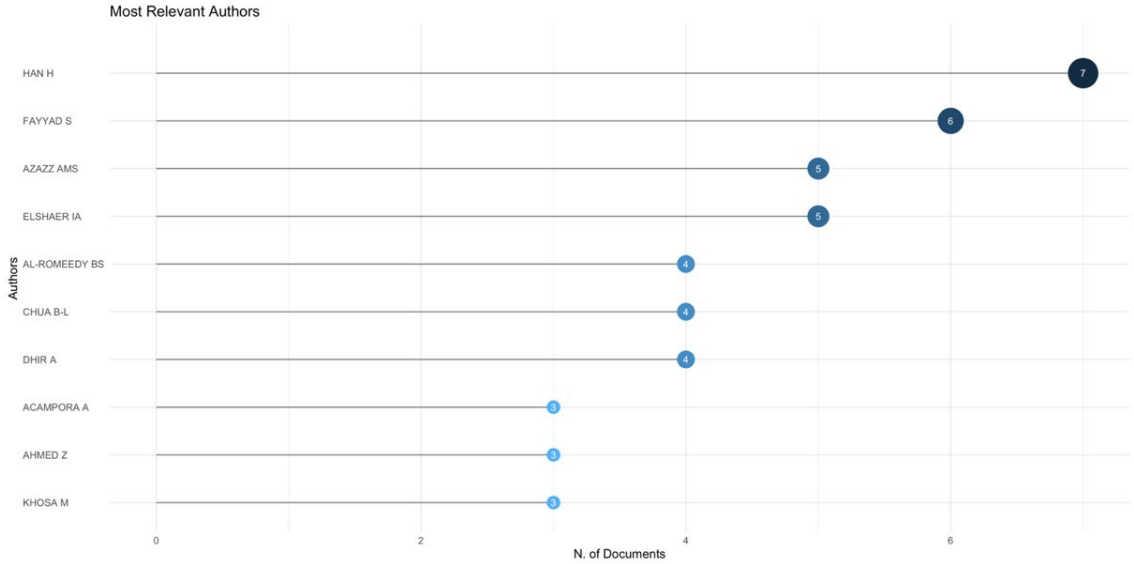

Figure no. 5. Most Relevant Authors – number of papers

Conclusions

This study advances the existing literature on green hospitality through the alignment of the bibliometric insights with the strategic objectives of the European Green Deal, offering a forward-looking structure that maps the current academic landscape and also pinpoints key areas for future academic and practical investment. This comprehensive and policy-oriented method increases the significance of bibliometric research in influencing academic discussions and promoting sustainable practices within the hospitality sector, policymakers, and investors, highlighting emerging areas for investments such as green HRM, sustainable mobility, and smart technologies.

The results provide a systematic analysis of trends and significant players in the shift towards sustainable hospitality, matching the ones from other important papers in the field (Kalıpçı and Şimşek, 2023; Fauzi et al., 2024; Singh et al., 2024; and Wahjono and Rahmanita, 2024).

Some of the limitations of this study are: only final and complete articles in English from the Scopus database were used, and the bibliometric analysis doesn't offer an overview to see the real impact of the European Green Deal initiatives on the hospitality industry. This study could be based on multiple databases, also extending the period of the analysis. Also, future studies could investigate the similarities and differences between different countries or regions in terms of adopting sustainable practices in the hospitality industry, but also by looking into the relationship between sustainable leadership and green human resource management or the economic performance in this field.

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References

Alsheref, F.K., Khairy, H.A., Alsetoohy, O., Elsawy, O., Fayyad, S., Salama, M., Al-Romeedy, B.S. and Soliman, S.A.E.M., 2024. Catalyzing green identity and sustainable advantage in tourism and hotel businesses. *Sustainability*, 16(12), p.5267. https://doi.org/10.3390/su16125267.

Alyahia, M., Azazz, A.M.S., Fayyad, S., Elshaer, I.A. and Mohammad, A.A.A., 2024. Greenwashing behavior in hotels industry: The role of green transparency and green authenticity. *Sustainability* (Switzerland), 16(3), p.1050. https://doi.org/10.3390/su16031050.

Baquero, A., 2024. Examining the role of ambidextrous green innovation and green competitive advantage in stimulating sustainable performance: The moderating role of green absorptive capacity. *SAGE Open,* 14(4). https://doi.org/10.1177/21582440241294160.

D'Adamo, I. and Rossi, E.N., 2024. Impact of regional investment on the sustainable development goals: A group analysis of economic and territorial development. *Sustainable Development*, 33(2), pp.1816-1834. https://doi.org/10.1002/sd.3215.

Ellegaard, O. and Wallin, J.A., 2015. The bibliometric analysis of scholarly production: How great is the impact? *Scientometrics*, 105(3), pp.1809–1831. https://doi.org/10.1007/s11192-015-1645-z.

Fauzi, M.A., Han, H., Loureiro, S.M.C., Ariza-Montes, A. and Wider, W., 2024. Bibliometric analysis on green hotels: past, present and future trends. *Journal of Hospitality and Tourism Insights*, 8(1), pp.241-262. https://doi.org/10.1108/JHTI-01-2024-0121.

Granat, A. and Kozak, M., 2021. The implementation of the European Green Deal – tensions between a market-based approach and state aid for renewables. *Yearbook of Antitrust and Regulatory Studies*, 14(23), pp.69–100. https://doi.org/10.7172/1689-9024.YARS.2021.14.23.3.

Kalıpçı, M.B. and Şimşek, E.K., 2023. Exploring the intersection of big data and hospitality: A bibliometric analysis. *İşletme Araştırmaları Dergisi,* 15(3), pp.2096-2110. https://doi.org/10.20491/isarder.2023.1700.

Moher, D., Liberati, A., Tetzlaff, J. and Altman, D.G., 2009. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med*, 6(7), e1000097. https://doi.org/10.1371/journal.pmed.1000097.

Mughal, Y.H., Nair, K.S., Arif, M., Albejaidi, F., Thurasamy, R., Chuadhry, M.A. and Malik, S.Y., 2023. Employees' perceptions of green supply-chain management, corporate social responsibility, and sustainability in organizations: Mediating effect of reflective moral attentiveness. *Sustainability*, 15(13), p. 10528. https://doi.org/10.3390/su151310528.

Nisar, Q.A., Hussain, K., Sohail, S., Yaghmour, S., Nasir, N. and Haider, S., 2023. Green HRM and sustainable performance in Malaysian hotels: The role of employees' pro-environmental attitudes and green behaviors. *Tourism*, 71(2), pp.367–387. https://doi.org/10.37741/t.71.2.9.

Preziosi, M., Acampora, A., Lucchetti, M.C. and Merli, R., 2022. Delighting hotel guests with sustainability: Revamping importance-performance analysis in the light of the three-factor theory of customer satisfaction. *Sustainability*, 14(6), p.3575. https://doi.org/10.3390/su14063575.

Purcărea, T., Ioan-Franc, V., Ionescu, Ş.A., Purcărea, I.M., Purcărea, V.L., Purcărea, I., Mateescu-Soare, M.C., Platon, O.E. and Orzan, A.O., 2022. Major shifts in sustainable consumer behavior in Romania and retailers' priorities in agilely adapting to it. *Sustainability*, 14(3), p.1627. https://doi.org/10.3390/su14031627.

Singh, R., Khana, I.S., Najara, A.H. and Shafi, I., 2024. Bibliometric analysis of sustainable practices in the hotel industry: Current trends and future research directions. *Atna Journal of Tourism Studies,* 19(1), pp. 113-132. https://doi.org/10.12727/ajts.31.4.

Tan, Y.S. and Wright, A.S., 2022. Exploring "smart and green" concepts: A new synergy for Irish hospitality. *Tourism and Hospitality*, 3(1), pp.276–296. https://doi.org/10.3390/tourhosp3010019.

Wahjono, B. and Rahmanita, M., 2024. Bibliometric analysis of green hotel at sustainable tourism destination area. *European Modern Studies Journal*, 8(6), pp.10–21. https://doi.org/10.59573/emsj.8(6).2024.2.

Yoo, D.Y., 2024. Eco-leadership in action: Integrating green HRM and the new ecological paradigm to foster organizational commitment and environmental citizenship in the hospitality industry. *Sustainability*, 16(20), p.9040. https://doi.org/10.3390/su16209044.

Zarifis, A., 2024. Leadership in fintech builds trust and reduces vulnerability more when combined with leadership in sustainability. *Sustainability*, 16(13), p.5757. https://doi.org/10.3390/su16135757.

Navigating Succession in European Family Businesses: A Three-Circle Model Reinterpretation of Case Studies

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Abstract

Family-owned businesses are foundational to Europe's economic fabric, yet many fail to navigate intergenerational transitions successfully. This study aims to explore how European family-owned SMEs manage succession processes across the domains of family, business, and ownership. Specifically, it investigates the role of narrative strategies, governance structures, and emotional dynamics in shaping succession outcomes, with a view toward identifying systemic sources of conflict or cohesion. The study adopts a qualitative secondary multiple case study approach, analyzing three detailed European family business cases through the lens of the Three-Circle Model. Cases were selected based on geographic location (Europe), firm size (SMEs and one large company), and the depth of qualitative documentation. The analytical framework facilitates reinterpretation of existing data, focusing on how the alignment – or misalignment – of family, business, and ownership roles affects succession success. The analysis reveals several underexplored but critical dynamics. First, succession narratives can function as an alternative infrastructure to formal plans, especially in contexts rich in symbolic capital. Second, excessive stewardship by successors may inhibit open dialogue and necessary change. Third, inertia within the ownership domain can stall strategic renewal. Finally, misalignment among the three circles systematically generates friction unless mediated by deliberate governance mechanisms and identity management strategies. By applying the Three-Circle Model in a novel comparative context, the study offers an integrated perspective on succession that bridges emotional, structural, and symbolic dimensions. It introduces the concept of "narrative legitimacy" and demonstrates how identity narratives can stabilize or destabilize transition processes. Findings support the implementation of early succession planning, role clarity frameworks, and governance innovations such as family councils. The study also underscores the value of narrative construction in managing stakeholder expectations and reinforcing continuity. These insights are particularly relevant for family firms in Central and Eastern Europe currently facing generational transitions.

Keywords

Family business succession; Three-Circle Model; Succession planning; Intergenerational transition; Emotional dynamics in SMEs

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Introduction

Family-owned businesses are vital to Europe's economy and society, yet they face a formidable challenge: sustaining the business across multiple generations. Research indicates that only about 30% of family businesses survive the first generational succession, and far fewer (around 12 – 15%) make it to a third generation (Deb and Dube, 2017). This "succession bottleneck" threatens not only individual firms but also

broader economic stability, as family firms contribute significantly to GDP and employment (Paço et al., 2012).

The core problem is that many family business do not adequately prepare for leadership succession. A recent global survey (Calabró and Valentino, 2019) found that 70% of family businesses had no formal succession plan. Similarly, such as in Hungary, nearly half of family firms admit to having no succession strategy, and no written plan (Budapest LAB, 2020). With a wave of first-generation founders in Central and Eastern Europe now reaching retirement (many businesses were founded after the 1989–90 transition), the lack of succession planning is an urgent issue. Without effective succession, thousands of companies risk closure as their founders exit.

The challenge, therefore, is to identify how family-owned businesses, which most of them belong to the small and medium (SME) sector (Siuta-Tokarska et al., 2025), can navigate generational transitions successfully, preserving both family harmony and business performance.

The succession of family businesses remains a key area of scholarly interest due to its critical role in firm survival. Recent studies highlight its complexity, including aspects of innovation, knowledge transfer, professionalization, and socioemotional dynamics. Baltazar et al. (2023) note that succession can hinder innovation investment, despite its essential role in long-term survival. In rural contexts, such as family farming and beekeeping, where family farms have had reasons for existence (Nagy, 2006), succession ensures livelihood continuity while balancing tradition and innovation (Feketéné et al., 2021). Emotional factors are also pivotal: the incumbent's willingness to step down and the successor's readiness are major success drivers (Cabrera-Suárez & Martín-Santana, 2012; De Massis et al., 2016). Socioemotional wealth theory explains that family firms often prioritize non-financial goals, which can both obstruct and strengthen succession processes. Additionally, recent disruptions like the COVID-19 pandemic have reshaped family firm operations and decision-making contexts (Vida & Popovics, 2021).

In response to these gaps, our study aims to explore the mechanisms through which European family-owned SMEs manage intergenerational succession, with a particular focus on the alignment - or misalignment - of family, business, and ownership roles. To guide the inquiry, we pose the following research questions:

RQ1: How do successful and less successful European family firms manage intergenerational succession across the Family, Business, and Ownership domains?

RQ2: What role do narrative strategies, governance structures, and emotional dynamics play in shaping the outcome of the succession process?

RQ3: How can the Three-Circle Model help identify systemic sources of conflict or cohesion during generational transition?

1. Review of the scientific literature

Succession in family firms has long been recognized as a critical meeting point in the organizational life cycle. Classic studies noted the low probability of survival beyond two generations (Zellweger *et al*., 2012). Recent literature continues to explore why this process is so difficult and how it can be managed more effectively. There are many versions of the definition of efficiency and, of course, of efficiency-related ratios in the literature (Nábrádi et. al., 2008). Morris et al. (1997) distinguished between *succession process satisfaction* (the family's subjective view of how well the transition went) and *succession outcome effectiveness* (objective firm performance post-succession). Both dimensions are important: even if a successor is installed and the firm survives, unresolved family tensions or stakeholder mistrust can undermine long-term success. Indeed, surveys in Europe show that succession is often delayed or stalled – for example, a study in Slovakia found only 48.6% of family business owners had even started succession processes, and about 20% of firms had succession "stuck" with no clear successor identified (Rumanko et al., 2021). These statistics underscore that in many cases, founders postpone succession planning, increasing the risk of crisis if an unforeseen event occurs.

In the recent years, several studies have focused on the factors influencing successful succession in family SMEs. A few key themes emerge:

- **Lack of formal planning:** consistent with global findings, many European family SMEs do not engage in formal succession planning. Paço et al. (2021) report that most European family businesses they studied had no written succession plan and relied on implicit understandings. The absence of clear planning can lead to confusion and conflict when the time comes to transition leadership. However,

when companies *do* plan ahead, they tend to outline steps like selecting a successor, timing the handover, and tax or ownership arrangements. Formal plans can serve as "roadmaps," though scholars caution that *planning in itself does not guarantee success* – it must be coupled with execution and relationship management.

- **Successor development and next-gen engagement:** a strong finding across studies is the importance of preparing the next generation well in advance. This includes education, training, and progressive involvement in the business. Daughter and son successors alike benefit from early exposure to the firm. Yet, some cultures exhibit a gender bias in succession: daughters have historically been overlooked as successors in favor of sons or other male relatives. Recent research is beginning to document successful female succession cases, Floris and Dettori (2022) conducted a multiple-case study of daughters who took over family firms in Italy, highlighting both the opportunities and the distinct challenges that female successors face. Regardless of gender, effective grooming of a successor often entails deliberate rotation through various roles in the company, mentorship from the incumbent, and sometimes external work experience to build confidence and credibility.
- **Communication and stakeholder management:** transparent communication is frequently cited as a best practice to avoid the rumor mills and uncertainty that can plague succession scenarios. Open dialogue within the family about succession intentions and criteria can help manage expectations and reduce conflict. Equally important is communication with non-family stakeholders – key employees, customers, suppliers, and partners. A qualitative study of Polish family firms (Klaczak, 2023) found that communicating the succession plan to non-family managers and employees helped maintain their trust and commitment during the transition. When stakeholders are informed and involved, the business is more likely to retain its value through the handover. Conversely, poor communication can lead to an exodus of talent or clients who fear the unknown.
- **Intergenerational dynamics and conflict:** family business research increasingly acknowledges the complex emotional dynamics around succession. The incumbent leader (often a founder or long-time family CEO) may struggle with loss of identity upon retirement, while the successor may feel pressure to live up to the predecessor's legacy. These dynamics can create conflict, especially if multiple family members aspire to leadership or if sibling rivalry is at play. A recent study by Chang *et al.* (2020) on family firms in an emerging economy noted that *lack of consideration of certain family members (e.g. daughters)* and *ambiguity in successor selection* often led to conflicts and delayed succession. Best practices to mitigate these issues include establishing clear criteria for succession and sometimes using family governance mechanisms like family councils or constitutions to set ground rules.

European cases illustrate the role of professionalization in succession. Founders of SMEs often have an informal management style; as the firm grows and passes to the next generation, there is often a need (and an opportunity) to professionalize management practices (e.g. implementing formal governance, hiring non-family executives) to support the new leader. The Three-Circle Model (Tagiuri and Davis, 1982) is instructive here, highlighting that family firms consist of overlapping systems of family, ownership, and business (management). In a healthy succession, these spheres are realigned, while a next-gen member moves into management and possibly ownership over time. Many firms institute a board of directors or advisory board during succession to formalize decision-making and include independent perspectives – a practice recommended in family business governance literature (Bennedsen *et al.*, 2015). The Three-Circle Model of family business systems (on Figure no. 1.) illustrates the overlapping domains. Succession events require managing changes in all three circles (e.g. shifting roles of family members as owners and managers), underscoring the need for holistic planning (Tagiuri and Davis, 1982).

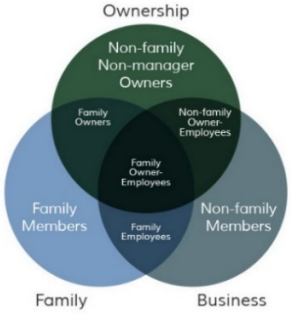

Figure no. 1. The Three-Circle Model
Source: Tagiuri and Davis, 1982

Literature in the past few years has also examined how generational change can be a catalyst for innovation – or conversely, a threat to it. The entry of a new generation is often associated with fresh ideas, digital savvy, and willingness to pursue new markets/products. Yet if the succession process is tumultuous, it can put innovation on hold. In the future, companies will need to develop social and environmental responsibility programs (Vida – Talatu, 2025), which is also an innovation that the younger generation can more easily implement. Baltazar et al. (2023) conducted a Web of Science-based literature review on succession and innovation, concluding that the uncertainty during succession often leads family firms to *temporarily curtail investment in innovation*, which can harm competitiveness. On the other hand, if the succession is well-managed, the next generation can "revive" innovation in a mature family firm by integrating past knowledge with new practices, as it is one of the most important part of the future goals of the successors (Tóth, 2024).

In addition to structural and relational aspects, a growing body of literature emphasizes the symbolic dimension of succession. Narratives – both internal and external – are increasingly recognized as tools for managing identity continuity, legitimizing successor roles, and reducing stakeholder uncertainty (Dalpiaz et al., 2014; De Massis and Rondi, 2020). Such narrative strategies can complement or even substitute formal planning in family firms, particularly in contexts where emotional legacy and brand heritage play a central role.

Recent literature highlights key succession challenges, while calling for more context-specific, qualitative insights. This study addresses that gap by analyzing European family business cases to offer both theoretical and practical contributions.

2. Research methodology

To answer the above research questions, we adopted a qualitative secondary multiple case study approach. This method allows for a systematic reinterpretation of previously published family business succession cases using a new analytical framework. By comparing multiple cases, it becomes possible to identify recurring patterns, divergences, and previously overlooked factors. This approach enables meta-level insights and can highlight theoretical blind spots or gaps in the literature, especially when cases are reassessed in light of recent models or emerging reserach questions. (Welch et al. 2011).

In addition to the multiple case study method, the Three-Circle Model provided the framework for a novel approach to the analysis, eg. to place the actors of succession in each segment of the circle (where possible), and to examine the importance of each circle, the lack of each, the reasons for potential conflicts. With the new comparison, we can highlight the importance of some elements of the Three-Circle Model and draw new conclusions that may be useful for successor family businesses in Europe.

The cases to be analysed from the new approach were selected according to different criteria. The first step was to search the databases for secondary sources. During the search, we identified 3 peer-reviewed academic sources in which the enterprise under analysis: (1) is a family business (the focus of our analysis) (2) is geographically located in Europe (to avoid strongly different cultural differences) (3) not engaged in agricultural activities (as their succession is highly sector-specific) (4) belongs to the category of SMEs, only one large company (because the majority of family businesses are SMEs) and (5) is documented in detail in the academic source (1 enterprise case per source was documented).

The characteristics of the three selected cases are represented in Table no. 1.

Table no. 1. Characteristics of the selected cases

Case Study	Authors	Methodology	Focus	Country	Firm's activity, size
Family firm succession in tourism and hospitality: an ethnographic case study approach	Kallmuenzer et al. (2022)	Longitudinal ethnographic case study	Family firm succession in the tourism and hospitality sector	Austria	Hotel, small enterprise
Succession Narratives in Family Business: The Case of Alessi	Dalpiaz et al. (2014)	Case study of narrative strategies	Family business succession and the use of narratives	Italy	Desing, medium enterprise
The succession dilemma in family firms: case study of a French company	Meier and Thelisson (2020)	Longitudinal case study	Challenges in succession in family firms	France	Industrial services, large enterprise

Source: own processing

The articles each adopt qualitative methods, particularly longitudinal case studies or ethnographic approaches, which are well-suited for capturing the complexity and emotional depth inherent in family business transitions. This approach allows for in-depth exploration of how family dynamics and business imperatives intersect, which is critical for understanding succession beyond surface-level analysis.

The employment of longitudinal data gathering, as found in the Kallmuenzer et al. (2021) and Meier and Thelisson (2020) studies, is important because it offers insight into the dynamic processes and struggles of succession, as opposed to taking a snapshot of one event.

The Dalpiaz et al. (2014) work emphasizes the function of the narrative in justifying succession transitions. This is a critical area of study since the narrative influences the identity of the organization and the views of stakeholders, which contribute to the success or failure of the succession. This approach deepens the knowledge regarding succession by highlighting the significance of the symbolic and the emotive.

The Kallmuenzer et al. (2021) approach centers on family businesses within the tourism and hospitality sector, where succession is specifically challenging because of the sector's seasonality and turnover, offering insights into sector-specific issues. It is important that the approach is specific to the sector because it provides tangible insights into family businesses operating within tourism, which tend to be distinct compared to other sectors.

The compilation of these case studies provides an overall perspective on family business succession and offers both theoretical and pragmatic lessons informed by actual-world examples. These case studies individually and together highlight the requirements of good communication, business planning, and the management of family conflict to provide long-term success to family enterprises.

3. Results and discussion

Case study analysis 1: *Family Firm Succession in Tourism and Hospitality* (Kallmuenzer et al., 2021)

This article, grounded in longitudinal ethnographic research on an Austrian family-run hotel in Western Austria, offers an in-depth, multi-stakeholder description of succession across generations. The secondary analysis recasts the findings through the Three-Circle Model – Family, Business, and Ownership – and centers specifically on the intersectional position and tensions within the three domains.

Within the Family circle, the strongest finding is regarding the emotional dynamics and identity entanglement between the founders and the successors. The founders' emotional connection to the business and an unstated belief that successions should pass to their children tended to create successors' ambivalence. This was reflected in procrastination in decision-making and sidestepping conflict-ridden discussions about succession. The family identity – particularly the eldest daughter's, who was emotionally and professionally committed – was critical to the legitimation of her as successor. Yet the pervasiveness of the family norms, including loyalty and informality, at times made it difficult to be open about evaluation of other, perhaps better, successors.

The Business circle also exposed an additional layer of complexity. Daily activities were inextricably tied to family routines and therefore standardization and professionalization were frequently in short supply. Nonetheless, the high quality of performance was sustained by the flexibility and informality characteristic of small family tourism businesses. But the very same features created huge succession threats: the absence of formal HR structures and strategic planning retarded role definition and succession preparation. The ethnographic data indicated that employees – and long-serving non-family ones at that – were thoroughly immersed in the informal organisational culture, and that adjustment to new leadership practices threatened to become an arena of resistance.

In the Ownership circle, the investigation described how complete family ownership both promoted cohesion and rigidities. The founders maintained decision-making rights long after the successors were operationally engaged, leading to an imbalance between formal ownership and informal leadership. One of the insights is that despite the high level of commitment of the successors, the lack of an accepted governance model or shareholder agreement led to underlying tensions. Ownership was employed as an informal proxy for legitimacy instead of an institutional mechanism for the delegation of decision rights.

Another aspect of the case is the stewardship culture of the next-generation successor group, particularly the daughters. Their deep emotional stake and values congruence with the founding group resonate with stewardship theory principles, enforcing continuity and commitment. The case does, however, also

illustrate how stewardship, when overly tied to tradition and unwritten understandings, can act as an inhibitor to frank succession communication.

Together, the results indicate a highly personal, emotion-laden, and informally managed succession process. Although these characteristics are comforting in the short run, they conceal underlying problems regarding authority, planning, and organisational resilience. The Three-Circle Model enables us to observe how shared roles – such as both daughter and manager – generate identity tensions which express themselves during succession. The overlap between the circles, notably between the Family and the Business, diminish the organisation's ability to take on generational transition.

Case study analysis 2: *Succession Narratives in Family Business: The Case of Alessi* (Dalpiaz et al., 2014)

The case of Alessi provides an unusual perspective on how narrative construction can act as an intentional tool for legitimation of succession in family businesses. Through longitudinal case study design, the authors followed the ways in which Alberto Alessi constructed curated autobiographical stories to frame his leadership and restructuring of the company. The secondary analysis, informed by the Three-Circle Model, highlights how the intersections of Family, Business, and Ownership were dealt with symbolically and discursively and not just structurally.

Within the Family circle, Alberto anchored his legitimacy through an artfully constructed family lineage narrative. Succession was not just articulated as transfer of command, but as an extension of an entrenched family mandate. This strategy allowed him to shore up the emotional loyalty of senior family members and staff who cherished tradition. Specifically, Alberto distinguished himself by engaging the family's aesthetic legacy, choosing to highlight his continuity with earlier generations but at the same time bringing new artistic trends into play. This "commemorating" of earlier family contributions allowed him to pay homage to and move beyond tradition – an essential tension of family business succession.

The Business community underwent radical transformation during the tenure of Alberto. The former manufacturing turnkey to household products became, under his reign, a design dynamo. Although the move was strategic, it demanded internal cultural adjustment as well. It is the narrative that played an important role in aligning the internal and external constituents behind a new vision without disenfranchising the establishment-oriented individuals. Employees, designers, and outside collaborators were gradually absorbed into the cultural vision of Alberto as it erased the distinction between business and art. Significantly, these business transitions were framed within the narrative as organically evolving within family values and thereby strengthened the internal consistency of the succession narrative.

With regards to ownership, the company stayed wholly owned by the family, but the stories also legitimized Alberto's independence to make key decisions. This case particularly illustrates the ways in which stories can take the place of formal governance practices in the area of ownership. Rather than shareholder agreements or succession procedures, Alberto utilized symbolic capital – in the form of exhibitions, publications, and public narrative – to institutionalize his leadership.

One new perspective gained from the case is the manner in which the successor's narrative functions as a "bridging device" between each of the three circles. It provides an explanatory framework through which the successor's vision is reconciled to family identity, business aspirations, and ownership succession. The employment of narrative also allows for temporal depth, as the successor is able to reinterpret the history, legitimize the present, and outline an agenda for the future.

The case of Alessi therefore shows the centrality of meaning-making in succession. It demonstrates that symbolic legitimacy is just as vital as legality or management command in certain family businesses. Narrative techniques minimize intergenerational tension by recasting continuity through change. This is particularly true for successor firms within the European context, where brand history and historical identity tend to be closely intertwined.

Case study analysis 3: *The Succession Dilemma in Family Firms* (Meier and Thelisson, 2020)

This case study from France examines the succession dilemmas of a large family business (Onyx) during the course of ten years. The analysis reveals six succession dilemmas the CEO had to deal with, mainly the balancing act between professional management and family loyalty. By using the Three-Circle Modle as the framework of interpretation, the balancing act is made visible analytically.

Within the family, the greatest concern was the founder's resistance to giving up control. While succession was identified as necessary, the emotional ties to the firm hindered planning and led to uncertainty regarding

the successor's role. The family's identity embedded in the firm was simultaneously an area of strength and inertia. The analysis also identified conflicts between active family business participants and non-active family investors, particularly in the areas of dividend expectations and direction.

The Business community evidenced unmistakable symptoms of professionalization tension. Onyx, with its 8,500 staff and €112 million turnover, had grown beyond the bounds of casual governance structures. The conflict there was between safeguarding the legacy of the founder and instilling formal managerial systems. The CEO encountered resistance from family stakeholders when pushing to hire outside professionals, even when the expertise was critical to growth. This is an inherent dilemma in established family firms: how to balance business effectiveness and family harmony.

Ownership considerations were at the heart of the succession dilemma. Contrary to small firms, Onyx boasted both family and non-family owners. It became the duty of the CEO to mediate between competing interests: the family owners desired stable dividends and control retention, but the institutional investors wanted transparency, expansion, and market-based returns. The succession procedure threatened to disrupt the fragile balance. The absence of transparency in the valuation of shares during succession was most controversial since various groups were interested in reducing tax liabilities or increasing exit value.

The uniqueness of this case lies in the clear face-off between two logics: the emotional, identity-based logic of family succession and the rational, performance-driven logic of business management. The Three-Circle Model illustrates how, unless mediated, these logics generate ongoing ambiguity and strife. The CEO's resolution – ten years of succession planning involving consultants and shareholders – was pragmatic but emotionally exhaustive.

The major finding is, however, that such long-term succession planning is success reliant not just on governance structures or instruments of law but also on the capability of the incumbent to balance competing logics. Succession is not just an event for managers; it is an existential transition for the organization and the individual as well. The case also shows how the misaligment between ownership and business requirements can freeze strategic decision-making.

Across the three cases, several recurring, yet previously underemphasized new and novel findings emerge:

Narratives as succession infrastructure: particularly in Dalpiaz et al. (2014) narrative construction emerges not just as a communication tool but as an alternative form of succession infrastructure in the absence of formal planning.

Stewardship saturation: in Kallmuenzer et al. (2022) deep emotional investment in stewardship can paradoxically hinder adaptation and open succession dialogue, suggesting the need for structured dis-identification processes.

Ownership inertia: in Meier and Thelisson (2020) family-controlled ownership often perpetuates status quo biases that delay essential strategic shifts, even when the need for change is acknowledged.

Three Circles misalignment: misalignment between circles – especially when family expectations override business needs – is a systemic source of conflict that requires deliberate realignment through governance innovations.

Conclusions

This Three-Circle-based secondary analysis finds that the most exposed points for succession processes in family firms occur when the boundaries among family, business, and ownership become fuzzy or contentious. Central among the concepts in countering such vulnerabilities are those of narrative legitimacy, emotional identity, and stakeholder alignment, all being important determinants for the mediation of tensions associated with transitions.

Based on the above findings, the following several strategy recommendations for European family businesses in generational transitions emerge. First, it is crucial to formulate well-structured succession plans early, preferably with the help of external consultants in order to remain objective and benefit from their expert advice. Second, the family business should make use of framing strategies in such a manner that succession comes across as continuity rather than change, thereby creating convergence among the stakeholders. Third, introducing formal mechanisms for governance (family councils, shareholder agreements, etc.) can help manage misalignments among the three circles of the model. Last, promoting

clear definition of roles can avoid overlaps and identity ambiguity in transition periods.

This integrated analysis offers a novel lens for understanding family business succession and contributes to both theory and practice by highlighting the need for narrative, structural, and relational solutions.

This study is limited by its reliance on secondary case analyses, which restricts access to firsthand data and may reflect interpretative biases. The small sample size and Western European focus limit generalizability, especially for Central and Eastern Europe (CEE). Future research should include primary, longitudinal data and broader cultural contexts – particularly from CEE – to better capture succession dynamics and deepen understanding of the interplay between emotional legitimacy and formal planning.

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References

Baltazar, J.R., Fernandes, C.I., Ramadani, and V., Hughes, M., 2023. Family business succession and innovation: a systematic literature review. *Review of Managerial Science*, 17(8), 2897-2920. https://doi.org/10.1007/s11846-022-00607-8

Bennedsen, M., Fang, H., and Pérez-González, F., 2015. The family business map: Framework, selective survey, and evidence from Chinese family firm succession. *Journal of Corporate Finance*, 33, 212-226. https://doi.org/10.1016/j.jcorpfin.2015.01.008

Budapest LAB, 2020. Sokan vannak, de mennyien lesznek a családi cégek? There are many, but how many will be family firms? [online] Available at: https://budapestlab.hu/index.php/sokan-vannak-de-mennyien-lesznek-a-csaladi-cegek/ [Accessed 20 March 2025].

Cabrera-Suárez, M. K. and Martín-Santana, J. D., 2012. 'Successor's commitment and succession success: dimensions and antecedents in the small Spanish family firm', *The International Journal of Human Resource Management*, 23(13), pp. 2736–2762. doi: 10.1080/09585192.2012.676458.

Calabrò, A., and Valentino, A., 2019. STEP 2019 Global Family Business Survey: The impact of changing demographics on family business succession planning and governance. *STEP Project Global Consortium & KPMG Private Enterprise*. [online] Available at: https://assets.kpmg.com/content/dam/kpmg/sa/pdf/2020/step-2019-global-family-business-survey-report.pdf [Accessed 28 March 2025].

Chang, A.A., Mubarik, M.S. and Naghavi, N., 2021. Passing on the legacy: exploring the dynamics of succession in family businesses in Pakistan, *Journal of Family Business Management*, Vol. 11 No. 2, pp. 161-184. https://doi.org/10.1108/JFBM-10-2019-0065

Dalpiaz, E., Tracey, P., and Phillips, N., 2014. Succession narratives in family business: The case of Alessi. *Entrepreneurship Theory and Practice*, *38*(6), 1375-1394. https://doi.org/10.1111/etap.12129

De Massis, A. and Rondi, E., 2020. Covid-19 and the Future of Family Business Research. *Journal of Management Studies*, 57(8), 1727–1731. https://doi.org/10.1111/joms.12632

De Massis, A., Frattini, F., Kotlar, J., Petruzzelli, A. M., and Wright, M., 2016. Innovation through tradition: Lessons from innovative family businesses and directions for future research. *Academy of management Perspectives*, *30*(1), 93-116. https://doi.org/10.5465/amp.2015.0017

Deb, S., and Dube, I., 2017. Corporate governance disclosure for complex ownership structure in India. *Indian Journal of Corporate Governance, 10*(2), 143–175. https://doi.org/10.1177/0974686217730937

Feketéné Ferenczi, A., Szűcs, I., and Vida, V., 2021. Családi gazdasági keretek között működő méhészeti vállalkozás üzemtani vizsgálata. Operational study of a family beekeeping business. *Gazdálkodás*: *Scientific Journal on Agricultural Economics*, 65(3), 237-255. https://doi.org/10.22004/ag.econ.312085

Floris, M., and Dettori, A., 2022. Daughters' involvement and female succession in family businesses: A multiple case study. *Piccola Impresa/Small Business,* (3), Article 2880. https://doi.org/10.14596/pisb.2880

Kallmuenzer, A., Tajeddini, K., Gamage, T.C., Lorenzo, D., Rojas, A. and Schallner, M.J.A., 2022. Family firm succession in tourism and hospitality: an ethnographic case study approach, *Journal of Family Business Management*, Vol. 12 No. 3, pp. 393-413. https://doi.org/10.1108/JFBM-07-2021-0072

Klaczak, Jan Marcin, 2023. Succession Planning Strategies in Polish Family-Owned Businesses. *Walden Dissertations and Doctoral Studies*. [online] Available at: https://scholarworks.waldenu.edu/dissertations/14263 [Accessed 2 April 2025].

Meier, Olivier and Thelisson, Anne-Sophie., 2020. The succession dilemma in family firms: case study of a French company. *Journal of Business Strategy*. https://doi.org/10.1108/JBS-04-2020-0078

Morris, M. H., Williams, R. O., Allen, J. A., and Avila, R. A., 1997. Correlates of success in family business transitions. *Journal of Business Venturing*, 12, 385–401. https://doi.org/10.1016/S0883-9026(97)00010-4

Nábrádi, A., Pető, K., Balogh, V., and Szabó, E., 2008. Efficiency indicators of various levels - Partial, comlex, social, corporate, regional and macro-economical. Efficiency in Agriculture: Theory and practice (2008). ISBN:9789635028993. 23-51.

Nagy, A. S., 2006. Családi alapon működő mezőgazdasági vállalkozások (családi gazdaságok) ökonómiai elemzése. Economic Analysis of Hungarian Family Farm Businesses. *Ph.D. thesis, Doctoral School of Interdisciplinary Social and Agricultural Sciences.* http://hdl.handle.net/2437/78165

Paço, A., Fernandes, C., Nave, E., Alves, H., Ferreira, J. J. D. M., and Raposo, M., 2021. Succession planning and strategies in family business: A multiple case study. *International Entrepreneurship Journal*, *25*(Special Issue 1), 1-12. Online ISSN: 1939-4675

Rumanko, B., Lušňáková, Z., Moravanská, M., and Šajbidorová, M. (2021). Succession as a Risk Process in the Survival of a Family Business – Case of Slovakia. *Journal of Risk and Financial Management*, *14*(10), 458. https://doi.org/10.3390/jrfm14100458

Siuta-Tokarska B, Kowalik M, Juchniewicz J., 2025. Factors in the Development of Family Businesses in the SME Sector: Analysis and Assessment of Their Importance in Strategic Enterprise Management. *Sustainability*. 17(5):1821. https://doi.org/10.3390/su17051821

Tagiuri, R., and Davis, J., 1996. Bivalent Attributes of the Family Firm. *Family Business Review*, *9*(2), 199-208. https://doi.org/10.1111/j.1741-6248.1996.00199.x

Tóth, B., 2024. The Role Of Innovation In The Succession Of Family Businesses. *Applied Studies in Agribusiness and Commerce*, 18(2). https://doi.org/10.19041/APSTRACT/2024/2/2

Vida, V., and Popovics, P., 2021. A COVID-19 járvány hatása Magyarországon az élet különböző területeire (munka, magánélet, egészségi és mentális állapot). The impact of the COVID-19 epidemic in Hungary on different aspects of life (work, private life, health and mental health). *Régiókutatás Szemle*, 6(1), 25-36. https://doiorg/10.30716/RSZ/21/1/2

Vida, V., and Talatu, M. A., 2025. Analysis of Social And Environmentally Conscious Behavior As Part In Companies. *Applied Studies in Agribusiness and Commerce*, 18(2). https://doi.org/10.19041/APSTRACT/2024/2/11

Welch, C., Piekkari, R., Plakoyiannaki, E., Paavilainen-Mäntymäki, E., 2011. Theorising from case studies: Towards a pluralist future for international business research. *Journal of International Business Studies*, 42, 740–762. https://doi.org/10.1057/jibs.2010.55

Zellweger, T. M., Nason, R. S., Nordqvist, M. (2011). From Longevity of Firms to Transgenerational Entrepreneurship of Families: Introducing Family Entrepreneurial Orientation. *Family Business Review*, *25*(2), 136-155. https://doi.org/10.1177/0894486511423531

Sustainable Agriculture through Efficient Leadership: A Comparative Analysis on Italy and Romania

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Abstract

This paper explores how efficacious leadership is vital in furthering enduring agriculture, pivoting upon a comparative assessment between Italy and Romania. The research integrates both quantitative as well as qualitative methodologies. It scrutinises indicators including ammonia emissions, pesticide usage, energy consumption within agriculture, organic farming development, and technological investments. Italy exhibits a deeply secured leadership hierarchy. It is additionally distinguished via strong regional governance coupled with prominent integration of digital as well as agroecological practices, alongside cohesive public policies. Conversely, Romania confronts institutional disaggregation, sluggish technological uptake, and infrastructural constraints yet presents auspicious advancements within organic agriculture and sustainable power. The study accentuates how forward-thinking and flexible governance, by means of leadership, can substantially shape the sustainability path of national farming systems if established upon innovation, collaboration, and considered progression. The findings underscore Italy's capacity for intimate alignment to EU Green Deal goals, whilst Romania requires further structural reformation, stakeholder coordination, and investment toward improving its leadership plus sustainable agriculture framework. Juxtaposing these approaches highlights that policies necessitate contextual awareness and that formal plus informal leadership structures within rural locales require enablement.

Keywords

Sustainable agriculture, efficient leadership, agricultural policies, Italy agriculture, Romania agriculture, comparative analysis.

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Introduction

Sustainable agriculture represent a structure of land management practices focused at meeting the current food and essential resources of the population without disregarding the needs of future generations. It is created around the principle of balance between environmental protection, economic stability, and helping agricultural communities (Sarkar et al.,2022).

The concept of sustainable agricultural production development encompasses four fundamental principles like persistence, resilience, autarchy, benevolence. Regarding the persistence, it is the ability to consistently deliver desired outputs on long periods, ensuring predictability. The resilience is about the ability to adapt, maintaining structural integrity without significant changes. The autarchy is the capacity to generate outputs using inputs and resources sourced within defined system limits. Benevolence refers to the capacity to produce preferred outputs while protecting ecosystem services and avoiding the reduction of environmental assets (Pretty, 2007).

Italy and Romania were selected for this analysis due to their particular agricultural contexts and diversity in land management practices and policy administration. Italy, a founding member of the European Union, has a established tradition in sustainable agriculture, while Romania, a more recent EU member, is in the process of developing its agricultural sector and applying sustainable methods. The fundamental purpose of this paper is to analyze how efficient leadership can sustain sustainable agriculture in each countries, analyzing indicators such as ammonia emissions, food waste and food waste prevention, agri-environmental indicator - consumption of pesticides and investments in sustainable agriculture.

1. Review of scientific literature

Ensuring the transition to sustainable agriculture requires effective leadership that promotes ecological practices, mobilizes farmers and communities, leverages local knowledge, and influences public policy. Leaders play a central role in integrating biological and ecological processes into agricultural production, replacing dependence on non-renewable resources with sustainable, accessible, and innovative solutions that contribute to increased productivity and long-term environmental protection (Pretty, 2007).

Westley et. al. (2018) argue that, instead of using the traditional concept of "leadership," the notion of institutional entrepreneurship is more appropriate – that is, individuals or networks of actors who initiate and support transformations in complex systems, not through command and control, but through strategic influence, resource mobilization, and the building of partnerships.

Effective leadership is contextual and phased. Transformational leaders need to adapt their strategies according to the phases of the adaptive cycle. Each stage requires different skills – from creating tensions within the system, to facilitating innovation, and finally to institutionalizing change (Westley et. al, 2018).

Leadership involves collaboration, communication, and building a shared vision. Sustainable transformations emerge through networks of actors who coordinate their efforts. Essential skills include: vision-building, facilitating social learning, network creation, conflict mediation, and leveraging emergent opportunities (Westley et. al, 2018).

In the context of efforts to transition towards more sustainable agriculture, the concept of leadership requires a re-evaluation beyond traditional hierarchical models. The information presented highlights two distinct, yet potentially complementary, forms of leadership among farmers. Firstly, it is observed informal leadership, manifested through the role of local farmers as principal agents of change within their communities, disseminating agroforestry knowledge and technologies. This form of influence, based on trust and local expertise, demonstrates an intrinsic capacity to generate change from the grassroots level. Secondly, participatory leadership emerges as essential in the process of technological development. By actively involving farmers in the design and adaptation of new technologies, the passive adoption model is overcome, and their practical knowledge is valued, significantly increasing the chances of sustainable and effective adoption. These examples suggest that strategies for promoting sustainable agriculture should recognize and leverage these existing forms of leadership among farmers, creating the necessary framework to amplify their impact (Meijer et al. 2014).

Darnhofer (2014) suggests that farmers are not merely passive subjects of change but active agents who exercise their capacity to make decisions and act to ensure the viability of their farms in uncertain environments. This ability to act strategically and influence the farm's trajectory can be interpreted as a form of leadership, even if not explicitly labeled as such. Therefore, farm resilience significantly depends on farmers' agency, strategic decision-making, and navigation of complex changes, indicating their active and leading role in managing their farms' future.

As Klerk and Rose (2020) sustain, leadership in the context of Agriculture 4.0 requires a balanced approach that integrates technological innovation with social responsibility and sustainability. Leaders must ensure that emerging technologies are implemented responsibly, considering their potential social, economic, and environmental impacts. They should foster inclusivity by supporting both high-tech and low-tech solutions and promote cross-sector collaboration to address food system challenges. Furthermore, a mission-oriented innovation policy is essential for guiding the transition towards more sustainable agricultural practices. Ultimately, effective leadership in Agriculture 4.0 must be adaptable, forward-thinking, and committed to creating a fair and resilient food system for all.

Supporting sustainable livelihoods in agriculture depends on Educational methodologies, adaptation, and repositioning. Knickel et al. (2018) argue that boosting transformational capacity by supporting co-learning represents one of two main strategies for promoting the fundamental systemic changes in agriculture and rural development. Learning, evolution and rebalancing are essential for maintaining livelihoods in the

agricultural environment, and effective leadership should facilitate these processes as part of the transition to more sustainable agricultural systems. Farmers will decisively have the responsibility for executing the policies and programs necessary for long-lasting development. It is important to incorporate their skills, expertise and ideas into current approaches, as well as grow their ability to become leaders in managing the challenges of sustainable development (Zamani and Karami, 2006).

In Romania, one of the most important institution that is involved in a sustainable agriculture is the Ministry of Agriculture and Rural Development (MADR). Regarding leadership in Romania, MADR implements and coordinates agricultural policies in the field of agriculture development and manages the use of European funds for the modernization of the agricultural sector. It also develops the legislative framework, elaborating and promoting normative acts and represents Romania's interests, participating in European and international negotiations on agricultural policies. Similarly, it implements support measures for agricultural producers and sustainable agricultural practices through digitalization with digital solutions to streamline administrative processes in agriculture. Moreover, this institution supports agricultural research via the transfer of knowledge to farmers. MADR, anyway, is confronted with challenges at the leadership level, like the frequency of management changes and impediments in ensuring long-term strategic continuity (MADR, 2021).

MADR (2021) has many institutions under its authority, each dealing with different dimensions of the agricultural sector. These include: the National Agency for Improvement and Reproduction in Zootechnics (ANARZ), the Agency for the Financing of Rural Investments (AFIR), the National Office for Vine and Wine Products (ONVPV), the National Institute for Research and Development in Biology and Zootechnics (ICDBZ), and the National Sanitary Veterinary and Food Safety Authority (ANSVSA). These institutions collaborate to develop national agricultural policies, manage European funds, and stimulate sustainable agriculture in Romania.

In the Ministry of Agriculture, Food Sovereignty and Forestry of Italy (MASAF), leadership plays an essential role in defining strategic direction and representing Italy's agricultural interests both nationally and internationally. The leadership role in MASAF is complex and multifaceted, including the coordination of rural development policies, the representation of Italy's priorities internationally, the promotion of Italian agri-food quality and the implementation of long-term development strategies. The current leadership has refocused the ministry towards the concept of food autonomy, highlighting the valorization of Italian agricultural practices and the competitive orientation of Italian products on international markets (MASAF, 2024). Moreover, CREA (Council for Agricultural Research and the Analysis of Agricultural Economics) is a leader in agricultural research and in developing creative solutions to strengthen the productivity of the agricultural sector in Italy. Institutional leadership here signify coordinating research across various sectors, such as bioeconomy, environmental protection, and sustainable development. Also, CREA shapes policies through its research, which engages a form of leadership in sustainable agriculture and technological improvements (CREA, n.d.).

2. Research methodology

This paper represents a comparative analysis of sustainable agriculture in Romania and Italy with a focus on the importance of leadership in managing sustainable agriculture. The two countries were chosen for the analysis because the article represents the result of research activities carried out within an Erasmus mobility at the Aldo Moro University of Bari. Italy. To achieve the research objectives, a quantitative analysis of statistical data on sustainable agriculture was conducted. A qualitative analysis of policies and initiatives in the two states for sustainable agriculture was also conducted.

3. Results and discussion

Ammonia emissions from agriculture are a major source of air pollution, driven by the use of fertilizers and the management of animal manure. In the period 2018-2022, Italy recorded average annual emissions of approximately 336.6 thousand tonnes, with a maximum in 2020 (356.2 thousand tonnes) and a minimum in 2022 (299.1 thousand tonnes), reflecting a total reduction of 12.9% compared to 2018. Romania had much lower average emissions, of approximately 139.9 thousand tonnes annually, with a slower decrease of only 5.9% over the same period.

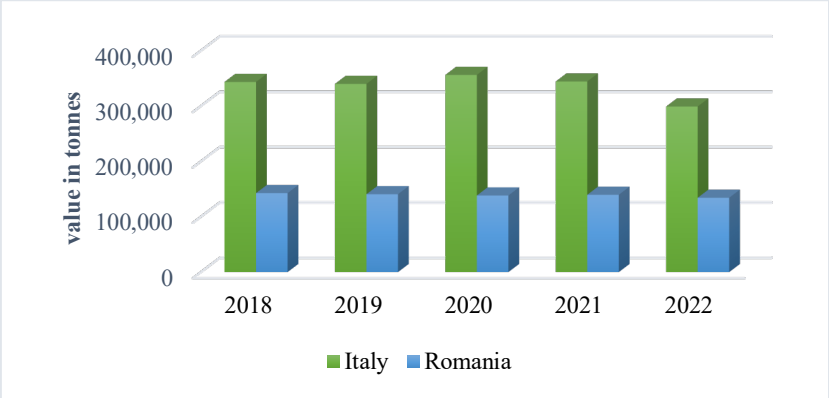

Figure no. 1. Comparative ammonia emissions from agriculture in Italy and Romania

Source: Eurostat, 2024. Ammonia emissions from agriculture

Italy has consistently emitted approximately 2.4 times more ammonia than Romania, a difference explained by the larger size of the agricultural sector and the intensity of production. At the same time, the faster pace of reduction in Italy suggests a more efficient implementation of environmental measures. Romania, although stable, indicates potential for improvement through sustainable agricultural technologies and policies.

Energy usage within the farming and forestry industries signals the resilience of agri-food schemes plus energy conservation across countryside locales. Examination of Italy and Romania throughout 2019–2023 uncovers substantial structural divergences as amongst them, and also some correspondences within the proportion of agrarian energy comparative to the national aggregation.

Regarding direct energy usage in agriculture and forestry, Italy's listed figures exceeded those of Romania by a meaningful amount. During the period of 2020-2022, Italy's agricultural sector utilised from 2.759 thousand to 2,986 thousand tonnes of oil equivalent (toe), with a minor reduction in 2022 from the apex of 2021. By contrast, agricultural consumption in Romania was approximately five times less. The consumption incremented to 555 thousand toes within 2022 from 531 thousand toe during 2020, which mirrors a rise of near 4.5%. The greater economic and technological scale of Italian agriculture plus its superior degree of mechanisation validate this quantitative distinction.

Across 2019-2023, Italy's aggregate national energy usage remained consistently superior to that of Romania, concomitantly. Italy's ultimate energy consumption in 2023 attained roughly 36.13 million units (likely MWh), a prominent quantity. In contrast, Romania used 21.99 million units during that annum. The variance in these figures comes to approximately 14 million units, implying Italy's national consumption exceeds Romania's by 64%. The medium-term tendency evinces a modest variation, though with no major structural alterations within either country. Throughout both instances, agriculture's fraction within energy usage has stayed quite constant. Eurostat data (Agri-environmental indicator - energy use, 2024) depict this sector consistently represented 2.6% from total consumption in Italy between 2020 as well as 2022. Within Romania, the sector fluctuated between 2.2% to 2.4%. These proportions hint at a like structural relevance for agriculture within both nations' energy design, though the specific values vary greatly. This might intimate the agricultural energy consumption pattern verges upon convergence. Notwithstanding the convergence, the scale exhibits palpable disparities.

Both Italy and Romania use agricultural energy, showing different quantitative patterns, although proportional to total national consumption. While maintaining a stable proportion overall, Italy is establishing a model of energy conservation in agriculture through a more industrialized agriculture, corroborated with increased consumption. In contrast, Romania shows a measured increase in agricultural consumption, as national consumption stagnates or somewhat decreases. This scenario presents opportunities for Romania to renew itself and move towards more energy-efficient agricultural practices. Pesticide sales indicate, like a measure, the degree agriculture uses chemical input, showing direct effects for the environment, human health and farming systems' sustainability. Data analysis shows key differences between Italy and Romania from 2019-2023 (Eurostat, 2024). These differences are apparent throughout evolutionary trends and throughout total quantities. Pesticide sales within Italy have consistently been high, peaking in 2020 when 56.3+ million kilograms of active substances were sold. In the following years, values gradually decreased to about 39.6 million kilograms in 2023. This marked a reduction overall of 29% from 2020. Organic farming or the use of precision technologies or measures for complying with EU

regulations on the sustainable use of pesticides may be reflected in this decrease toward agricultural practices that are more sustainable.

Comparatively, Romania did record much lower absolute values that ranged from 7.9 to 9.1 million kg on a yearly basis. Besides the gradual decrease between 2019 and 2022 peaking at 7.96 million kg in 2022, 2023 sharply increased it to 9.16 million kg which even exceeded the 2019 level. This reversed trend recently suggests farming strengthens possibly, or strategies reduce chemical input ineffectively. In comparison, Italy sold about 5-6 times more pesticides than Romania in each year of the period analyzed. However, the increase in Romania from 2023, in parallel with the clear decrease in Italy, may indicate a diverging direction in terms of agricultural policies and sustainability of applied practices (Eurostat, 2024. Sales of pesticides by type of pesticide)

In 2023, Italy clearly committed itself to sustainable agriculture and invested greatly in digitization. The Agriculture 4.0 market got to €2.5 billion, that is up 19%, because digital solutions were expanded for traceability and artificial intelligence plus the Internet of Things. However, only 9% of farms adopt green practices like carbon farming, applying them rarely. Romania, in contrast, has focused on the energy transition, plus this focus attracted over €500m investment in wind energy through the Pestera II project. This project does contribute to decarbonizing of the rural economy, even though it is not targeting agriculture so directly. Romania has not made obvious moves toward agricultural digitalization. Romania has not integrated smart technologies on farms either, just unlike Italy. Agricultural technology interests Italy for investment. In Romania, green infrastructure is the focus. For Romanian farms, the integration of digitization becomes important for both sustainable agriculture and complementary approaches.

Between 2019 to 2023, the area that farmers farmed organically in Italy along with Romania followed different trajectories regarding pace plus magnitude, which reflected distinct stages while they transitioned toward sustainable agricultural practices. Italy has borne witness to a steady increase within the area which is farmed organically, going from 1,993,225 hectares back in 2019 up to 2,455,586 hectares in 2023 since it increased by about 23% during five years. This development confirms Italy's leadership within Europe in organic farming, because sound public policies support it, its domestic market is mature, and its infrastructure for certification and distribution is well-developed.

Comparatively, Romania has experienced a faster growth pattern. A smaller base was the starting point though. The organic area grew from 395,228 hectares in 2019 up to 644,520 hectares in 2022. This registered an increase of about 63% in just three years. This expansion is explained by rising interest in sustainable practices and access to European subsidies, though 2023 data is missing. Romania lags behind Italy to a large extent in total organic area nevertheless, but this positive trend does suggest a potential for development. In comparison, Italy has a consolidated organic farming infrastructure so it covers almost four times as much organic cultivated land as Romania, and Romania clearly needs investment in certification plus processing and education.

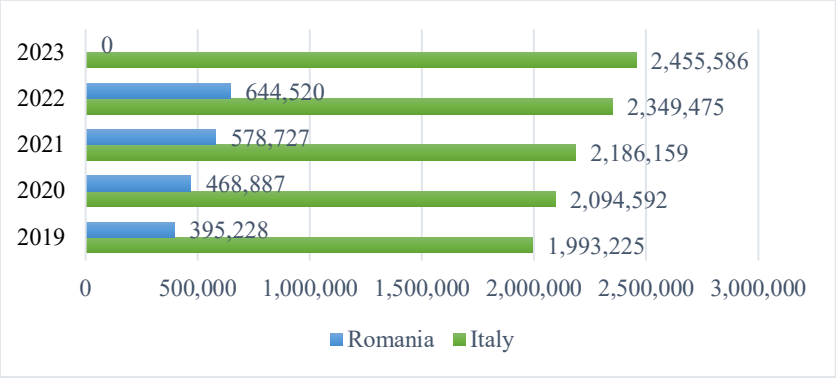

Figure no. 2. Total organic agricultural area

Source: Eurostat, 2024. Agricultural area under organic farming

According to the specialized literature, we identified a series of aspects regarding agriculture in the two states. Sustainable agriculture in Italy and Romania represents a detailed image consisting of disparate prospects and predicaments, as evinced by many investigations. The agricultural sector of Italy displays a distinct economic as well as environmental sustainability trade-off, especially within both livestock and cereal sectors, whilst horticulture reveals a synergy amid these dimensions (Arru et al., 2024). Italian agriculture evolved greatly between 2010 and 2020, whilst farm size, investment in innovation, plus sustainability correlate positively, despite regional disparities persisting (Altamore et al., 2024). A divide

between the north and south additionally confounds the sustainability of agriculture in Italy, with younger farm supervisors displaying a greater inclination to embrace sustainable practices (Gismondi, 2024). Conversely, Romania's agriculture faces predicaments such as fragmented landownership and antiquated infrastructure. This impedes its congruence with Sustainable Development Goals such as climate action and zero hunger (Nistoroiu, Nicolae and Condeianu, 2024). Despite encountering difficulties, Romania reduces unemployment, increases income, yet struggles with industrial innovation plus sustainable consumption (Puiu, 2024). Climate change additionally exerts large impacts upon the Romanian agricultural sector, and this therefore necessitates public-private partnerships for the reduction of methane emissions alongside the promotion of sustainable practices (Stoian et al., 2024). Ecologically sound agriculture represents a main focal point inside the wider European Union framework, in which those countries both participate. Nevertheless large spatial variation in sustainability metrics is displayed by them (Wyrwa, Barska and Jędrzejczak-Gas, 2024). Italy's agricultural sector profits from a more regimented approach to innovation as well as sustainability, however Romania's advancement is impeded by infrastructural plus systemic challenges, also this accentuates the requirement for focused policy interventions plus investments in both nations to achieve sustainable agricultural development (Buzoianu et al., 2024). These discoveries underscore the importance of approaches that are bespoke and contemplate geographical attributes. Furthermore, amalgamating technological innovations and policy increases agricultural sustainability throughout Europe (Zhang, 2024).

Sustainable agriculture has become a central pillar of the European Union's Common Agricultural Policy (CAP), emphasizing the transition towards agro-ecological practices, reducing environmental impacts and ensuring sustainable food security. In this context, Romania and Italy, two Member States with different agricultural structures, have adopted varied measures to implement European objectives, reflecting distinct levels of leadership and strategic coherence in governance (European Environment Agency, 2024).

In Romania, sustainable agriculture is in a phase of institutional consolidation. The measures supported by the National Strategic Plan 2023-2027 aim in particular at digitalizing farms, supporting organic farming and encouraging young farmers. However, the leadership on sustainability is often fragmented between different institutions (Ministry of Agriculture, Rural Investment Financing Agency - AFIR, local authorities), which creates difficulties in the coherent implementation of strategies. Agrienvironmental policies, such as compensatory payments for environmentally friendly practices or the protection of high biodiversity areas, are present, but do not yet reach a critical mass in terms of impact. Moreover, the lack of strategic leadership is reflected in the slow uptake of innovative tools such as precision farming or short supply chains, especially in remote rural areas.

In contrast, Italy stands out with a more integrated and advanced approach to sustainable agriculture. Leadership is more consolidated, especially at regional level, where government structures (such as the Emilia-Romagna or Tuscany Regions) have implemented coherent and well-funded agroecological policies. Italy has a strong tradition in organic farming, being one of the EU leaders in certified areas and number of producers. Public-private initiatives are also well developed and cooperation between research, administration and farmers is closer than in Romania. Platforms such as the Rete Rurale Nazionale or agricultural innovation networks provide systematic support for the adoption of green technologies and circular models in agriculture. Leadership in Italy is thus characterized by proactivity, social dialogue and effective decentralization.

In line with the European strategies "From Farm to Fork" and the "European Green Pact", Italy has demonstrated a superior capacity to translate the objectives into concrete policies, through regional agrobiodiversity programs, the promotion of local food and the reduction of pesticide use. Romania, although theoretically committed in the same directions, faces problems of administrative capacity and limited access of small farmers to information and training, which diminishes the potential for leadership in agro-ecological transformation.

Conclusions

The study highlights the critical importance of effective leadership in the transition towards sustainable agriculture, especially in the context of the current challenges of climate change, food security and sustainable resource use. The comparative analysis between Italy and Romania reveals two different models for the development and implementation of sustainable agriculture strategies, at distinct stages of institutional and technological maturity.

Italy is characterized by a well-established institutional framework, where leadership - at both national and regional level - is coherent, visionary and anchored in the European sustainable development objectives.

Agrarian policies are underpinned by consistent investment in research, digitalization and the promotion of organic farming. Regional programmes, public-private partnerships and innovation networks contribute to effective governance and mobilize farmers to adopt sustainable practices.

Instead, Romania faces a number of structural constraints, such as institutional fragmentation, frequent changes in political leadership, lack of strategic continuity and difficulties in accessing and implementing new agricultural technologies. However, progress in expanding the area under organic farming and in attracting investment in renewable energy points to significant potential for development. To realize this potential, it is imperative to strengthen administrative capacity, stimulate participatory rural leadership and promote education for sustainability.

However, the study also has a number of limitations, including the predominant use of aggregated data and public policy analyses without integrating the perspectives of direct stakeholders such as farmers or local leaders, or a more granular regional detail, especially for Romania. The lack of recent or complete data for all indicators also limits the complexity of the analysis. Future research could explore these dimensions, through qualitative studies, interviews and focus groups with farmers and decision-makers, as well as regional case studies, to better understand how leadership is manifested at the local level. Extending the comparative analysis to other EU Member States could also provide a broader perspective on the factors that determine the success of the transition to sustainable agriculture.

In conclusion, effective leadership - understood not only as institutional authority, but also as the ability to mobilize resources, knowledge and communities - is a key determinant of the success of sustainable agriculture. For Romania, the lessons learned from the Italian model can be valuable benchmarks in the formulation of coherent public policies adapted to the national context. At the same time, both countries need to continue efforts to align with European strategies such as 'From Farm to Consumer' and the 'European Ecological Pact', taking into account territorial specificities and the need for a just transition for all actors involved.

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References

Altamore, L., Chinnici, P., Bacarella, S., Chironi, S. and Ingrassia, M., 2024. Current Framework of Italian Agriculture and Changes between the 2010 and 2020. Censuses. *Agriculture*, 14(9), p.1603. https://doi.org/10.3390/agriculture14091603.

Arru, B., Cisilino, F., Sau, P., Furesi, R., Pulina, P. and Madau, F.A., 2024. The economic and environmental sustainability dimensions of agriculture: A trade-off analysis of Italian farms. *Frontiers in Sustainable Food Systems*, 8, p.1474903. https://doi.org/10.3389/fsufs.2024.1474903.

CREA, n.d. *About CREA*, [online] Available at: <https://www.crea.gov.it/en/about-crea> [Accessed 23 March 2025].

Cristian Buzoianu, O.A., Iacob, O., Mihai Mateescu, V. and Burlacu, S., 2024. Balancing Economic, Environmental, and Technological Systems for Sustainable Agricultural Development in Romania. *European Journal of Sustainable Development*, 13(4), p.153. https://doi.org/10.14207/ejsd.2024.v13n4p153.

Darnhofer, I., 2014. Resilience and why it matters for farm management. *European Review of Agricultural Economics*, 41(3), pp.461–484. https://doi.org/10.1093/erae/jbu012.

European Environment Agency, 2024. *Agricultural area used for organic farming in Europe*. [online] EEA. Available at: https://www.eea.europa.eu/en/analysis/indicators/agricultural-area-used-for-organic [Accessed 23 March 2025].

Eurostat, 2024. *Agri-environmental indicator - energy use*. [online] Eurostat - Statistics Explained. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_energy_use [Accessed 22 March 2025].

Eurostat, 2024. *Ammonia emissions from agriculture* [online] Eurostat - Statistics Explained. Available at: https://ec.europa.eu/eurostat/databrowser/view/sdg_02_60/default/table?lang=en [Accessed 22 March 2025].

Eurostat, 2024. *Sales of pesticides by type of pesticide*. [online] Eurostat DataBrowser. Available at: https://ec.europa.eu/eurostat/databrowser/view/aei_fm_salpest09/default/table?lang=en [Accessed 22 March 2025].

Eurostat, 2024. *SDG 02.60 - Agricultural area under organic farming*. [online] Eurostat DataBrowser. Available at: https://ec.europa.eu/eurostat/databrowser/view/sdg_02_60__custom_16501768/default/table?lang=en [Accessed 22 March 2025].

Gismondi, R., 2024. A census-based sustainability indicator of agricultural holdings: The case of Italy. *Rivista di Economia Agraria*, 79(2), pp.35–48. https://doi.org/10.36253/rea-15056.

Klerkx, L. and Rose, D., 2020. Dealing with the game-changing technologies of Agriculture 4.0: How do we manage diversity and responsibility in food system transition pathways. *Global Food Security,* 24, 100347. https://doi.org/10.1016/j.gfs.2019.100347.

Knickel, K., Redman, M., Darnhofer, I., Ashkenazy, A., Calvão Chebach, T., Šūmane, T., Tisenkopfs, R. Zemeckis, V., Atkociuniene, M., Rivera, A., 2018. Making farming more resilient, sustainable and equitable. *Journal of Rural Studies*, 59, pp.197–210. https://doi.org/10.1016/j.jrurstud.2017.04.012.

MADR, 2021. *Regulamentul de organizare şi funcţionare a Ministerului Agriculturii şi Dezvoltării Rurale*, [online] Available at: <https://www.madr.ro/docs/minister/2021/Ordin-2480-din-26-10-2021-de-modif-ROF-.pdf> [Accessed 22 March 2025].

MASAF, 2024. *Regolamento di riorganizzazione del Ministero dell'agricoltura, della sovranità alimentare e delle foreste*, [online] Available at: < https://www.masaf.gov.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/21208>[Accessed 22 March 2025].

Meijer, S.S., Catacutan, D., Ajayi, O.C., Sileshi, G.W. and Nieuwenhuis, M., 2014. The role of knowledge, attitudes and perceptions in the uptake of agricultural and agroforestry innovations among smallholder farmers in sub - Saharan Africa. *International Journal of Agricultural Sustainability*, 13(1), pp.40–54. https://doi.org/10.1080/14735903.2014.912493.

Nistoroiu, B.-F., Nicolae, I. and Condeianu, O., 2024. Agriculture and rural development in Romania: Navigating the challenges and demands of sustainable development goals. *Journal of Research and Innovation for Sustainable Society*, 6(2), pp.352–357. https://doi.org/10.33727/JRISS.2024.2.37:352-357.

Pretty, J., 2007. Agricultural sustainability: Concepts, principles and evidence. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 363(1491), pp.447–465. https://doi.org/10.1098/rstb.2007.2163.

Puiu, I., 2024. Assessing Romania's progress towards Sustainable Development Goals 8, 9, 10 and 12: A comparative analysis in the EU context. *Journal of Research and Innovation for Sustainable Society*, 6(2), pp.358–374. https://doi.org/10.33727/JRISS.2024.2.38:358-374.

Sarkar, A., Wang, H., Rahman, A., Memon, W.H. and Qian, L., 2022. A bibliometric analysis of sustainable agriculture: Based on the Web of Science (WOS) platform. *Environmental Science and Pollution Research*, 29(1), pp.38928–38949. https://doi.org/10.1007/s11356-022-19632-x.

Stoian, M., Drăcea, R.M., Deaconu, E.-M., Chiripuci, B., Constantin, F. and Ciobanu, L., 2024. Exploring The Impact Of Climate Change On The Associative Structures Of Romanian Agriculture: A Prospective Approach Towards Achieving Sustainability. Proceedings of the International Conference Competitiveness of Agro-Food and Environmental Economy 2024. Bucharest, Romania, 7-8 November 2024. https://doi.org/10.24818/CAFEE/2023/12/04.

Westley, F.R., Tjornbo, O., Schultz, L., Olsson, P., Folke, C., Crona, B. and Bodin, O., 2013. A theory of transformative agency in linked social-ecological systems. *Ecology and Society*, 18(3), p.27. http://dx.doi.org/10.5751/ES-05072-180327.

Wyrwa, J., Barska, A. and Jędrzejczak-Gas, J., 2024. Sustainable Energy Development and Agriculture in European Union Member States—Territorial Differentiation and Interrelationships. *Energies*, 18(1), p.25. https://doi.org/10.3390/en18010025.

Zamani, G.H. and Karami, E., 2006. Rural leadership and sustainable agriculture: Criteria for recruiting leaders. *Journal of Food Agriculture and Environment*, 4(3), pp.228-234.

Zhang, Q.F., 2024. From Sustainable Agriculture to Sustainable Agrifood Systems: A Comparative Review of Alternative Models. *Sustainability*, [online] 16(22), p.9675. https://doi.org/10.3390/su16229675.

Eco-Anxiety and Tourist Destinations: Emerging Challenges in Destination Image and Sustainable

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Abstract

This study examines the relationship between eco-anxiety and the perceived importance of environmental and sustainability-related issues in tourism, aiming to assess whether heightened levels of eco-anxiety influence tourists' prioritization of specific sustainability challenges. Based on a sample of 247 respondents, the research employed a structured questionnaire to gather data on both self-reported eco-anxiety levels and perceived importance rankings for ten tourism-related problems. Quantitative analysis included the computation of mean scores and Pearson correlation coefficients, followed by scatter plot visualizations to explore the patterns of association between variables. Results revealed that while climate change and greenwashing were rated as highly important issues, their correlations with eco-anxiety were only moderate ($r = 0.42$ and $r = 0.22$, respectively). Other issues, such as the lack of clear regulations or the high costs of eco-friendly solutions, demonstrated weak or insignificant relationships with eco-anxiety levels. The scatter plots showed considerable variability across all levels of eco-anxiety, suggesting that this emotional state does not consistently predict how individuals assess the importance of specific issues. Emotional concern for the environment appears to function more as a generalized disposition rather than a determinant of specific cognitive evaluations. These findings emphasize the complexity of consumer attitudes in sustainable tourism and underline the need for communication strategies that are both emotionally engaging and factually credible, tailored to diverse informational and psychological profiles.

Keywords

Eco-anxiety, tourism destination, marketing strategies, sustainable tourism, climate change.

DOI: 10.24818/BASIQ/2025/11/050

Introduction

In recent decades, the accelerated degradation of ecosystems and the intensification of extreme climate events have generated not only visible changes in the physical environment but also profound shifts in the psychological and behavioral dynamics of contemporary society. Within this evolving context, *eco-anxiety* — a form of anxiety related to environmental threats—has emerged as a significant psychological phenomenon (Clayton et al., 2021). This emotional response encompasses a complex range of feelings, including guilt, anger, sadness, helplessness, and exhaustion (Pihkala, 2020; Clayton and Karazsia, 2020; Verplanken, Marks and Dobromir, 2020), and has begun to influence decision-making processes, including those related to tourism consumption. Although not officially recognized as a clinical diagnosis, eco-anxiety shares symptoms with anxiety disorders, such as insomnia, panic attacks, and loss of appetite

(Castelloe, 2018; Pihkala, 2019). These reactions may be directed toward the self, others, or nature itself (Helm, Kemper and White, 2018).

1. Literature review

Climate change has also been associated with a wide range of psychological effects, including PTSD, depression, and chronic stress (Clayton et al., 2021). Young people are particularly vulnerable due to their long-term exposure to environmental risks and a lack of adaptive coping mechanisms (Diffey et al., 2022). Moreover, cultural differences shape the way eco-anxiety is experienced and expressed. For instance, social hierarchy and cultural values influence how individuals interpret and internalize environmental messages (Brewer and Venaik, 2011). Most existing research on eco-anxiety remains Western-centric, indicating the need for studies in underrepresented contexts, particularly in developing economies across Africa and Asia (Mkono and Hughes, 2020; Joshua et al., 2023). In the tourism and hospitality sector, increasing attention has been given to ecological emotions and psychoterratic syndromes such as eco-guilt, flight shame, and ecological grief (Crossley, 2020; Mkono and Hughes, 2020). However, fewer studies explore eco-anxiety and related concepts like solastalgia (Lalicic, 2020), especially in relation to tourist behavior. As the tourism industry contributes significantly to global greenhouse gas emissions, eco-conscious travelers may experience emotional conflict and cognitive dissonance. These tensions often result in changes in travel preferences, such as avoiding air travel, opting for low-impact alternatives, or seeking eco-certified destinations (Newman, 2019). Despite growing interest in sustainability, much of the research in this area analyzes online discourse or virtual behaviors, with limited engagement of tourists in their active, performative roles (Mkono, 2020; Talwar et al., 2022). Yet understanding responses such as eco-paralysis — the feeling of being overwhelmed and immobilized by environmental threats—can offer valuable insights into emotional and behavioral reactions to climate change (D'Arco, Marino and Resciniti, 2023; Cleveland, Robertson and Volk, 2020).

Within this complex emotional and environmental landscape, destination marketing faces the challenge of reconciling tourists' need for escapism with their increasing desire for authenticity and sustainability. In an era of heightened environmental sensitivity, marketing strategies must avoid superficial "greenwashing" and instead promote credible and transparent solutions (Peattie and Crane, 2005; Grigorescu et al., 2020). Media representations can play both constructive and detrimental roles, by either amplifying eco-anxiety through sensationalism or fostering ecological awareness and literacy (Pihkala, 2019; Boykoff and Pearman, 2019). This study aims to explore how eco-anxiety shapes the perception and selection of tourist destinations, identifying key marketing challenges that arise from this emergent emotional response. By doing so, the research contributes to a better understanding of the intersection between environmental psychology and sustainable tourism marketing.

2. Research methodology

To explore how eco-anxiety influences perceptions of destination marketing, a quantitative study was conducted using a questionnaire developed through Google Forms. The data collection period extended from October 2024 to January 2025. The questionnaire was distributed via social media networks (primarily Facebook), educational platforms (such as Moodle and Microsoft Teams), and through personal contact networks. A total of 247 respondents completed the survey. The data collected were processed and analyzed using Microsoft Excel. The research instrument was structured into three main sections, each targeting a distinct set of variables relevant to the study's objectives. The first section collected demographic data to help define the profile of respondents. The second section focused on measuring the level of eco-anxiety. Instead of employing established psychometric scales from the literature, the researchers opted for customized questions designed to reveal respondents' emotional and cognitive relationships with environmental issues. Responses were recorded using a five-point Likert scale, and scores were used to compute an average eco-anxiety level across the sample. In the third section, participants were asked to rank ten specific challenges faced by destination marketing in the context of growing eco-anxiety. This ranking exercise (forced classification) enabled the identification of key concerns and perceived priorities among the public.

The *primary objective* of this study was to rank ten proposed challenges facing destination marketing in the era of eco-anxiety and to analyze the relationship between these perceptions and respondents' average level of eco-anxiety. This goal was addressed through a series of specific objectives: *To calculate the average eco-anxiety level among respondents, based on a set of custom-designed items; To determine public perception regarding the most relevant marketing-related issues in the context of climate change and rising*

environmental concerns; To analyze the relationship between levels of eco-anxiety and the perceived ranking of destination marketing challenges, in order to identify potential significant correlations.

Based on these objectives, the following hypotheses were formulated:

- H1: Respondents rank destination marketing challenges differently depending on their general perception of sustainability in tourism.
- H2: Issues related to sustainable communication (e.g., climate change, greenwashing, cost implications) are perceived as more important than those related to infrastructure or regulatory frameworks.
- H3: The average level of eco-anxiety significantly influences the perceived severity ranking of marketing-related problems in tourist destinations.

3. Results and discussion

This section presents the results of the data analysis and interprets them in relation to the study's research objectives, with a particular focus on the relationship between levels of eco-anxiety and tourist behaviors or preferences.

a. Demographic Profile of Respondents

Analysis of the demographic data reveals a relatively balanced gender distribution, with a slightly higher proportion of male respondents (52%) compared to female respondents (46%) (Table no. 1). The majority of participants fall within the 25–45 age range (62%), and the sample is predominantly urban (69%). Most respondents report a medium income level (58%) and possess higher education qualifications, with 63% holding either a bachelor's or a master's degree. In terms of travel behavior, the data show that respondents are moderately active travelers: 67% reported taking one to two leisure trips per year over the past three years.

Table no. 1. Demographic Profile of Respondents

Sex			**Age**				
Male	*Female*		*18-25*	*25-35*	*36-45*	*46-55*	*56-65*
52	46	2	7	33	29	14	17
Location			**Education level**				
Rural		*Urban*	*High school*	*Bachelor's degree*		*Master's degree*	*PhDegree*
31		69	37	49		11	3
Income level			**Travel frequency in the last 3 years/year**				
Low	*Medium*	*High*	Not at all			1-2 trips	More than 3
20	58	22	11			67	19

b. Eco-Anxiety Levels Among Respondents

The level of eco-anxiety among respondents was not measured using a validated psychological scale but rather inferred from their reported reactions to various environmental issues. The questionnaire focused on several key indicators, including concern about environmental degradation, feelings of being overwhelmed, guilt and responsibility, helplessness, and a sense of personal duty to adopt a more sustainable lifestyle. These responses were interpreted as direct self-assessments rather than the result of formal psychological evaluation.

The overall distribution of responses shows a concentration around mid-levels on the Likert scale, particularly at level 2 (33.27%) and level 3 (35.05%), indicating a general trend toward moderate concern and emotional impact related to environmental issues. The overall mean eco-anxiety score was 2.7 out of 5. The findings suggest that while respondents are aware of and concerned about environmental problems, eco-anxiety is not a persistent or dominant emotional state for most of them. Respondents demonstrated an active concern for the long-term consequences of environmental degradation and acknowledged their own role in contributing to such issues. However, this awareness does not manifest as extreme distress. Many expressed a sense of personal responsibility in adopting more sustainable lifestyles, but the responses also revealed a degree of skepticism regarding the effectiveness of individual actions in the broader context of global climate change. Occasional feelings of informational overload were reported, though the emotional impact of such information was generally moderate. Environmental issues do not appear to significantly affect respondents' cognitive functions or sleep patterns, nor are they a major source of interpersonal conflict. However, they can occasionally provoke discussion or differences of opinion within social interactions.

The data presented in Chart no.1 shows that the highest average eco-anxiety score (3.10) is associated with feeling responsible for making lifestyle changes to reduce environmental impact, while the lowest score (2.17) is related to difficulty concentrating or sleeping due to environmental concerns. Overall, most responses fall in the moderate range (Level 3), which accounts for approximately 35% of all responses.

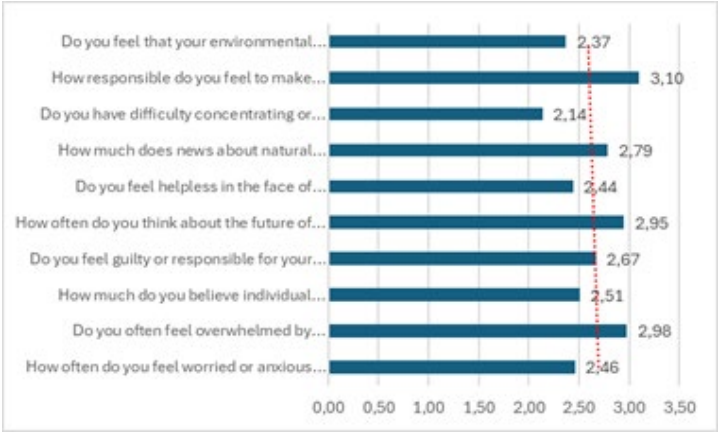

Chart no. 1. Average Score for Each Question

c. Perceived Challenges in Sustainable Tourism Marketing

The analysis of survey data collected from 247 respondents reveals significant trends in public perceptions regarding issues related to sustainable tourism. The study demonstrates a high level of internal consistency, with a response rate exceeding 90% across all questions—providing a strong foundation for interpretation.

Findings indicate that respondents are highly aware of sustainability-related challenges in tourism, with the most prominent concerns centered around the tangible impacts of climate change and the perceived lack of authenticity and concrete action toward sustainable destination management (Chart no.2). At the top of the ranking, *Climate change and its impact on destinations*" received the highest average score (4.01), reflecting a deep concern among tourists regarding the threat that climate change poses to their preferred destinations. The visible effects of climate change—such as extreme weather events and ecosystem degradation—whether experienced directly or presented through media coverage, appear to trigger eco-anxiety related to travel.

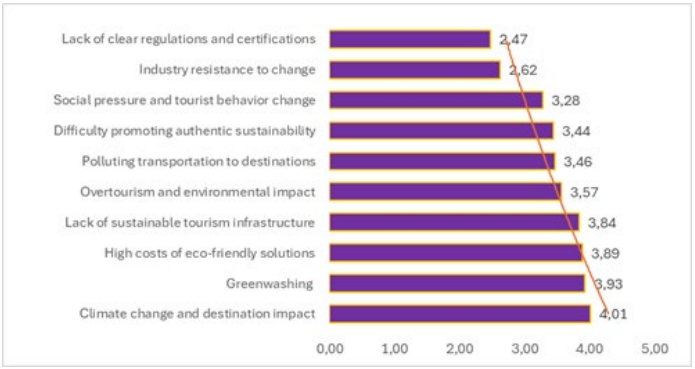

Chart 2. Ranking of problems according to the weighted

Closely following, *greenwashing* emerged as a major concern (3.93), suggesting a growing critical awareness among tourists who are increasingly skeptical and discerning about eco-marketing claims. The feeling of being misled or deprived of transparent information erodes consumer trust and complicates the ability to make responsible travel choices.

Additional high scores were reported for the *lack of sustainable infrastructure* (3.84) and the high cost of eco-friendly solutions (3.89). These results indicate the existence of significant practical barriers to adopting more responsible travel behaviors. Respondents emphasized the difficulty of accessing facilities and services that support sustainable travel—such as green public transportation, affordable eco-lodging options, or proper waste management infrastructure. Financial constraints were cited as a key obstacle, hindering both tourists and tourism providers from adopting sustainable practices on a scale. Green solutions are often perceived as expensive, which may discourage sustainable decision-making.

Moreover, the *difficulty of promoting authentic sustainability* (3.44) highlights a notable challenge in effectively communicating genuine sustainability efforts. Tourists may express skepticism or confusion when faced with "green" marketing messages, making it difficult for truly sustainable initiatives to be recognized and appreciated. Nonetheless, there is a growing awareness among tourists of their potential role in promoting sustainability through informed and responsible choices.

Social pressure and the desire to engage in more responsible behavior are increasingly influential factors (3.28). The relatively high mean scores for awareness of the negative impacts of over-tourism (3.57) and transportation on the environment and local culture suggest that tourists either do not perceive viable alternatives or are unwilling to compromise on destination, comfort, or travel costs.

Overall, respondents appear to be neither directly affected by nor fully aware of the lack of clear standards within the sustainable tourism industry (2.47). The low rating attributed to this issue may reflect either a lack of knowledge or a perception that the absence of clear standards does not have an immediate impact on their travel experience. Consequently, tourists do not perceive substantial resistance from the industry toward sustainable practices, which is reflected in the similarly low ranking of Industry resistance to change (2.62). This perception may be explained by the observation of isolated sustainability initiatives or by a general lack of information regarding the broader sector's efforts—or lack thereof—to undergo systemic transformation. Nevertheless, industry inertia and resistance to change can slow the large-scale adoption of sustainable solutions, while the absence of clear standards complicates the differentiation between genuinely sustainable offerings and those that merely claim to be.

The overall mean score across all assessed issues was 3.45 out of 5, indicating a relatively high level of concern among tourists regarding these matters. The highest mean scores were assigned to issues related to climate change and greenwashing, suggesting that tourists are aware of environmental risks and are cautious about misleading claims of sustainability. However, respondents demonstrated limited understanding of the structural mechanisms underpinning the tourism industry's transition toward sustainability, leading to the relative minimization of concerns such as the legislative framework and responsible behavior.

An additional analysis examined the distribution of respondents' ratings for each issue within their respective rankings (Chart 3). For issues perceived as highly important (ranked first and second), more than half of the participants (52% and 60%, respectively) assigned the maximum score of 5. Notably, these issues exhibited a bimodal distribution, with a significant secondary group assigning a score of 2, indicating a certain polarization of public perception into two distinct perspectives. Conversely, the Lack of clear regulations and certifications and Industry resistance to change were perceived as least important, with 65% and 58% of responses, respectively, concentrated at the lowest scores (1 and 2). Although not directly assessed through specific survey questions, "eco-anxiety" can be inferred from the scores assigned to issues related to environmental impact and sustainability. To explore the relationship between the importance attributed to these issues and the previously determined average level of eco-anxiety, we calculated the Pearson correlation coefficient using the following formula:

$$r = \sum[(X - \bar{X})(Y - \bar{Y})\sqrt{\sum[(X - \bar{X})^2 (Y - \bar{Y})^2]}$$

where: X -Average Importance Score; Y Average Eco-Anxiety Level; $\bar{X}$ average of the values X; $\bar{Y}$ average of the values Y.

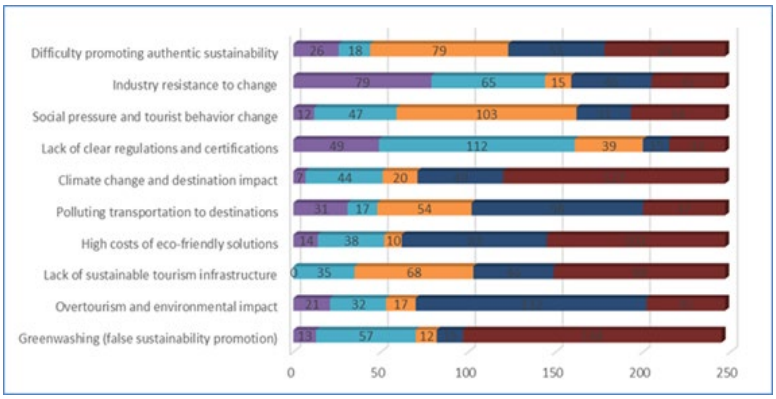

Chart 3. Complete distribution of responses for each problem, maintaining the same order

The relationship between various issues affecting the tourism industry and the average level of eco-anxiety reveals several significant trends (table no.2). The strongest association—a moderate correlation of 0.42—was observed between *Climate change and its impact on destinations.*

Table no. 2. Relationship between eco-anxiety and importance of sustainable tourism issues

Issues	$\bar{X}$	$\bar{Y}$	r	Interpretation
Greenwashing (false sustainability promotion)	3.93	2.74	0,22	Weak positive correlation
Overtourism and environmental impact	3.57		0.16	Very weak positive correlation
Lack of sustainable tourism infrastructure	3.84		0.19	Very weak positive correlation
High costs of eco-friendly solutions	3.89		0.05	No significant correlation
Polluting transportation to destinations	3.46		0.13	Very weak positive correlation.
Climate change and destination impact	4.01		0.42	Moderate positive correlation
Lack of clear regulations and certifications	2.47		0.24	Weak positive correlation
Social pressure and tourist behavior change	3.28		0.24	Weak positive correlation.
Industry resistance to change	2.62		0.19	Very weak positive correlation
Difficulty promoting authentic sustainability	3.44		0.30	Weak positive correlation.

This result was expected, given the growing visibility of climate change effects on popular destinations (e.g., wildfires, floods, earthquakes, destruction of coral reefs), which act as direct triggers for eco-anxiety. The *Difficulty in promoting genuine sustainability* shows a weak but notable correlation (0.30) with eco-anxiety, suggesting that the authenticity of sustainability marketing communications is meaningfully linked to consumers' ecological anxiety. This finding highlights the need for greater transparency and credibility in marketing messages. *Lack of clear regulations and certifications* and *Social pressure and behavioral change among tourists* both show weak correlations (0.24), indicating that regulatory uncertainty and social dynamics exert a similar, though moderate, impact on eco-anxiety levels.

Interestingly, *Greenwashing*, despite receiving a high importance score (3.93), shows only a weak correlation (0.22) with eco-anxiety. This suggests that although the issue is widely recognized as important, its direct influence on ecological anxiety is less pronounced than might have been anticipated. Similarly intriguing is the case of *High costs of eco-friendly solutions*, which shows no significant correlation (0.05) with eco-anxiety, despite being rated as highly important (3.89). This finding suggests that although financial aspects are critical for the implementation of sustainability initiatives, they do not directly affect tourists' psychological states related to environmental concerns.Issues such as *Polluting transportation to destinations*, *Overtourism and its environmental impact*, and *Lack of sustainable tourism infrastructure* all exhibit very weak correlations with eco-anxiety. This indicates that, while these problems are considered of moderate importance, their direct contribution to ecological anxiety is extremely limited.

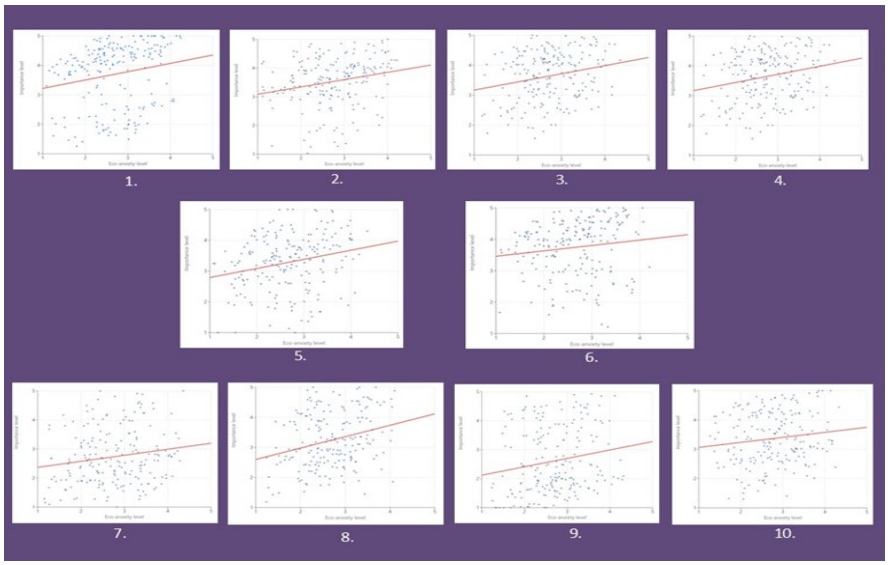

Figure no. 1. Relationship between eco-anxiety levels and the perceived importance of sustainable tourism issues (The issues are presented from 1 to 10, as in Table no. 2.)

To better understand these correlations, scatter plots were generated, mapping eco-anxiety scores on the horizontal axis and issue importance (ranked from 1 to 10) on the vertical axis (Figure no.1). The analysis of the scatter plots further supports the findings previously discussed. Scatter plots 1, 2, 3, 4, 7, 9, and 10 exhibit a weak or very weak positive correlation between eco-anxiety and the perceived importance of various issues.

The widespread dispersion of data points around the regression line indicates that participants with low, medium, or high levels of eco-anxiety may attribute similar levels of importance to the same issue, suggesting a lack of strong differentiation based on emotional factors alone. The regression line's minimal upward inclination confirms that increases in eco-anxiety are not systematically associated with higher perceived importance across these issues. In contrast, scatter plots 5, 6, and 8 reveal a slight tendency toward a weak-to-moderate positive correlation, implying that higher eco-anxiety may, in some cases, lead to assigning greater importance to specific sustainability concerns. However, the significant variability among respondents indicates that this pattern is neither robust nor generalizable.

Overall, the absence of strong linear relationships suggests that eco-anxiety operates more as a diffuse emotional background rather than a direct, issue-specific driver of concern. Emotional responses such as eco-anxiety, while influential at a general level, do not consistently predict cognitive prioritization of individual sustainability issues within tourism. For example, despite a high importance score, High costs of eco-friendly solutions showed virtually no meaningful correlation ($r = 0.05$) with eco-anxiety, highlighting the complexity of the emotion-cognition dynamic. These findings emphasize that the importance attributed to sustainability issues is shaped by multiple factors beyond emotional disposition, such as personal experiences, information availability, value systems, and the perceived relevance of each issue. Consequently, while statistically significant correlations may arise due to the relatively large sample size ($n = 247$), their practical significance appears limited.

In conclusion, the research hypotheses were only partially confirmed: although a relationship between eco-anxiety and issue prioritization exists, it is generally weak and inconsistent across the range of problems analyzed. This calls for a more nuanced understanding of the mechanisms linking emotional and cognitive dimensions in sustainable tourism behavior. Future research should further investigate mediating variables, such as knowledge levels, trust in information sources, and personal exposure to environmental risks, to better explain the observed variability.

Conclusions

The analysis of the collected data revealed that the research hypotheses are only partially supported. While certain correlations were identified between the average level of eco-anxiety and the perceived ranking of issues facing destination marketing, these associations are generally weak and inconsistent. This suggests that eco-anxiety, as a generalized emotional response to environmental threats, does not necessarily translate into a differentiated or systematic evaluation of each specific issue analyzed in this study. Therefore, while eco-anxiety is indeed present among respondents and plays a role in shaping perceptions of sustainability, it cannot be considered a direct or consistent predictor of how tourism marketing challenges are prioritized. These findings highlight the complexity of the relationship between affective dimensions (such as anxiety) and cognitive evaluations (such as the perceived importance of problems), emphasizing the need for interdisciplinary approaches and more refined measurement tools in future research. Tourism destination marketing strategies should consider the need for authentic, transparent communication tailored to the target audience’s level of knowledge and value system, rather than the superficial use of ecological discourse as a decorative element.

The use of self-reported measures and a non-standardized eco-anxiety scale may affect the reliability and generalizability of the findings. The sample, while diverse, was limited to 247 respondents primarily from urban areas, potentially introducing demographic bias. Additionally, the cross-sectional design cannot capture the evolution of eco-anxiety over time. Future studies should incorporate longitudinal data, validated psychological instruments, and a broader geographic representation to better assess the complex relationship between emotional states and sustainability-related tourist behaviors. Also the influence of other variables, such as environmental education, institutional trust, or personal experiences with sustainable tourism, should be explored.

References

Boykoff, M. and Pearman, O., 2019. Now or Never: How Media Coverage of the IPCC Special Report on 1.5°C Shaped Climate-Action Deadlines. *One Earth*, 1(3), pp.285-288.

Brewer, P. and Venaik, S., 2011. Individualism–Collectivism in Hofstede and GLOBE. *Journal of International Business Studies*, 42, pp.436–445. https://doi.org/10.1057/jibs.2010.62.

Castelloe, M., 2018. *Coming to terms with ecoanxiety; growing awareness of climate change*, [online] Available at: <https://www.psychologytoday.com/au/blog/the-me-in-we/201801/coming-terms-ecoanxiety>[Accessed 4 July 2024].

Clayton, S. and Karazsia, B., 2020. Development and validation of a measure of climate change anxiety. *Journal of Environmental Psychology,* 69, p.101434. https://doi.org/10.1016/j.jenvp.2020.101434.

Clayton, S., Manning, C., Speiser, M. and Hill, A., 2021. *Mental Health and Our Changing Climate: Impacts, Inequities, Responses*, [online] Available at: < https://www.apa.org/news/press/releases/mental-health-climate-change.pdf>[Accessed 4 July 2024].

Cleveland, M., Robertson, J.L. and Volk, V. 2020. Helping or hindering: Environmental locus of control, subjective enablers and constraints, and pro-environmental behaviors. *Journal of Cleaner Production,* 249, p.119394. https://doi.org/10.1016/j.jclepro.2019.119394.

Crossley, 2020. Ecological grief generates a desire for environmental healing in tourism after COVID-19. *Tourism Geographies*, 22(3), pp.536–546. https://doi.org/10.1080/14616688.2020.1759133.

D'Arco, M., Marino, V. and Resciniti, R. 2023, Exploring the pro-environmental behavioral intention of generation Z in the tourism context: the role of injunctive social norms and personal norms. *Journal of Sustainable Tourism*, pp.1-22. https://doi.org/10.1080/09669582.2023.2171049.

Diffey, J., Wright, S., Uchendu, J.O., Masithi, S., Olude, A., Juma, D.O. and Lawrance, E., 2022. Not about us without us – the feelings and hopes of climate-concerned young people around the world. *International Review of Psychiatry*, 34(5), pp.499–509. https://doi.org/10.1080/09540261.2022.2126297.

Grigorescu, A., Lincaru, C., & Pîrciog, S. (2020). Ethic Leadership Trigger for Talents. In A. Grigorescu & V. Radu (vol. ed.), *Lumen Proceedings: Vol. 11. 1st International Conference Global Ethics - Key of Sustainability (GEKoS)* (pp. 32-44). Iasi, Romania: LUMEN Publishing House. https://doi.org/10.18662/lumproc/gekos2020/05

Helm, S., Kemper, J.A. and White, S.K., 2021. No future, no kids–no kids, no future? *Population and Environment*, 43, pp.108–129. https://doi.org/10.1007/s11111-021-00379-5.

Joshua, J. B., Jin, Y., Ogunmokun, O.A. and Ikhide, J.E., 2023. Hospitality for sustainability: employee eco-anxiety and employee green behaviors in green restaurants, *Journal of Sustainable Tourism*, 31(6), pp. 1356-1372. https://doi.org/10.1080/09669582.2022.2043877.

Lalicic, L., 2020. Solastalgia: An application in the overtourism context. *Annals of Tourism Research*, 82, p.102766. https://doi.org/10.1016/j.annals.2019.102766.

Mkono, M., 2020. Eco-anxiety and the flight shaming movement: implications for tourism. *Journal of Tourism Futures*, 6(3), pp.223-226. https://doi.org/10.1108/JTF-10-2019-0093.

Mkono, M., Hughes, K., 2020. Eco-guilt and eco-shame in tourism consumption contexts: understanding the triggers and responses. *Journal of Sustainable Tourism*, 28(8), pp.1223–1244. https://doi.org/10.1080/09669582.2020.1730388.

Newman, G.E., 2019. The Psychology of Authenticity. *Review of General Psychology*, 23(1), pp.8-18. https://doi.org/10.1037/gpr000015.

Peattie, K., Crane, A. 2005. Green marketing: legend, myth, farce or prophesy? *Qualitative Market Research*, 8(4), pp. 357-370. https://doi.org/10.1108/13522750510619733

Pihkala, P., 2019. *Climate anxiety: a report*, [online] Available at: < https://mieli.fi/wp-content/uploads/2021/12/mieli_climate_anxiety_30_10_2019.pdf>[Accessed 4 July 2024].

Pihkala, P., 2020. Anxiety and the ecological crisis. *Sustainability,* 12, p.7836. https://doi.org/10.3390/su12197836.

Talwar, S., Kaur, P., Escobar, O. and Lan, S., 2022. Virtual reality tourism to satisfy wanderlust without wandering: An unconventional innovation to promote sustainability. *Journal of Business Research,* 152, pp.128-143. https://doi.org/10.1016/j.jbusres.2022.07.032.

Verplanken, B., Marks, E., and Dobromir, A. I., 2020. On the nature of eco-anxiety. *Journal of Environmental Psychology,* 72, p.101528. https://doi.org/10.1016/j.jenvp.2020.101528.

From Transparency to Maturity. An Exploratory Exercise to Assess Supply Value Chain ESG Reporting in the Light of ESRS Requirements

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Abstract

The study is an exploratory exercise to assess the transparency and quality of supply chain reporting through ESG factors. A qualitative thematic content analysis of sustainability and integrated reports was employed on a sample constituted by Romanian listed companies, following the topic of supply and value chain reporting and transparency. The textual analysis was carried out with NVivo 15 after manual data gathering of reports publicly available for 2024. Afterward, a qualitative assessment was employed on the quality of supply and value chain reporting. For both qualitative assessments, the scoring method was used. The qualitative analysis revealed that the sustainability themes regarding "Value chain policies and codes of business conduct" and "ESRS value chain reporting" are the most transparently presented, obtaining the highest scores, followed by "Supply chain impact" and "Due diligence and ESG risk management in the value chain". The least transparent topics are "ESG criteria integrated into supply chain management and suppliers selection" and "Communication and grievance mechanisms for value chain workers". The supply chain reporting quality was assessed through the lens of robust points and weaknesses. The results showed that three companies have a good to outstanding quality of reporting, with a clear understanding of ESRS requirements and concrete steps integrated to improve supply chain transparency through ESG reporting. The paper enriches the knowledge in the field of assessing the supply chain ESG reporting transparency by adding value through the thematic qualitative analysis and evaluation of supply chain reporting quality, following the ESRS reporting framework. The results of the study can be helpful in the process of improving supply chain reporting, integrating ESG, and increasing the transparency of information by offering managers possible options for developing appropriate reporting tools.

Keywords

supply chain, sustainability reports, ESG, transparency, ESRS, content analysis

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Introduction

As global sustainability concerns become increasingly pressing, the demand for rigorous environmental, social, and governance (ESG) reporting in supply chains has intensified. The ESRS represents a legislative framework that obligates companies to disclose non-financial information, enhancing accountability in their sustainability practices. Research suggests that the adoption of structured ESG reporting can significantly improve transparency and stakeholder trust while facilitating better decision-making within supply chains (Vegter, Hillegersberg and Olthaar, 2021; Betts, Gutierrez-Franco and Ponce-Cueto, 2022; Zeng, Li and Zeng, 2022). Effective ESG reporting supports the establishment of performance measurement systems that monitor sustainability across various dimensions, including economic, social, and environmental parameters. Thus, performance metrics must align with ESG requirements to ensure supply

chains can adequately assess and articulate their sustainability efforts (Ahi, 2021; Cao, Shen and Chan, 2024). Moreover, developing supply chain sustainability metrics, framed within the ESRS context, promotes identifying critical success factors, thus fostering sustainable practices within supply chain operations (Dai and Tang, 2022; Paul et al., 2022). Companies are often pressured to substantiate their ESG claims with quantitative evidence, which highlights the importance of integrating quantitative techniques and data-driven assessments into supply chain sustainability reporting frameworks (Xing, 2023; Leogrande, 2024). In this regard, the ESRS is a guiding instrument pushes organizations towards embracing comprehensive ESG metrics that cater to regulatory demands while promoting holistic sustainability throughout their supply chains.

According to the GEM 2022 Report, *Measuring ESG transparency worldwide*, prepared for Romania, the supply value chain is not sufficiently described, and generally presents a low degree of transparency (Hofstetter and Diegelmann, 2023). As Hofstetter and Diegelmann (2023) pointed out, in the sustainability reports of the Romanian listed companies included in the top 20, according to the BET index, the topic of supply value chain is not very present, approx. 30% of the companies report a description of the supply value chain, only 5% provide information about their suppliers and contractors, and also about the estimated number of suppliers along the value chain, and a percentage of 15% of the companies report on the geographical distribution of suppliers. The issue of insufficient ESG transparency in supply chains has been observed not only in Romania but also in various other countries. According to Chang (2023), integrating ESG principles in China's supply chains has gained momentum but remains hampered by incomplete disclosures and a lack of clarity regarding supplier engagement and environmental impacts. The study indicates that while many firms recognize the importance of ESG, less than 35% effectively report detailed information on their supply chains, with substantial gaps in disclosing supplier evaluations and geographical distribution, akin to findings observed in Romania (Das, 2023). In the United States, Villena and Dhanorkar (2020) addressed the need for enhanced transparency in global supply chains, underscoring how institutional pressures compel companies to provide substantial disclosures regarding environmental practices. Like the Romanian context, many firms lacked comprehensive information on supplier assessments and the environmental criteria used in decision-making processes (Villena and Dhanorkar, 2020; Tian, Tian and Guo, 2025; Xing, 2023). Moreover, a comparative study analyzing multiple countries, including those within the European Union, found that companies often provided minimal information about their ESG partnerships. While 55% of surveyed companies reported ESG-related practices in their sustainability reports, only 25% provided adequate information on the environmental regulations adhered to by their suppliers. Such findings reflect a trend where the focus on ESG as a marketing tool often overshadows the necessity for genuine transparency and accountability in supply chains, echoing concerns raised in related reports about Romania (Baid and Jayaraman, 2022). On the other hand, the recent amendments to the CSRD following the European Commission's proposal as part of the "Omnibus I" package to simplify EU sustainability legislation, postpone by two years the entry into force of the CSRD requirements for large companies that have not yet started reporting, as well as for listed SMEs, and by one year the deadline for transposition and the first phase of application (covering the most prominent companies) of the Corporate Sustainability Due Diligence Directive (CSDDD) (The European Parliament and of the Council, 2025). This delay is beneficial, providing companies with extra time to enhance their reporting practices. However, it also raises concerns about ongoing commitment to sustainability and accountability during the transition period. This postponement reflects a growing recognition of the complexities involved in implementing ESG frameworks within corporate structures. Similar trends have been observed in other jurisdictions, including the United States, where the Securities and Exchange Commission (SEC) has indicated the need for more flexible timelines for ESG disclosures due to varied levels of preparation among companies (Marie et al., 2024). Such regulatory approaches emphasize the balance that authorities must maintain between fostering transparency and ensuring companies are adequately prepared to meet these standards. Organizations grappling with similar reporting challenges can benefit from more straightforward guidelines and enhanced institutional support, as studies show this fosters more effective ESG practices (Luo and Tang, 2023; Korzeb et al., 2025).

In this context, our study aims primarily to assess the reporting and transparency of the value and supply chain by integrating ESG aspects and a proposal to assess the quality of information reporting on this topic. To achieve this objective, a qualitative thematic content analysis of sustainability and integrated reports was carried out, where applicable, for listed Romanian companies selected and included in the top 20, according to the BET index and rigorous selection criteria. Only companies with sustainability or integrated reports published for 2024 by the end of April 2025 were included in the final sample. Through our scientific approach, we aimed to find answers to the following questions: *RQ1. What is the degree of transparency and maturity of companies in the process of reporting information on the value and supply chain?; RQ2. What are the most transparently reported supply value chain topics?; RQ3. How can the*

quality of supply chain reporting be assessed by integrating ESG aspects into sustainability or integrated reports?

1. Review of the scientific literature

Recent research underscores the importance of supply chain transparency as a critical aspect of effective ESG reporting. Morgan, Richey Jr. and Ellinger (2018) emphasize that supplier transparency, as a strategic advantage, is pivotal for facilitating comprehensive information sharing between stakeholders. Their findings show that although numerous firms recognize the competitive advantage linked to transparency, many still encounter challenges in executing and managing transparent practices throughout their supply chains. Furthermore, the ongoing evolution of sustainability reporting reflects a broader trend towards greater accountability and trust among stakeholders, further reinforcing the significance of establishing operational transparency within the value chain. Oriekhoe et al. (2024) present a compelling argument regarding blockchain's capacity to revolutionize traditional supply chain management paradigms by providing real-time, immutable information to stakeholders. The integration of blockchain technology streamlines operations and bolsters the reliability and accessibility of ESG-related data within supply chains. The potential for blockchain to enhance transparency is echoed by Maslekar and Mandave (2024), who highlight its multifaceted benefits, including improved traceability and operational efficiency across the supply chain. On the social responsibility front, Baid and Jayaraman (2022) advocate for amplifying the "S" aspect of ESG within supply chain finance. Their approach resonates with findings that underscore the interconnection between social responsibility initiatives and enhanced transparency within the supply chain, suggesting that companies fulfilling social governance responsibilities through clear reporting practices will likely see improved stakeholder trust and investment potential. Moreover, Zhu et al. (2018) describe how operational supply chain transparency (OSCT) enables firms to engage proactively with their stakeholders, ensuring completeness and accuracy in the information shared across the supply chain. This reiterates the importance of structured and coherent information reporting in enhancing visibility within the supply chain framework. The dynamic nature of supply chains requires continuous improvement in information quality, aligning with the emerging ESG reporting standards.

The literature also highlights distinct patterns of ESG performance across various supply chain layers, as Xu et al. (2024) identified, suggesting that the depth and quality of ESG disclosures can significantly influence financial outcomes and stakeholder engagement. Thus, a strategic alignment between ESG objectives and supply chain management practices is crucial for fostering sustainable business operations. Furthermore, Chevrollier et al. (2020) discuss the predictive value of strategic orientation concerning ESG performance, suggesting that organizations adopting a more stakeholder-oriented approach yield significantly better ESG outcomes. This finding implies that corporate cultures promoting transparency and stakeholder engagement will likely be more effective in fulfilling ESG commitments. In addressing the challenges of adequate supply chain transparency, Zheng et al. (2024) illustrate potential solutions, highlighting how enhanced digitalization efforts can mitigate risks associated with insufficient transparency. These insights support the notion that leveraging technological advancements is vital for improving compliance with stakeholder expectations and regulatory frameworks. Lastly, Chatterjee and Chatterjee (2022) assert that a transparent supply chain is fundamental to sustainable supply chain management (SSCM), revealing that operational resilience, efficiency, and sustainability are interconnected through comprehensive reporting practices. Additional research by Das (2023) substantiates this perspective, showing that sustainability initiatives correlate positively with improved ESG performance across global supply chains.

2. Research methodology

2.1. Sample constitution and data collection

To constitute the sample of RO companies listed on Bucharest Stock Exchange (BSE), the top 20 companies that recorded the highest ESG reporting transparency score according to the GEM ASSAY™ 2022 methodology were selected. The Global ESG monitor investigates the transparency of non-financial reporting of companies listed in Europe, the United States, Australia, and Asia (Hofstetter and Diegelmann, 2023). The content analysis of the reports within the GEM ASSAY™ methodology was based on six criteria (balance, comparability, accuracy, timeliness, reliability, relevance), and fifteen evaluation components were included in this methodology. The weight of the value and supply chain component is 8% (Hofstetter and Diegelmann, 2023). The following selection criteria were further applied to establish the final sample of companies in the non-financial sector: online availability of the sustainability report/statement for 2024;

online publication of the sustainability report/statement for 2024, in English, and the ESRS reporting framework. Also, the premise of this study is the higher probability of the companies in the sample, considered to be the most transparent in ESG reporting according to the GEM AssayScore 2022 methodology, to publish more comprehensive and detailed information on the supply value chain, in their sustainability or integrated reports for 2024. Thus, in order to carry out the qualitative content analysis aimed at assessing the supply chain transparency, the companies' sustainability reports/statements for 2024 were downloaded. Six companies published individual sustainability reports or statements (OMV, Alro, Aquila, Conpet, Transgaz, and MedLife), and two included the sustainability information according to the ESRS framework within the integrated annual report (Romgaz and Teraplast).

2.2. Methodology design

To build a methodology for assessing the transparency, extent, and maturity of ESG reporting in the supply value chain, data was collected and extracted manually and processed using NVivo 15 software, from companies' descriptions and reports on items and processes related to the supply chain that could serve as components in building the assessment model. Also, the KPMG report (2023), *The Future of Supply Chain*, was studied to establish the evaluation criteria for the reported components regarding the supply value chain. This report emphasizes that to build a sustainable value chain, companies must be prepared to make substantial progress in the following aspects: responsible sourcing, due diligence, decarbonization, circular economy, human rights working in manufacturing and production, and technology-based ESG reporting (KPMG, 2023). Thus, considering the ESRS reporting requirements, the KPMG report on the sustainable value chain, and the studies conducted by Chiffoleau and Dourian (2020), Cavicchi and Vagnoni (2022), Zidar, Turk and Prišenk (2023), six main themes were identified and subjected to analysis based on criteria and a rating scale. The scoring scale from 0 to 3 was used, and points were assigned based on the existence and level of detail of the reported information, as can be seen in Table no. 1.

Table no. 1. The supply value chain transparency reporting assessment process descriptors

Supply and value chain (S&VC) themes	Assessment criterion	The scoring basis	The scoring scale
Supply chain impact	The company identifies the value chain (suppliers, contractors, value chain workers) as a key stakeholder and recognizes the relevant impacts, risks, and opportunities (IROs) at this level. Briefly, IROs' identification in the value chain	Awarding scores for explicitly recognizing the value chain as an area of impact, risk, or opportunity (IRO).	0 points (not explicitly recognized), 1 point (generally recognized), 2 points (general IRO identification), 3 points (key IROs identified in the S&VC and detailed).
ESG criteria integrated into supply chain management and supplier selection	The company uses ESG criteria in the supplier selection, evaluation, or monitoring processes.	Points are awarded for ESG integration processes in the relationship with suppliers (for instance, questionnaires, audits, various platforms, acquisition criteria, other issues).	0 points (not mentioned), 1 point (generally mentioned), 2 points (existence of processes , for instance, measurement), 3 points (formal processes are mentioned clearly, for instance questionnaires, audits, external platforms).
Value chain policies and codes of business conduct	The company establishes and communicates to suppliers ESG policies and codes of conduct that they must comply with.	Points are awarded for the existence of policies and codes of conduct relevant to the value chain and mechanisms to ensure adherence (for instance contractual provisions, responsibility statements).	0 points (not mentioned), 1 point (existence of a general code), 2 points (particular code applicable to suppliers and contractors), 3 points (existence of a code with a clear compliance mechanism).

Due diligence and ESG risk management in the value chain	The company employs due diligence and risk management processes that cover ESG issues specific to the value chain (for instance, human rights, environment, corruption, bribery, working terms).	Points are awarded for due diligence and ESG risk management processes description in the value chain. Additional points are awarded for a formalized system or clear implementation plans.	0 points (not mentioned), 1 point (existence of a general due diligence), 2 points (due diligence that includes ESG value chain aspects), 3 points (a coherent and clear formalized ESG value chain due diligence system).
Communication and grievance mechanisms for value chain workers	The company provides channels through which workers in the value chain (not just its employees) can express their concerns or complaints about ESG issues.	Points are awarded for mechanisms accessible to workers in the value chain and plans to improve accessibility and also, credibility in them.	0 points (not mentioned), 1 point (channels available to other parties generically), 2 points (channels specified as accessible to the value chain), 3 points (channels accessible to the value chain with monitoring or improvement plans).
ESRS value chain reporting	The company reports on aspects related to managing relationships with suppliers (ESRS G1-2) and workers in the value chain (ESRS S2) or other ESG topics significant for the value chain (ESRS E1-1 Climate transition plan, ESRS E5-7 Resource use optimization, ESRS E5-9 Financial effects from resource use and circular economy-related IROs.), ESRS compliant.	Awarding points for reporting according to ESRS on topics directly relevant to suppy and value chain (S2, G1-2) and for other ESG topics (E, S1, S3, G1) that significantly influence the company value chain.	0 points (no value chain reference), 1 point (existence of general reference), 2 points (reporting on ESRS topics relevant to the value chain, for instance, G1-2, S2), 3 points (detailed reporting on several ESRS topics significant to the supply value chain).

3. Results and discussion

The analysis began with examining the state of the overall degree of transparency of ESG reporting compared to the degree of transparency of the value and supply chain, according to the GEM ASSAY™ 2022 methodology. As can be seen in Figure no. 1, the supply chain transparency score follows the same trend as the ESG reporting transparency scores according to the GEM ASSAY™ 2022 methodology.

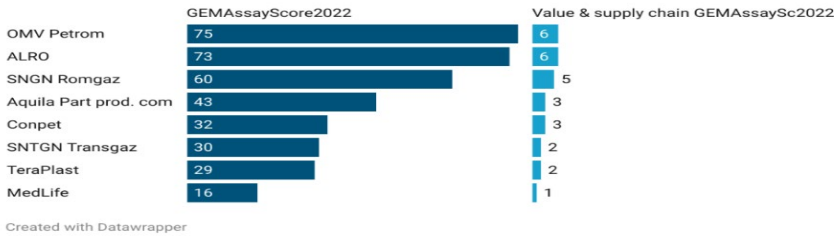

Figure no. 1. Distribution of ESG and supply value chain transparency score
*Source: authors' projection based on (*Hofstetter and Diegelmann, 2023)

In the first stage of content analysis, a text examination was performed, and key terms were extracted based on their frequency. As can be seen in Figure no. 2, the highest frequency of the term value chain is recorded in the case of the companies OMV, ALRO, MedLife, and Romgaz, and the item supply chain presents a high frequency in the case of OMV, ALRO, Conpet, and MedLife. Therefore, it is assumed that in the case of these companies, more quantitative and qualitative information on the sustainable supply value chain will be identified and extracted.

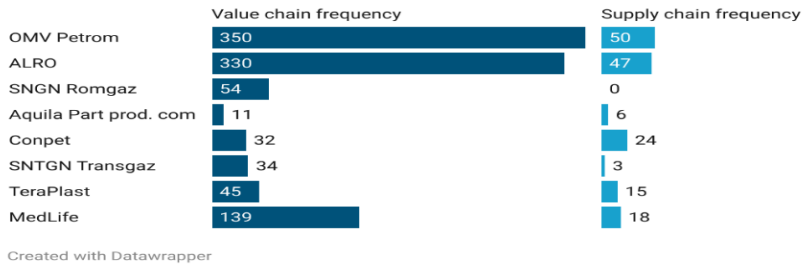

Figure no. 2. Supply and value chain frequency in the analyzed reports

In the second stage, thematic content analysis of sustainability and integrated reports was used, focusing on the qualitative examination of the information reported on the six aspects pre-established in the methodology. Thus, the thematic analysis was carried out using NVivo 15.0 software, and the scoring was done manually. In Figure no. 3 it can be seen that the sustainability themes regarding "Value chain policies and codes of business conduct" and "ESRS value chain reporting" obtained the highest scores, followed by the aspects reported regarding "Supply chain impact" and "Due diligence and ESG risk management in the value chain". The least well-represented topics from the perspective of reported information are "ESG criteria integrated into supply chain management and suppliers selection" and "Communication and grievance mechanisms for value chain workers". This ranking is not surprising if we consider that this is the first year of ESRS reporting, excluding pilot year reporting. From the perspective of ESG factors and the integrated value chain, the degree of transparency is average, good, or, in other words, developing.

Figure no. 3. The average transparency scores on supply and value chain selected topics

The thematic analysis revealed that supply and value chain impact obtained the highest score in the case of Teraplast, the theme ESG criteria integrated into supply chain management and suppliers selection obtained the highest transparency score in the case of OMV, and the degree of transparency of value chain policies and codes of business conduct obtained the highest score in the case of OMV, ALRO, and Conpet. OMV and MedLife obtained the best transparency score for the topic of due diligence and ESG risk management in the value chain. These companies also recorded the highest transparency score for communication and grievance mechanisms for value chain workers, along with ALRO. Regarding the degree of transparency of ESRS value chain reporting, it is observed that the other companies register high scores, except for Aquila, which does not report according to ESRS. Thus, Transgaz and Teraplast have a reasonable degree of transparency, and OMV, ALRO, Romgaz, Conpet, and MedLife register very good scores in terms of the ESRS reporting framework and the ESRS references related to the value and supply chain. Also, as can be seen in Figure no. 4, based on the average transparency score of sustainability themes on value and supply chain, the best ranked companies are OMV (2.83), MedLife (2.50), Conpet (2.33), and ALRO (2.00). In summary, the thematic content analysis highlights that the leader in reporting and transparency of the supply value chain is OMV, with an advanced degree of maturity in reporting information, detailed processes, using external tools (EcoVadis, Tfs), and specific indicators in supplier management. ALRO, Conpet, and MedLife companies, on the other hand, have good reporting and transparency, in development and demonstrating a good understanding of the requirements (ESRS), including the value chain in the materiality assessment, have started integrating ESG criteria in the relationship with suppliers (ALRO) or monitor operational indicators (MedLife), and explicitly recognize areas for improvement. These companies have robust reporting foundations but still need to mature in detailing information on the value chain. The other category includes companies that report well on other ESG areas but have limited details on the supply value chain (Romgaz, TeraPlast, Transgaz).

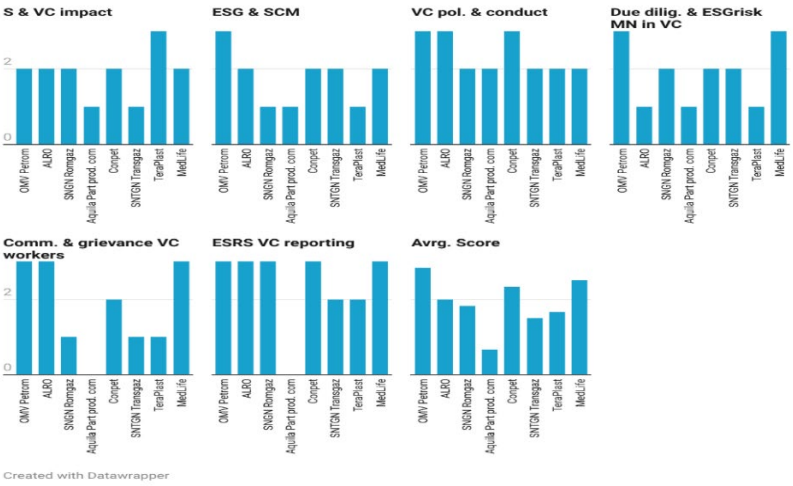

Figure no. 4. Distribution of supply and value chain transparency scores by companies

Further on, we proceeded to an assessment of the quality of value and supply chain reporting by integrating ESG aspects and to perform this, we focused on the following criteria: reporting of information according to the requirements of the ESRS framework; compliance and detail of the due diligence and supplier management processes, including their monitoring; availability of data and quantitative indicators, and mentioning of challenges and concrete action plans. The quality of supply chain reporting was assessed through the lens of identifying strong and robust points and weaknesses, using an assessment scale (1 to 4), where the score 1 was assigned for weak quality, and 4 for very good quality. Visualization of companies' rankings can be seen in Figure no. 5.

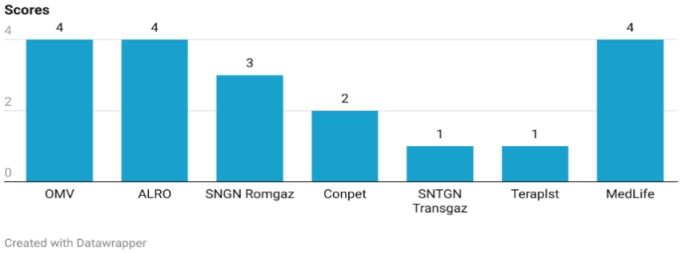

Figure no. 5. Distribution of supply value chain reporting quality scores by companies

Therefore, based on the qualitative thematic content analysis targeting the transparency, extent and maturity of companies' value and supply chain management practices, and the qualitative assessment of their reporting, OMV offers the most complete, complex and interrelated picture of information communication and transparency and can be included in the category of companies with good practices and to follow in the area of supply chain reporting by integrating ESG aspects.

Conclusions

This study is an exercise to assess the transparency and quality of supply and value chain reporting through integrated ESG factors, for a small sample of companies listed on the BSE and considered to be the most transparent, from the perspective of ESG reporting using the GEM ASSAY™ methodology for the year 2022. To conduct the qualitative thematic analysis, companies that have prepared and published sustainability or integrated reports for 2024, according to ESRS requirements, were selected. The results of the thematic analysis showed that the most transparent topics according to the degree of detail of the reported information are "Value chain policies and codes of business conduct" and "ESRS value chain reporting", and the least transparent are "ESG criteria integrated into supply chain management and suppliers selection" and "Communication and grievance mechanisms for value chain workers". Depending on the scores obtained by companies for the six themes analyzed according to the degree of transparency, it can be assessed that the degree of maturity of reporting and communication of supply and value chain information is developing. The content analysis revealed that the examined reports describe how these sampled companies address, manage, and report ESG aspects in their relationship with their suppliers and contractors, emphasizing the importance of the value chain. The results showed that in terms of recognizing the importance of the value chain, companies identify suppliers and workers in the value chain as key stakeholders and recognize the impact, both positive and negative, risks and opportunities (IROs) that may

arise at this level, and ESG criteria are taken into account in the processes of identifying and assessing IROs. The key finding is that transparency and quality of supply chain reporting, according to ESRS requirements, are improving; listed companies are making efforts to increase the quality of sustainability reporting. However, there is a need to increase the degree of connectivity of information and a more structured and layered presentation with clear reference to specific indicators and their degree of fulfillment. The study has practical implications and can provide managers with several insights into what needs to be improved regarding reporting and transparency in the supply value chain. The limitations are found in the small sample of companies. Future studies aim to expand the study to a larger number of companies.

References

Ahi, P., 2021. *Sustainability analysis and assessment in the supply chain*. Toronto Metropolitan University. https://doi.org/10.32920/ryerson.14662254.v1.

Baid, V. and Jayaraman, V., 2022. Amplifying and promoting the "S" in ESG investing: the case for social responsibility in supply chain financing. *Managerial Finance*, 48(8), pp.1279–1297. https://doi.org/10.1108/MF-12-2021-0588.

Betts, K., Gutierrez-Franco, E. and Ponce-Cueto, E., 2022. Key metrics to measure the performance and impact of reusable packaging in circular supply chains. *Frontiers in Sustainability*, 3. https://doi.org/10.3389/frsus.2022.910215.

Cao, Y., Shen, B. and Chan, H., 2024. Buyer direct financing with blockchain-assisted due diligence in supply chain. *International Transactions in Operational Research*, 31(6), pp.3905–3932. https://doi.org/10.1111/itor.13334.

Cavicchi, C. and Vagnoni, E., 2022. The role of performance measurement in assessing the contribution of circular economy to the sustainability of a wine value chain. *British Food Journal*, 124(5), pp.1551–1568. https://doi.org/10.1108/BFJ-08-2021-0920.

Chang, H., 2023. ESG Integration in Chinas Sustainable Supply Chain: Feasibility, Impact, and Optimization Strategies. *Advances in Economics, Management and Political Sciences*, 65(1), pp.201–208. https://doi.org/10.54254/2754-1169/65/20231632.

Chatterjee, S. and Chatterjee, D., 2022. Modelling the barriers of supply chain transparency in the post-COVID-19 scenario. *International Journal of Logistics Economics and Globalisation*, 9(3), p.277. https://doi.org/10.1504/IJLEG.2022.120812.

Chevrollier, N., Zhang, J., van Leeuwen, T. and Nijhof, A., 2020. The predictive value of strategic orientation for ESG performance over time. *Corporate Governance: The International Journal of Business in Society*, 20(1), pp.123–142. https://doi.org/10.1108/CG-03-2019-0105.

Chiffoleau, Y. and Dourian, T., 2020. Sustainable Food Supply Chains: Is Shortening the Answer? A Literature Review for a Research and Innovation Agenda. *Sustainability*, 12(23), p.9831. https://doi.org/10.3390/su12239831.

Dai, T. and Tang, C., 2022. Frontiers in Service Science: Integrating ESG Measures and Supply Chain Management: Research Opportunities in the Postpandemic Era. *Service Science*, 14(1), pp.1–12. https://doi.org/10.1287/serv.2021.0295.

Das, A., 2023. Predictive value of supply chain sustainability initiatives for ESG performance: a study of large multinationals. *Multinational Business Review*, 32(1), pp.20–40. https://doi.org/10.1108/MBR-09-2022-0149.

Directive of the European Parliament and of the Council amending Directives (EU) 2022/2464 and (EU) 2024/1760 as regards the dates from which Member States are to apply certain corporate sustainability reporting and due diligence requirementsamending. [online] Available at: <chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://data.consilium.europa.eu/doc/document/PE-6-2025-INIT/en/pdf> [Accessed 2 May 2025].

Hofstetter, A. and Diegelmann, M., 2023. *Global ESG monitor transparency ranking Romania 2022. Global ESG Monitor - Think Tank for Corporate Sustainability*. [online] Available at: <https://globalesgmonitor.com> [Accessed 14 April 2025].

Korzeb, Z., Karkowska, R., Matysek-Jędrych, A. and Niedziółka, P., 2025. How do ESG challenges affect default risk? An empirical analysis from the global banking sector perspective. *Studies in Economics and Finance*, 42(1), pp.89–114. https://doi.org/10.1108/SEF-09-2023-0540.

KPMG International Limited, 2023. *The future of supply chain*. [online] Available at: <chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://assets.kpmg.com/content/dam/kpmgsites/xx/pdf/2023/09/kpmg-future-of-supply-chain-report.pdf> [Accessed 28 April 2025].

Leogrande, A., 2024. *Integrating ESG Principles into Smart Logistics:Toward Sustainable Supply Chains*. https://doi.org/10.20944/preprints202411.1432.v1.

Luo, L. and Tang, Q., 2023. The real effects of ESG reporting and GRI standards on carbon mitigation: International evidence. *Business Strategy and the Environment*, 32(6), pp.2985–3000. https://doi.org/10.1002/bse.3281.

Marie, M., Qi, B., Gerged, A.M. and Nobanee, H., 2024. Exploring Environmental, Social and Governance research in the wake of COVID-19: A bibliometric analysis of current trends and recommendations for future research. *Corporate Social Responsibility and Environmental Management*, 31(6), pp.6131–6149. https://doi.org/10.1002/csr.2909.

Morgan, T.R., Richey Jr, R.G. and Ellinger, A.E., 2018. Supplier transparency: scale development and validation. *The International Journal of Logistics Management*, 29(3), pp.959–984. https://doi.org/10.1108/IJLM-01-2017-0018.

Maslekar, M. and Mandave, V., 2024. Implementation of Food Supply Chain Management System. *International Research Journal on Advanced Engineering Hub (IRJAEH)*, 2(07), pp.2037–2040. https://doi.org/10.47392/IRJAEH.2024.0278.

Oriekhoe, O.I., Oyeyemi, O.P., Bello, B.G., Omotoye, G.B., Daraojimba, A.I. and Adefemi, A., 2024. Blockchain in supply chain management: A review of efficiency, transparency, and innovation. *International Journal of Science and Research Archive*, 11(1), pp.173–181. https://doi.org/10.30574/ijsra.2024.11.1.0028.

Paul, S., Ali, S.M., Hasan, M.A., Paul, S.K. and Kabir, G., 2022. Critical Success Factors for Supply Chain Sustainability in the Wood Industry: An Integrated PCA-ISM Model. *Sustainability*, 14(3), p.1863. https://doi.org/10.3390/su14031863.

Tian, L., Tian, W. and Guo, M., 2025. Can supply chain digitalization open the way to sustainable development? Evidence from corporate <scp>ESG</scp> performance. *Corporate Social Responsibility and Environmental Management*, 32(2), pp.2332–2346. https://doi.org/10.1002/csr.3067.

Vegter, D., Hillegersberg, J. van and Olthaar, M., 2021. Performance Measurement Systems for Circular Supply Chain Management: Current State of Development. *Sustainability*, 13(21), p.12082. https://doi.org/10.3390/su132112082.

Villena, V.H. and Dhanorkar, S., 2020. How institutional pressures and managerial incentives elicit carbon transparency in global supply chains. *Journal of Operations Management*, 66(6), pp.697–734. https://doi.org/10.1002/joom.1088.

Xing, C., 2023. Critical Success Factors for a Sustainable Supply Chain: The Case of Apple Inc. *Advances in Economics, Management and Political Sciences*, 39(1), pp.11–16. https://doi.org/10.54254/2754-1169/39/20231923.

Xu, J., Lu, J., Chai, L., Zhang, B., Qiao, D. and Li, S., 2024. Untangling the Impact of ESG Performance on Financing and Value in the Supply Chain: A Congruence Theory Perspective. *Business Strategy and the Environment*, 34(2), pp.2190–2206. https://doi.org/10.1002/bse.4098.

Zeng, H., Li, R.Y.M. and Zeng, L., 2022. Evaluating green supply chain performance based on ESG and financial indicators. *Frontiers in Environmental Science*, 10. https://doi.org/10.3389/fenvs.2022.982828.

Zheng, L.J., Islam, N., Zhang, J.Z., Wang, H. and Au, K.M.A., 2024. How does supply chain transparency influence idiosyncratic risk in newly public firms: the moderating role of firm digitalization. *International Journal of Operations & Production Management*, 44(9), pp.1649–1675. https://doi.org/10.1108/IJOPM-08-2023-0689.

Zhu, S., Song, J., Hazen, B.T., Lee, K. and Cegielski, C., 2018. How supply chain analytics enables operational supply chain transparency. *International Journal of Physical Distribution & Logistics Management*, 48(1), pp.47–68. https://doi.org/10.1108/IJPDLM-11-2017-0341.

Zidar, N., Turk, J. and Prišenk, J., 2023. Expressing Added Value in Food Supply Chains. *Agricultura Scientia*, 20(2), pp.31–40. https://doi.org/10.18690/agricsci.20.2.4.

The Impact of Leadership Styles on Essential Factors of the Labor Market in Romania

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Abstract

This article investigates the relationship between leadership styles practiced in Romanian organizations and four essential dimensions of the labor market: unemployment rate, labor mobility, digital skills and labor productivity. Given the rapid transformations of the economic and social environment – driven by digitalization, globalization, human capital migration and recent economic crises – leadership is gaining an increasingly important role in influencing organizational adaptability and performance. The study aims to analyze to what extent different leadership styles (transformational, transactional, autocratic and laissez-faire) contribute to managing labor market challenges and strengthening a sustainable organizational culture. The research methodology was based on the application of a standardized questionnaire, using a Likert scale, addressed to a sample of 150 respondents from various fields of activity (IT, manufacturing, services, public administration). The instrument aimed both to identify the perception of existing leadership styles and to assess the essential dimensions of the labor market. The statistical analysis was performed using the Pearson correlation coefficient, highlighting relevant associations between the investigated variables. The results demonstrated that transformational leadership is associated with a high level of digital skills and productivity, while autocratic and laissez-faire styles are negatively correlated with professional stability and employee satisfaction. The study offers a series of conclusions and recommendations for practitioners in the field of human resources and organizational management, emphasizing the importance of adopting adaptive leadership models, focused on human resources development and oriented towards the future of the Romanian labor market.

Keywords:

Organizational leadership, labor market, digital skills, professional mobility, labor productivity.

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Introduction

In the current context, characterized by increased volatility of the socio-economic environment, leadership becomes an essential factor in maintaining organizational balance and stimulating workforce adaptability. Accelerated technological changes, increased competition on the labor market, and the transition to an economic model based on knowledge and innovation determine a redefinition of the role of the leader. It is no longer enough for leaders to be simple resource administrators or executors of institutional strategies; they must become architects of change, promoters of skills development, and supporters of team cohesion (Tucker, 2003). The Romanian labor market reflects a series of systemic and conjunctural challenges: labor migration in search of better conditions, the gap between available skills and those required by employers, unequal productivity between regions and sectors, as well as a digitalization that advances at an uneven pace. In this complex landscape, the leadership style practiced within organizations influences not only individual and collective performance, but also employees' perception of job stability, openness to continuous learning, and intention to remain within the same professional structure. Increasingly, the specialized literature and managerial practice emphasize that leadership is not only an internal factor of the

organization, but a true vector of interaction with the external environment. Specifically, the way leaders respond to labor market challenges – such as adapting to digitalization, talent retention, continuous professional training, and promoting inclusion – directly influences the organization's ability to remain competitive and sustainable (Azar, Marinescu and Steinbaum, 2017).

In Romania, these challenges take on specific valences. Phenomena such as the accelerated emigration of young and skilled labor, regional discrepancies regarding access to professional opportunities, the relatively low rate of participation in continuing professional training, but also the gap in the digitalization process of some economic sectors, determine a constant pressure on organizations. In this context, it becomes essential to analyze how different leadership styles can act as facilitating factors or, on the contrary, as barriers to organizational adaptation and resilience. The choice of the four leadership styles – transformational, transactional, autocratic and laissez-faire – is based on their extensive recognition in the specialized literature and their relevance for the organizational realities in Romania. Also, the four dimensions of the labor market selected for this research – perceived unemployment, professional mobility, digital skills and labor productivity – were chosen for their ability to directly reflect the interaction between human resource management and the socio-economic context (Heemskerk, Voinea and Cojocaru, 2018). By combining these two sets of variables, the research aims to identify possible correlations between leadership styles and labor market dynamics, while providing a solid basis for formulating practical recommendations. It starts from the premise that effective leadership – understood as an adaptive, empathetic and development-oriented form – can contribute to reducing labor market vulnerabilities and strengthening organizational cohesion.

This paper does not only aim to provide a static picture of the relationship between leadership and the labor market, but to contribute to a broader dialogue on the role of leadership in shaping the future of work in Romania. At a time when flexibility, innovation and trust are becoming essential currencies of performance, a deep understanding of leadership and its impact on fundamental factors of the labor market is not only timely, but absolutely necessary. The present study aims to analyze to what extent leadership styles contribute to shaping employees' behavior and attitude towards the labor market, exploring four essential dimensions: perceived unemployment rate, professional mobility, digital skills and productivity level. Through this approach, it aims to highlight the role that leadership plays in building a stable, high-performing organizational environment adapted to the requirements of the future. The paper starts from the premise that the typology of leadership styles can positively or negatively influence the way employees relate to the labor market. Thus, transformational leadership can stimulate professional development and employee retention, while authoritarian or passive styles can increase staff insecurity and turnover. The proposed analysis aims to provide an empirical perspective on these correlations, contributing to improving leadership strategies in Romanian organizations.

1. Review of the scientific literature

Leadership is a central concept in organizational sciences, being studied both from the perspective of its influence on performance and interpersonal relationships within teams. Over time, leadership theories have evolved from authoritarian and hierarchical models to participative styles, focused on the development of human resources. The transformational leadership style is associated with the leader's ability to inspire, motivate and support the personal and professional development of employees (Legvold, 2004). It fosters innovation, trust and active involvement, being considered effective in dynamic contexts and in organizations undergoing transition or restructuring. Transactional leadership, on the other hand, is built on the relationship between reward and performance, being effective in repetitive or well-structured activities, but less so in those that require adaptability and initiative. In contrast to these performance- and development-oriented styles, autocratic and laissez-faire styles are often perceived as dysfunctional in modern organizational environments (Yukl, 2013). Autocratic leadership involves centralization of decisions and excessive control, which can lead to demotivation and professional insecurity. On the other hand, the laissez-faire style is characterized by the lack of involvement of the leader, which negatively affects team cohesion and operational efficiency (Marinescu, 2017).

The labor market, in turn, is marked by accelerated transformations, caused by digitalization, increased labor mobility and economic instability. Digital skills are becoming an essential condition for employability, and their development is closely linked to the organizational climate and the way in which leaders support learning and adaptation processes (Nier et al., 2019). Labor productivity is also influenced by the leadership style practiced, the quality of internal communication and the level of autonomy granted to employees (House et al., 2004). Leadership is increasingly being addressed as an essential factor in human capital management, especially in the context of labor markets characterized by volatility,

diversification, and increased competition. In high-performing organizations, leaders are no longer just executors of institutional strategies, but also facilitators of change, organizational learning, and continuous innovation (Marinescu and Rathelot, 2018). Thus, leadership becomes a bridge between the strategic vision and the operational reality of employees. The specialized literature highlights the fact that leadership styles directly influence the degree of employee satisfaction and retention. Leadership based on open communication, recognition, and professional autonomy contributes to reducing the intention to migrate and strengthening loyalty to the organization (Tucker, 2003). At the same time, authoritarian or passive leadership styles are associated with high levels of occupational stress, low performance, and increased desire to change jobs. In the context of accelerated digitalization, leadership must increasingly focus on developing employees' digital skills and creating a climate conducive to innovation. Leaders have the role of shaping organizational culture, stimulating adaptability, and supporting the reskilling and upskilling processes, essential for maintaining the competitiveness of the workforce (Robbins and Judge, 2021). This dimension of leadership becomes even more important in economic sectors directly exposed to technological transformations, such as IT, telecommunications, education, or healthcare.

Also, in organizations where leadership aligns with collaborative values, oriented towards sustainable development and inclusion, an increased capacity to retain talents and increase productivity in the long term is observed. Modern leadership approaches aim not only to maximize economic results, but also to employee well-being, work-life balance, and social involvement (Northouse, 2019). Another aspect frequently addressed in the specialized literature is the connection between leadership styles and the ability of organizations to manage change (Nier et al., 2019). In an unpredictable economic climate, marked by technological transformations, health crises, or geopolitical conflicts, leaders play a crucial role in maintaining the coherence and stability of teams (Bass, 1990). Adaptive leadership, characterized by flexibility, resilience and empathy, is increasingly valued in recent research, being perceived as an essential trait of the modern manager (Legvold, 2004). As societies become more aware of the impact of organizational decisions on the community and the environment, leaders are evaluated not only in terms of economic performance, but also by their ability to promote equity, transparency and sustainability (Schein, 2010). This type of leadership, anchored in values and social responsibility, contributes to the creation of a healthy and stable organizational culture, which attracts and retains motivated and involved employees (Verbeke, van Tulder and Voinea, 2012). At the same time, the literature pays increased attention to situational leadership, which involves adapting the leadership style according to the context, the professional maturity of the team and the nature of the tasks. In this sense, an effective leader is one who can navigate between authoritarian, consultative or delegative styles, depending on the needs of the organization and the stage of development of team members. This approach is particularly relevant in the current context, in which organizations operate in a hybrid or fully digitalized environment, with geographically distributed and culturally diverse teams (Marinescu, 2017).

Regarding the generational dimension, recent studies highlight the fact that expectations towards leadership differ significantly between generations. Employees from generations Y and Z value more open communication, inclusion, flexibility and continuous feedback, while traditional, authoritarian or exclusively control-based styles are increasingly rejected (Marinescu and Rathelot, 2018). This paradigm shift leads leaders to develop soft skills, such as active listening, emotional intelligence and the ability to build authentic relationships with team members. Thus, contemporary leadership is increasingly seen as a form of positive influence, which transcends hierarchy and is expressed through co-creation, participation and mutual development. In this sense, the role of the leader is no longer to command, but to facilitate, support and create an environment in which people can develop and perform at the highest level (Heemskerk, Voinea and Cojocaru, 2018).

In parallel with the theoretical developments on leadership, the specialized literature also offers numerous perspectives on labor market transformations, especially in the context of Romania and the Central and Eastern European countries (Javidan and Dastmalchian, 2009). Among the most frequently analyzed trends are the increase in the degree of automation, the mismatch of available skills with employers' requirements, the migration of the labor force in search of better conditions, as well as the difficulty of organizations to attract and retain talent. In all these situations, the quality of leadership proves to be an essential element in the ability of an organization to manage change and to consolidate its position in the labor market (Aghion et al., 2004). Current literature increasingly emphasizes the role of leadership in promoting an organizational culture that supports continuous learning, collaboration and work-life balance. In such a climate, employees tend to show a higher level of involvement and stability, which directly contributes to reducing staff turnover and increasing overall performance. Therefore, a clear link is emerging between the type of leadership practiced in an organization and how employees perceive job security, development opportunities, professional stability and willingness to remain within the same structure in the long term (House et al., 2004; Mintzberg, 2009). Specialized studies indicate that leadership styles that emphasize

collaboration, recognition and personal development have a positive impact on these dimensions, while authoritarian or passive styles contribute to insecurity, demotivation and increased professional mobility. In conclusion, the specialized literature provides a solid foundation for exploring the relationship between leadership and the labor market. This supports the hypothesis that leadership directly influences both the internal dynamics of organizations and their ability to respond to external challenges in the socio-economic environment. Based on these theoretical premises, the present research aims to contribute to the consolidation of knowledge in the field through an empirical analysis of the correlations between leadership types and the main dimensions of the Romanian labor market.

2. Research methodology

This study aimed to identify and analyze the relationship between the types of leadership manifested in Romanian organizations and the main current challenges on the labor market. The research is part of a quantitative approach, with the aim of highlighting possible correlations between leadership styles and four essential elements of the labor market: unemployment rate, labor mobility, level of digital skills and labor productivity.

Research objectives*:*

- **O1**. Identifying the predominant leadership styles in Romanian organizations.
- **O2**. Assessing employees' perception of the four fundamental elements of the labor market.
- **O3**. Determining the existence of significant correlations between leadership styles and the analyzed factors.

The research was based on four types of leadership, theoretically grounded:

- **L1**. Transformational – characterized by motivation, vision and emotional involvement.
- **L2**. Transactional – focused on exchanges of rewards and penalties.
- **L3**. Autocratic (directional) – the leader has decision-making and authoritarian control.
- **L4**. Laissez-faire – minimal involvement of the leader in the work of subordinates.

Fundamental elements of the targeted labor market:

- Unemployment rate – employees' perception of job security and the risk of dismissal.
- Labor mobility – intention to migrate internally or externally for professional purposes.
- Digital skills – degree of adaptation to new technological requirements and digitalization.
- Labor productivity – perception of individual and collective efficiency at work.

The main instrument used was a structured questionnaire, consisting of two parts:

1. **Leadership assessment** – carried out through an adaptation of the MLQ (Multifactor Leadership Questionnaire), which measures respondents' perception of leaders' behaviors.
2. **Assessment of labor market factors** – a series of items comprising statements regarding job security, intention to migrate, level of digital skills and productivity, measured on a Likert scale from 1 (totally disagree) to 5 (totally agree).

Research sample: the questionnaire was applied to a sample of 150 respondents, employed in organizations in various fields (IT, production, services, public administration), distributed in several regions of the country. Choosing a diversified sample aimed to capture the most accurate picture possible of the multiple realities of the Romanian labor market.

The data obtained were processed using the SPSS program. To achieve the objectives, the following methods were used:

- **Pearson correlation coefficient** – to establish the existence and intensity of the relationship between the analyzed variables.
- **Descriptive analysis** – to characterize the distribution of responses.
- **Exploratory factor analysis** – to group the items and validate the measured dimensions.

Working hypotheses:

- **H1**. Transformational leadership is positively correlated with a high level of digital skills and labor productivity.
- **H2**. Transactional leadership is associated with an increased perception of effectiveness, but with a high intention of professional mobility.

• **H3**. Autocratic leadership is associated with an increased level of professional insecurity (perceived unemployment).

• **H4**. Laissez-faire leadership is negatively correlated with perceived performance and professional stability.

3. Results and discussion

The statistical analysis of the collected data allowed the formulation of conclusions regarding the relationships between the leadership styles identified in Romanian organizations and the main challenges on the labor market (Table no. 1). The results are presented below, grouped based on the four hypotheses formulated previously.

Table no. 1. Correlations between leadership types and elements of the labor market

Leadership Type	Digital Skills	Labor Productivity	Unemployment Perception	Professional Mobility
Transformation	0.58	0.46	-0.15	0.05
Transaction	0.2	0.39	0.1	0.44
Autocratic	-0.1	-0.25	0.41	0.2
Laissez-faire	-0.3	-0.52	0.3	0.48

Source: data processed with the SPSS application

1. Correlation between transformational leadership and digital skills/work productivity: the Pearson correlation coefficient indicated a significant positive relationship between transformational leadership and the level of digital skills perceived by employees ($r = 0.58$, $p < 0.01$). A moderate but significant correlation was also found with work productivity ($r = 0.46$, $p < 0.01$) – (Figure no. 1).

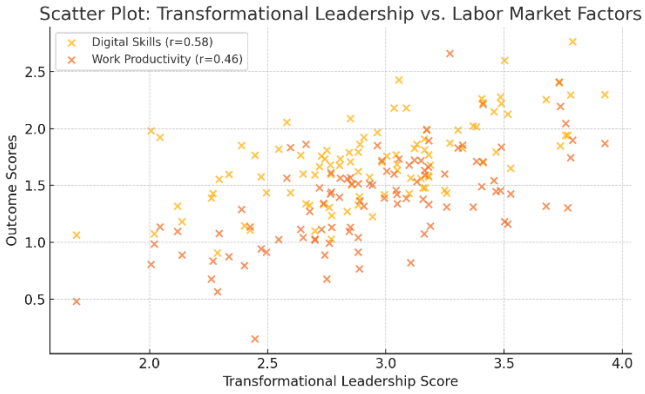

Figure no. 1. Scatter plot between transformational leadership and digital skills/work productivity

Source: data processed with the SPSS application

These results suggest that transformational leaders create an environment conducive to innovation, encourage continuous learning, and stimulate the personal and professional development of employees, thus contributing to increased productivity and adaptation to new technological requirements.

2. Correlation between transactional leadership and workforce mobility/productivity: transactional leadership showed a positive correlation with perceived work productivity ($r = 0.39$, $p < 0.05$), indicating the effectiveness of this style in managing routine tasks and achieving immediate goals. However, the same leadership style was positively correlated with the intention of professional migration (mobility) ($r = 0.44$, $p < 0.01$), which may indicate a lack of long-term organizational loyalty in the absence of intrinsic motivation – (Figure no. 2).

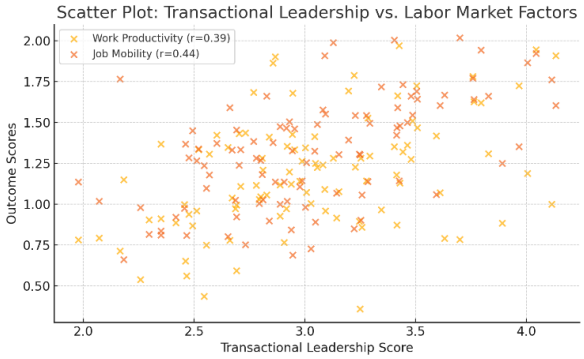

Figure no. 2. Scatter plot between transactional leadership and workforce mobility/productivity

Source: data processed with the SPSS application

3. Correlation between autocratic leadership and perception of unemployment: the data revealed a significant positive correlation between autocratic leadership and perception of unemployment risk ($r = 0.41$, $p < 0.01$) – (Figure no. 3).

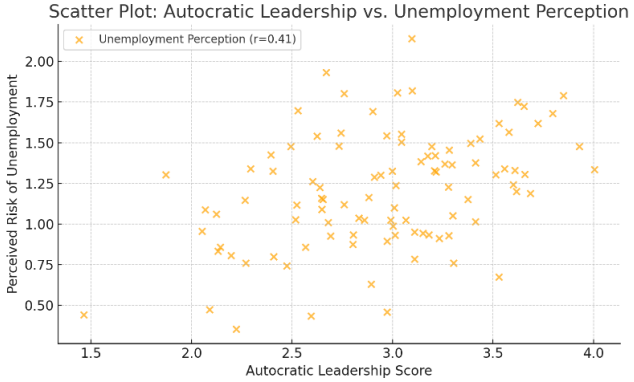

Figure no. 3. Scatter plot between autocratic leadership and perception of unemployment

Source: data processed with the SPSS application

Employees led by autocratic leaders reported increased feelings of job insecurity and a lack of job stability. This result indicates that excessive control and lack of employee participation in decision-making can diminish satisfaction and trust in the organization.

4. Correlation between laissez-faire leadership and Professional performance/stability: laissez-faire leadership was found to be negatively correlated with employee perceptions of productivity ($r = -0.52$, $p < 0.01$) and professional stability ($r = -0.48$, $p < 0.01$) – (Figure no 4).

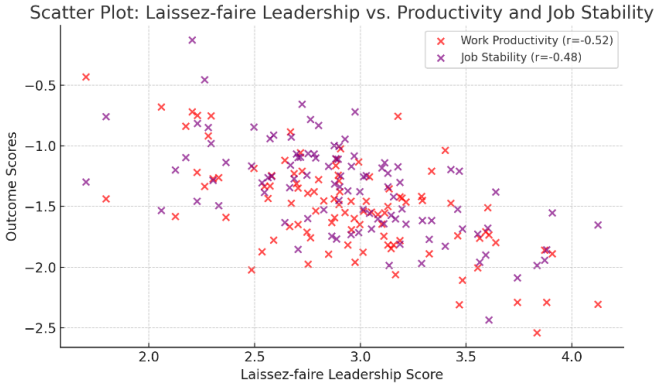

Figure no. 4. Scatter plot between laissez-faire leadership and professional performance/stability

Source: data processed with the SPSS application

Lack of leader involvement was associated with poor team coordination, low motivation, and increased desire to change jobs.

The hypothetical results highlight a clear trend: participative and motivating (transformational) leadership styles correlate with positive labor market factors, while passive or authoritarian styles (laissez-faire and autocratic) generate insecurity, increased mobility, and low productivity (Table no. 2).

Table no. 2. Hypothesized correlation between leadership styles and the main dimensions of the labor market

Leadership Type	Positive correlation	Negative correlation
Transformation	Digital skills, Productivity	–
Transaction	Productivity	Professional stability
Autocratic	–	Stability, Perception of unemployment
Laissez-faire	–	Productivity, Stability

Source: developed by the authors based on the collected data

This dynamic confirms the importance of adaptive and empathetic leadership in a socio-economic context marked by rapid change, accelerated digitalization and professional migration.

Conclusions

The present study highlighted the existence of significant correlations between leadership styles and fundamental elements of the Romanian labor market, thus outlining a framework for a deeper understanding of how leadership influences organizational dynamics and employee adaptability in the current context. Transformational leadership proves to be the most effective in stimulating digital skills and labor productivity. By focusing on innovation, motivation, and personal development, this style contributes to strengthening human resources in a constantly changing economic environment. Transactional leadership has a positive impact on short-term efficiency but is associated with increased labor mobility, suggesting that material rewards and contractual relationships are not sufficient to ensure employee retention and loyalty. Autocratic leadership is correlated with an increased perception of unemployment risk, reflecting a lack of trust in job stability and a rigid organizational culture, unadapted to the contemporary context. Laissez-faire leadership negatively influences both performance and the perception of professional stability, as the lack of managerial involvement leads to disorganization, demotivation, and an increased desire to leave the organization. The results obtained provide valuable directions for leaders and decision-makers in Romanian organizations. Adopting a transformational leadership style should be encouraged, especially in sectors affected by digitalization and accelerated innovation, as it can contribute to increasing employee adaptability and reducing the intention to migrate. Training programs for leaders should include components of emotional intelligence, effective communication, and collaborative leadership to support the development of inclusive and stable organizational cultures. Constant monitoring and evaluation of leadership styles in relation to labor market dynamics should become a frequent managerial practice to prevent the emergence of imbalances such as excessive staff turnover or decreased performance. Reforming authoritarian or passive leadership models, which no longer meet the current demands of the workforce, should be considered a priority for organizations aiming to remain competitive and sustainable. Furthermore, the integration of adaptive leadership strategies tailored to the specific needs of various industries could enhance the alignment between managerial approaches and employee expectations. For example, sectors such as information technology, finance, and creative industries, which are particularly sensitive to innovation cycles and market volatility, may benefit most from flexible, participative leadership models that foster autonomy and continuous learning. At the same time, more traditional sectors, such as manufacturing or public administration, may require a more gradual transition from hierarchical to collaborative models, guided by carefully designed change management processes. In addition, the development of a leadership culture that values feedback, transparency, and ethical decision-making can significantly contribute to restoring trust between employers and employees—a trust that has been increasingly tested by economic uncertainty, job insecurity, and rapid technological transformations. Organizations that actively invest in cultivating such cultures are more likely to attract and retain high-potential talent, thereby reinforcing their resilience and long-term competitiveness.

To deepen the results, future research could include comparative analyses between regions or economic sectors, qualitative investigations to understand employee perceptions of leadership, and studies on the impact of digitalization on emerging leadership styles.

References

Aghion, P., Bond, S., Klemm, A. and Marinescu, I., 2004. Technology and financial structure: Are innovative firms different? *Journal of the European Economic Association*, 2(2-3), pp.277–288. https://doi.org/10.1162/154247604323067989.

Azar, J., Marinescu, I. and Steinbaum, M.I., 2017. Labor market concentration. *National Bureau of Economic Research*, Working Paper No. 24147. https://doi.org/10.3386/w24147.

Bass, B.M., 1990. *Bass & Stogdill's Handbook of Leadership: Theory, Research, and Managerial Applications*. 3rd ed. New York: Free Press.

Heemskerk, F., Voinea, L. and Cojocaru, A., 2018. Busting the myth: The impact of increasing the minimum wage—the experience of Romania. *World Bank Policy Research Working Paper No. 8632*. https://doi.org/10.1596/1813-9450-8632.

House, R. J., Hanges, P. J., Javidan, M., Dorfman, P. W. and Gupta, V., 2004. *Culture, leadership, and organizations: The GLOBE study of 62 societies*. New York: Sage Publications.

Javidan, M. and Dastmalchian, A., 2009. Managerial implications of the GLOBE project: A study of 62 societies. *Asia Pacific Journal of Human Resources*, 47(1), pp.41–58. https://doi.org/10.1177/1038411108099289.

Legvold, R., 2004. Review of *Stalinism for all seasons: A political history of Romanian communism* by Vladimir Tismăneanu. *Foreign Affairs*, 83(2), pp.168–169. https://doi.org/10.2307/20033988.

Marinescu, I.E., 2017. The general equilibrium impacts of unemployment insurance: Evidence from a large online job board. *Journal of Public Economics*, 150, pp.14–29. https://doi.org/10.1016/j.jpubeco.2017.03.002.

Marinescu, I.E. and Rathelot, R., 2018. Mismatch unemployment and the geography of job search. *American Economic Journal: Macroeconomics*, 10(3), pp.42–70. https://doi.org/10.1257/mac.20150423.

Mintzberg, H., 2009. *Managing*. San Francisco: Berrett-Koehler Publishers.

Nier, E., Popa, R., Shamloo, M. and Voinea, L., 2019. Debt service and default: Calibrating macroprudential policy using micro data. *IMF Working Paper No. 19/182*. https://doi.org/10.5089/9781513511818.001.

Northouse, P.G., 2019. *Leadership: Theory and Practice*. 8th ed. Thousand Oaks, CA: Sage Publications.

Robbins, S.P. and Judge, T.A., 2021. *Organizational Behavior*. 18th ed. Harlow: Pearson Education.

Schein, E.H., 2010. *Organizational Culture and Leadership*. 4th ed. San Francisco: Jossey-Bass.

Tucker, R.C., 2003. Review of *Stalinism for all seasons: A political history of Romanian communism* by Vladimir Tismăneanu. *Slavic Review*, 62(3), pp.606–607. https://doi.org/10.2307/3185809.

Verbeke, A., van Tulder, R. and Voinea, L., 2012. New policy challenges for European multinationals: A resource bundling perspective. In *Progress in International Business Research* (Vol. 7, pp. 1–27). Emerald Group Publishing Limited. https://doi.org/10.1108/S1745-8862(2012)0000007004.

Yukl, G., 2013. *Leadership in Organizations*. 8th ed. Upper Saddle River, NJ: Pearson.

Bridging Sustainable Business and Regional Transformation: A Readiness Framework for High-Growth Contexts

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Abstract

This paper investigates organizational readiness and strategic challenges during a high-growth engagement in a large manufacturing company with a focus on sustainable business practices. It draws a parallel with a successful public-sector example: the accelerated, sustainability-driven development of Oradea, Romania. The study extracts actionable insights from both cases and proposes a strategic readiness framework that advances firm performance, sustainability objectives, and broader regional transformation. Using a qualitative, comparative case-study methodology, the research analyzes internal debriefs, project documentation, and thematic reflections from the private-sector case, alongside public data and assessments of Oradea's EU-funded development path.

A communication-and-collaboration diagnostic lens is applied to examine performance enablers, risk triggers, and learning mechanisms. In the private company, rapid scaling exposed gaps in capacity planning and internal communication, despite sustainability commitments, but also highlighted recovery through coordinated leadership and institutional learning. In Oradea, strategic public investment, cross-sector partnerships, and effective EU fund absorption anchored in sustainability, enabled regional transformation.

The study identifies three shared readiness enablers: foresight, alignment, and real-time coordination. It offers a novel public–private parallel, illustrating how coherence, proactive planning, and adaptability can drive both organizational resilience and regional development. The proposed readiness framework is scalable and applicable to diverse high-growth settings where sustainability and economic performance must converge. The findings offer practical guidance for managers, policymakers, and planners aiming to expand operations or investments under pressure: by leveraging insights across sectors, stakeholders can reduce systemic risk, enhance internal communication, and support sustainable growth.

Keywords

Sustainable business, sustainable development, high-growth, strategic readiness, organizational performance, organizational learning, regional development, EU funds.

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Introduction

In a volatile and interconnected economic landscape, rapid growth engagements, whether in the public or private sector, pose unique strategic and operational challenges. Organizations must manage increasing demand, scale internal systems, and maintain coherence under pressure. When handled effectively, such transitions become inflection points for long-term value creation; if mishandled, they can lead to systemic breakdowns. However, existing literature lacks a unified comparative framework that links strategic readiness in both public and private high-growth scenarios, especially under sustainability imperatives. This paper addresses that gap by identifying shared readiness enablers across sectors, grounded in real-world transformation cases.

This paper presents lessons from two high-growth trajectories: a large manufacturing firm's engagement with a strategic client aiming to double output in a short period, and the city of Oradea's transformation through EU-funded sustainable development. While the former encountered misalignments in planning and communication, it also revealed adaptive capacity. The latter demonstrated how strategic planning and effective fund absorption can drive regional prosperity.

The objective of this paper is to explore the strategic responses of organizations under high-growth pressure, analyze the mechanisms through which they align internal operations with external demands, and derive lessons that can inform both managerial and policy decisions. By focusing on a large-scale private sector scale-up alongside the sustainable development trajectory of Oradea, Romania, the study aims to generate a cross-sectoral understanding of readiness that is both theoretically grounded and practically applicable.

This paper contributes theoretically by synthesizing strategic readiness literature across sectors and practically by offering actionable insights for managers and policymakers facing growth challenges under sustainability demands. By juxtaposing these cases, we propose a cross-sectoral strategic readiness framework applicable in high-growth scenarios, where sustainability and resilience must converge.

1. Literature Review

The challenges and dynamics of high-growth organizational settings have been extensively studied under the lenses of dynamic capabilities, institutional learning, and strategic foresight. Teece, Peteraf and Leih (2016) argue that organizations must continuously adapt to uncertainty by developing agility in their operational and strategic routines a principle reinforced in the context of scale-up engagements. Similarly, Sirmon and Hitt (2009) highlight the role of dynamic managerial capabilities in coordinating resource investments and deployment under pressure, especially when market conditions evolve rapidly.

Grant (1996) and Eisenhardt and Martin (2000) establish the foundations of knowledge-based and capability-driven theories of the firm, asserting that sustainable performance under complex demands depends on a firm's ability to align internal systems to external requirements. Edmondson (1999) adds that psychological safety and internal communication are prerequisites for team-based learning, especially in volatile settings. These foundational models emphasize that internal alignment and learning are critical to navigating turbulence. Van der Heijden (2005) emphasizes that scenario-based thinking is essential for anticipating change, particularly in strategic environments characterized by uncertainty.

Importantly, the literature has evolved to emphasize not only the existence of capabilities, but the mechanisms by which lessons are institutionalized. Communication systems, structured feedback, and cross-functional learning platforms are now widely recognized as enablers of adaptive capacity (Teece, 2018; Robbins and Judge, 2020). Organizations that effectively transform short-term challenges into structured learning gain what Huber (1991) calls "institutional memory" the capacity to generalize experiences into long-term improvements. James (2018) adds that the cultural conditions that support digital transformation, particularly leadership alignment and trust are equally vital to sustaining growth readiness.

In public administration, this logic is mirrored in studies of administrative capacity and strategic governance. Dodescu and Chirilă (2012, 2013) emphasize that fund absorption effectiveness in EU-funded programs depends not only on technical execution but also on strategic learning and multi-level coordination. Sabău-Popa (2024) documents how Oradea's policy learning processes from transparent procurement to investment prioritization contributed to both growth and institutional maturity. Plečko and Bradač Hojnik (2024) similarly argue that digital governance and sustainability frameworks create continuous feedback channels that reinforce policy refinement.

Weiner's (2009) model of organizational readiness offers a unifying perspective across sectors: successful transformation requires both structural resources and psychological readiness shared belief in change and accountability mechanisms that reinforce it. In high-growth contexts, this means having systems in place not just to execute, but to learn while scaling.

Furthermore, research highlights that without explicit reflection and feedback, many organizations experience "growth fatigue" or fragmentation. Thus, diagnostic frameworks like the communication and collaboration lens applied in this study serve not just to assess current performance, but to detect early signals of breakdown or misalignment, particularly when external demands intensify. In this context, Visnjic, Monteiro and Tushman (2025) argue that strategies balancing efficiency and innovation are crucial

for navigating scale without compromising adaptability, a principle that resonates across both public and private growth trajectories.

At the EU level, this learning-oriented approach has been institutionalized through programs such as Interreg, UIA, and the European Urban Initiative, which formalize cross-regional policy learning, monitoring, and replication. Compared to many global models that emphasize growth scale or centralized leadership, the European approach places greater emphasis on capacity-building, benchmarking, and adaptive governance. Oradea's success illustrates this model in practice: growth was enabled not just through funding but through continuous refinement of administrative practice.

In sum, the literature affirms that strategic readiness is not static it evolves through cycles of action, reflection, and institutionalization. Whether in firms or public agencies, long-term performance depends on the ability to absorb lessons, translate them into routines, and adjust internal systems to support sustainable trajectories. A comparative perspective strengthens this insight, demonstrating that both public and private entities share a common imperative: to turn short-term pressure into long-term capability.

2. Research Methodology

This paper adopts a qualitative, comparative case-study design to investigate readiness conditions and strategic lessons in high-growth contexts. The research draws from two primary sources:

- A private-sector case: an internal business review of a large manufacturing company's engagement with a high-growth client, based on internal debriefs, project documentation and thematic reflections from operational teams and executives. The company requested anonymity due to the commercially sensitive nature of the data.
- A public-sector example: the case of Oradea, Romania—a city that has successfully leveraged EU structural and investment funds to catalyze regional transformation. Data for this case was drawn from public documents, evaluations, municipal strategies, and academic literature (Dodescu and Chirilă, 2012, 2013; Sabău-Popa, 2024).

These two organizational cases, one public, one private, were selected for their active involvement in sustainable development processes and for the contrasting governance and operational environments they represent. Their comparison enables a differentiated exploration of leadership, innovation, and cross-sector collaboration, with particular attention to how each organization approaches strategic readiness in response to high-growth opportunities and organizational challenges.

Both cases were examined using a communication and collaboration lens to assess performance conditions, risk triggers, and institutional responses across three phases: (1) strategic preparation, (2) operational scale-up, and (3) post-peak adaptation. A thematic content analysis approach was used to extract shared lessons, performance gaps, and recovery strategies.

The inclusion of a public–private comparative framework provides broader insight into how different governance systems adapt to growth and transformation pressure while aiming for sustainable outcomes.

3. Results and discussion

Private sector scale-up case: challenges and learnings

In the private-sector case, the analysis of a significant business engagement between a large manufacturing company and a rapidly expanding client. Initially projected as a major driver for organizational growth, the partnership encountered considerable challenges during execution, culminating in a substantial reduction in client demand post-peak production, due to market evolution. Drawing lessons from this experience, we dissect the critical phases of the engagement, pre-engagement, ramp-up and execution and post peak production to identify key factors influencing success and failure in high-growth scenarios. The objective is to inform future strategic approaches for similar opportunities, emphasizing the importance of rigorous preparation and adaptive management.

The engagement's initial phase was marked by critical challenges, including equipment capacity constraints, insufficient production footprint, an aggressive timeline, and limitations with tooling suppliers' capacity. The execution phase required rapid capacity expansion, equipment procurement and integration, process and technology adaptation, addressing design immaturity and quality issues, large-scale recruitment

and training, and managing the impact on existing operations. Despite significant efforts to scale operations, the engagement reached a peak followed by a drastic contraction in demand, leading to a significant revenue impact and customer diversification challenges, organizational restructuring and cost adjustments, impact on local reputation, and surplus capacity and financial implications.

The experience yielded valuable lessons applicable across the project lifecycle, particularly highlighted through a chronological perspective:

Pre-engagement stage:

Success in rapid growth engagements is heavily influenced by the preparatory steps taken before formal commitment. Key lessons identified for this stage include:

- Customer due diligence: Beyond general assessment, a thorough assessment of new customers is necessary, considering their maturity, expectations, and potential challenges.
- Establish realistic timelines: Setting achievable timelines is crucial.
- Early technical alignment: Engaging in Design for Manufacturing early and achieving tech-nical alignment are important technical prerequisites.
- Assess supply chain readiness: Evaluating the preparedness of the supply chain is a necessary step.
- Preparedness: Ensuring the factory is adequately prepared from a resource perspective before undertaking rapid growth is vital.

Ramp-up and Execution stage:

Managing the period of rapid expansion requires a disciplined and adaptable approach:

- Balancing the intense focus on onboarding new business while managing demand pressure re-quires a more disciplined approach and a very disciplined approach.
- Flexibility in Technology and Equipment Selection is important.
- Robust change Management and Communication are essential, particularly given challenges like design changes, equipment delays, process issues, and recruitment issues. Transparent communication with the customer regarding potential impacts on timelines and yields is key.
- Scalable recruitment and onboarding strategies: more sustainable recruitment channels and in-vestment in comprehensive and accelerated onboarding programs is needed.

Post peak production Stage:

Managing the aftermath of peak demand and potential contraction reveals lessons regarding agility and planning:

- Importance of demand visibility and forecasting: The sudden and drastic reduction in demand underscores the critical need for improved demand visibility and more reliable forecasting from customers, especially in rapidly evolving markets.
- Agile organizational structures: The challenges of organizational agility highlighted the need for building more flexible structures and developing contingency plans for significant demand volatility.
- Strategic asset management.

General lessons learned reinforce the need for strategic caution and preparedness:

- Balanced growth: Prioritizing sustainable growth over rapid expansion is key, ensuring re-sources and infrastructure can support new business.
- Realistic projections: Developing realistic revenue projections and avoiding over-optimistic forecasts are crucial.

This case study of a high-growth engagement provides a rich set of lessons for navigating opportunities in dynamic markets. While the engagement ultimately faced a significant downturn due to external factors, the challenges encountered and subsequent adjustments offer invaluable insights for improvement. By implementing more rigorous pre-engagement due diligence, fostering flexibility in processes and technology selection, prioritizing realistic planning and communication and leveraging the strengths of

internal networks, companies can be better positioned to capitalize on future high-growth opportunities while mitigating potential risks. The positive lessons learned, such as effective collaboration and project management capabilities of the team, form a foundation for building a more resilient and adaptive approach to strategic customer engagements.

Public sector model: Oradea's strategic transformation

In contrast to the private case, the municipality of Oradea exemplified structured foresight, strategic planning, and execution over a longer horizon. Between 2007 and 2023, Oradea:

- Absorbed over €425 million in EU funds with high efficiency (Sabău-Popa, 2024).
- Established industrial parks that attracted ~9.500 jobs (Portico, 2023).
- Revitalized its urban core through integrated planning and mobility strategies (Dodescu, 2014).
- Fostered public–private collaboration via transparent procurement, investment promotion, and real-time governance mechanisms.

The municipality's performance reflects the cumulative benefits of multi-level governance (Dodescu and Chirilă, 2012) and sustained institutional alignment, demonstrating how public institutions can catalyze local development while maintaining resilience under pressure.

In contrast to the private sector case, the municipality of Oradea offers a compelling example of public-sector strategic readiness in action. Drawing on both academic literature and analysis of publicly available administrative and financial data, this case illustrates how long-term institutional coherence, strategic planning, and collaborative governance mechanisms can deliver sustained development outcomes under pressure.

Between 2007 and 2023, Oradea implemented a comprehensive transformation agenda aligned with EU regional development goals. According to Sabău-Popa (2024), the municipality absorbed over €425 million in EU funds, positioning itself among the top performers in Romania in terms of both financial execution and project impact. Internal municipal reports and national funding data confirm the efficiency of fund allocation and timely project delivery across infrastructure, mobility, and urban renewal sectors.

Key institutional outcomes include:

- The creation of several industrial parks managed through the Oradea Local Development Agency (ADLO), attracting approximately 9.500 jobs and generating over €425 million in pri-vate investment (Portico, 2023).
- A revitalized historical urban core, supported by integrated urban mobility strategies and sustainable urban planning frameworks (Dodescu, 2014).
- A high-functioning administrative environment that prioritized public–private collaboration, transparent procurement processes, digital tools for service delivery, and evidence-based governance mechanisms.

The case demonstrates the value of multi-level governance (Dodescu and Chirilă, 2012) and long-term institutional capacity-building. It also reflects a high degree of internal coherence—manifested through aligned political vision, professionalized local administration, and sustained stakeholder engagement. These findings, derived from both genre literature and municipal data analysis, validate that public institutions can indeed catalyze regional economic development when they adopt structured foresight, performance monitoring, and adaptive planning mechanisms.

Comparative insights and strategic readiness model

By analyzing both cases, we identified three enablers of readiness:

- Foresight: Conducting scenario-based planning, supply chain assessments, and realistic de-mand forecasts (Weiner, 2009).
- Alignment: Ensuring organizational clarity, shared metrics, and role coherence (Grant, 1996; Robbins and Judge, 2020).
- Real-time coordination: Leveraging communication rituals, agile project teams, and change management routines (Edmondson, 1999; Teece et al., 2016).

These findings confirm that strategic readiness is not a fixed asset but a dynamic condition, built through iterative learning, leadership, and system alignment. Whether in a manufacturing firm or a municipality, organizations that cultivate adaptability, communication infrastructure, and institutional trust are better equipped to manage growth under pressure.

Broader Economic Implications

Although this paper is rooted in two specific cases, one private and one public, the insights drawn have broader relevance for stakeholders navigating high-growth scenarios. High-growth engagements, when poorly managed, pose systemic risks not only to the organizations involved but also to the wider ecosystems they influence, including employees, suppliers, customers, and local communities.

In the private sector, the rapid scale-up and subsequent demand contraction in the manufacturing case had cascading effects: surplus capacity, workforce restructuring, and reputational risks that affected the company's long-term operational stability. These dynamics illustrate that without proper readiness mechanisms such as foresight, flexible planning, and communication infrastructure—growth initiatives can lead to unintended and lasting consequences.

In contrast, the public sector example of Oradea demonstrates the transformative power of strategic investment and collaborative governance. By aligning local leadership, EU funding, and private-sector partnerships, Oradea successfully evolved from a post-industrial city to a regional innovation and logistics hub. The establishment of industrial parks, coupled with integrated mobility and urban revitalization projects, boosted employment, improved quality of life, and increased the city's attractiveness to both domestic and foreign investors. As noted by The Recursive (2022), Oradea is actively turning itself into a startup-friendly environment through digital governance, streamlined permitting, and entrepreneurial incentives a transformation rooted in public-sector strategic agility and cross-sector partnerships.

The comparison reveals that economic transformation is contingent on institutional alignment whether through municipal governance or corporate leadership. Effective growth, especially under sustainability imperatives, requires not just capital investment but also adaptive capacity, stakeholder coordination, and transparency.

Moreover, the public-sector experience offers important policy lessons: investments in physical infrastructure must be matched by investments in institutional capability and multi-level collaboration. This reinforces findings in the literature on strategic public management (Dodescu and Chirilă, 2013; Weiner, 2009), where regional development is shown to benefit from integrated, participatory planning processes and the continuous development of administrative competencies.

Ultimately, both cases highlight that growth without readiness is risky, while strategic readiness enables inclusive, resilient, and sustainable economic outcomes.

Conclusions

This paper examined the concept of strategic readiness through a comparative analysis of two high-growth contexts: a private-sector manufacturing company navigating a complex scale-up engagement, and the public-sector transformation of Oradea, Romania. Despite differences in sector, scale, and governance, both cases underline the importance of three foundational enablers: foresight, alignment, and real-time coordination.

The private-sector case revealed that rapid growth can expose structural weaknesses such as overstretched capacity, weak forecasting, and insufficient internal communication. However, it also demonstrated that institutional learning and agile leadership can support recovery, enabling companies to adapt, re-align, and rebuild operational credibility. Effective leadership remains a cornerstone of organizational readiness. Kotter (2012) outlines an eight-step process for leading change, emphasizing urgency, coalition-building, and vision alignment, elements reflected in both public and private transformation cases. Senge (2006) similarly underscores the importance of learning organizations, where shared vision, mental models, and team learning facilitate institutional adaptability.

The public-sector case of Oradea presented a contrasting yet complementary example. Through strategic EU fund absorption, transparent governance, and integrated urban planning, the city orchestrated a long-term transformation into a regional economic hub. This success was not accidental but the result of proactive leadership, cross-sector collaboration, and systematic investment in infrastructure and administrative capacity. While administrative structure and funding access are important, strategic

execution depends on leadership culture and stakeholder dynamics. Mintzberg (1994) cautions against overly mechanistic planning models, advocating for strategy as a pattern of action informed by intuition, experience, and context a perspective highly relevant in local governance settings like Oradea, where strategic adaptability has been key.

Together, these cases highlight that sustainable growth, whether in a firm or a city, depends not merely on opportunity or funding, but on institutional preparedness. The proposed strategic readiness framework offers a scalable model for organizations and municipalities facing similar pressures. It emphasizes that readiness is not static; it must be continually cultivated through planning, communication, and learning.

Future research may expand on this framework by applying it in other domains such as healthcare, education, or green transition initiatives. Moreover, quantitative analysis of performance metrics pre- and post-engagement could offer further validation and refinement. Ultimately, the findings provide actionable insights for business leaders, policymakers, and planners: growth must be guided by readiness if it is to be resilient, inclusive, and sustainable.

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References

Dodescu, A.O., 2014. Restoration and sustainable valorization of cultural heritage: A case study of Oradea Fortress. *Annals of the University of Oradea: Economic Science*, 2(2), pp.195–203.

Dodescu, A.O. and Chirilă, L.F., 2012. Multi-level governance and strategic planning for regional development policy: The case of Romania in the context of European integration. *Regional Studies Association Conference*, Beijing, China. [online] Available at: < http://www.regionalstudies.org/wp-content/uploads/2018/07/Multi-level_governance_-__Dodescu_Anca_and_Chirila_Lavinia_-_RSA_Beijing_2012.pdf > [Accessed 22 May 2025].

Dodescu, A.O. and Chirilă, L.F., 2013. The impact of Regional Operational Programme on the economic development and regional competitiveness of North-West Region of Romania: Partial findings and emerging challenges. In: I. Lengyel and Z. Vas, eds. *Regional Growth, Development and Competitiveness*. Szeged: University of Szeged, Doctoral School in Economics, pp.77–89.

Edmondson, A., 1999. Psychological Safety and Learning Behavior in Work Teams. *Administrative Science Quarterly*, [online] 44(2), pp.350–383. https://doi.org/10.2307/2666999.

Eisenhardt, K.M. and Martin, J.A., 2000. Dynamic capabilities: what are they? *Strategic Management Journal*, [online] 21(10–11), pp.1105–1121. https://doi.org/10.1002/1097-0266(200010/11)21:10/11<1105::AID-SMJ133>3.0.CO;2-E.

Grant, R.M., 1996. Toward a knowledge-based theory of the firm. *Strategic Management Journal*, [online] 17(S2), pp.109–122. https://doi.org/10.1002/smj.4250171110.

Huber, G.P. (1991) 'Organizational learning: The contributing processes and the literatures', *Organization Science*, 2(1), pp. 88–115.: https://doi.org/10.1287/orsc.2.1.88.

James, M., 2018. Strategic Readiness. In: *The International Encyclopedia of Strategic Communication*, 1st ed. [online] Wiley. pp.1–5. https://doi.org/10.1002/9781119010722.iesc0178.

Kotter, J.P., 2012. *Leading change*. Boston: Harvard Business Review Press.

Mintzberg, H., 1994. *The rise and fall of strategic planning: Reconceiving roles for planning, plans, planners*. New York: Free Press.

Oradea.ro, 2025. Business infrastructure. *Municipality of Oradea*. [online] Available at: < https://oradea.ro/en/for-companies/business-infrastructure/ > [Accessed 22 May 2025].

Plečko, S. and Bradač Hojnik, B., 2024. Sustainable Business Practices and the Role of Digital Technologies: A Cross-Regional Analysis. *Systems*, [online] 12(3), p.97. https://doi.org/10.3390/systems12030097.

Portico, 2023. Attracting private investments – Oradea Metropolitan Area. *Portico Urban Initiative*. [online] Available at: < https://portico.urban-initiative.eu/urban-practices/functional-areas-eu/attracting-private-investments > [Accessed 22 May 2025].

Robbins, S.P. and Judge, T.A., 2020. *Organizational behavior*. 18th ed. Harlow: Pearson Education.

Sabău-Popa, C., 2024. Analysis of the absorption of European structural and investment funds in Romania. *Analele Universității din Oradea, Seria Științe Economice*, 33(2), pp.128–135.

Senge, P.M., 2006. *The fifth discipline: The art and practice of the learning organization*. 2nd ed. New York: Doubleday.

Sirmon, D.G. and Hitt, M.A., 2009. Contingencies within dynamic managerial capabilities: interdependent effects of resource investment and deployment on firm performance. *Strategic Management Journal*, [online] 30(13), pp.1375–1394. https://doi.org/10.1002/smj.791.

Teece, D., Peteraf, M. and Leih, S., 2016. Dynamic Capabilities and Organizational Agility: Risk, Uncertainty, and Strategy in the Innovation Economy. *California Management Review*, [online] 58(4), pp.13–35. https://doi.org/10.1525/cmr.2016.58.4.13.

The Recursive, 2022. How the public sector is turning the city into a startup hub. *The Recursive*. [online] Available at: < https://therecursive.com/oradea-public-sector-involvement-turning-the-city-into-a-startup-hub/ > [Accessed 22 May 2025].

Van der Heijden, K., 2005. *Scenarios: The art of strategic conversation*. 2nd ed. Chichester: John Wiley & Sons.

Visnjic, I., Monteiro, F. and Tushman, M.L., 2025. Sustainability as a business-model transformation. *Harvard Business Review*, May–June. [online] Available at: < https://hbr.org/2025/05/sustainability-as-a-business-model-transformation > [Accessed 22 May 2025].

Weiner, B.J., 2009. A theory of organizational readiness for change. *Implementation Science*, [online] 4(1), p.67. https://doi.org/10.1186/1748-5908-4-67.

New values, attitudes and consumer behaviors. New approaches to creating a culture of quality

Food Consumption Patterns in the Post-COVID-19 Landscape: Urban and Rural Contrasts

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Abstract

The purpose of the study is to highlight the differences in grocery shopping practices between rural and urban areas prior to and following the recent COVID-19 epidemic and the New Normal. The study is based on an empirical methodology that was applied to Romanian customers using a questionnaire. The Mann-Whitney U test, chosen for its ability to compare two independent groups without assuming normality of data distribution. This approach was essential for highlighting the subtle differences between the two groups analyzed, both in the context of the COVID-19 pandemic and during the New Normality period, providing robust and relevant conclusions for the research field. Although respondents' earnings in urban and rural areas differ significantly, the volume of online orders from the two environments does not exhibit a similar trend. Unlike their urban counterparts, rural consumers were able to deal with the stress and issues of the COVID-19 pandemic, have a proactive and optimistic perspective to life, and figure out the best ways to handle difficult food procurement conditions. Regarding the frequency and process of online purchasing, including for groceries, both consumer groups exhibit comparable preferences under the New Normal. The study provides a valuable perspective on the consumption patterns of Romanians in urban and rural areas during the preceding pandemic and the New Normal, with a focus on their grocery shopping decisions. The study looked at how the two consumer groups managed the stress, difficulties, and buying process during the pandemic, as well as how these behaviours and preferences changed in the post-COVID era. To keep clients interested, managers can promote their online shopping platforms in both living spaces, encourage shopping as a social activity, and develop loyalty programs and special offers.

Keywords

COVID-19 pandemic, New Normal, urban, rural, Mann-Whitney U test, foodstuff, consumer behaviour.

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Introduction

Global consumer behaviour has changed dramatically because of the COVID-19 pandemic, especially regarding supermarket shopping. Supply chain disruptions, social distancing policies, and lockdowns compelled consumers to modify their buying habits, which resulted in changes in product selection, preferred channels (online vs. offline), and frequency of shopping. Numerous causes, such as mobility limitations, financial instability, and health concerns, had an impact on these adjustments (Sheth, 2020; Lu, Wand and Li, 2021). As regulations loosened and society shifted into the New Normal, it is unclear if consumers' pre-pandemic habits have returned or if these pandemic-induced habits have endured.

Although several studies have examined the grocery shopping habits during the pandemic (such as shifts in the use of online shopping and panic buying tendencies), little is known about how these habits have changed since then, especially when comparing urban and rural consumers. Without directly comparing these two periods in diverse geographic areas, most research (Headey et al., 2022) has emphasized pandemic consumer behaviours or broad post-pandemic consumption trends.

Therefore, the aim of this research is to stress out how much food shopping behaviours have modified between the pandemic and the New Normal, and to what extent do these changes vary for consumers in urban and rural areas? This research offers a complex picture of long-term consumer adaptation by looking at both behavioural changes and the endurance of pandemic-induced habits.

To address this research question, a quantitative approach using survey data was employed. Both urban and rural respondents are from Romania, an emerging market. This makes it possible to thoroughly examine important behavioural trends, inclinations, and determining aspects across various geographical locations. Income, shopping frequency, preferred channels of purchasing, spending habits, and perceptions regarding food shopping will all be compared between the two periods, COVID-19 pandemic, respectively post-pandemic.

By providing a longitudinal viewpoint on consumer behaviours, this research bridges the gap between pandemic-era studies and post-pandemic analysis, extending previous literature. For retailers, lawmakers, and marketers, the urban-rural comparison offers insightful information on how various customer categories have adjusted. The research examines the long-term implications of these alterations in a comparative context, in contrast to earlier studies that concentrate on the immediate pandemic effects.

This paper's following sections are organized as follows: The pertinent research on grocery shopping habits before and after the pandemic is reviewed in Section 1. The research methodology is presented in Section 2, which also includes protocols for data collecting and analysis. The findings are presented in Section 3, where consumer behaviour in urban and rural areas is compared over the two time periods. Section 4 ends with important conclusions, implications, and recommendations for further research.

1. Review of the scientific literature

Ennui, which is characterized by a high calorie intake by ingesting significant amounts of proteins, fats, and carbohydrates, was brought on by the disruption of daily routines caused by the COVID-19 pandemic (Brüggemann and Olbrich, 2022). Furthermore, consumers who were under quarantine experienced stress and were more likely to turn to sweet foods to improve their well-being, as such foodstuff acts as self-medicating substances by promoting the release of serotonin. Such unhealthy eating patterns might lead to obesity, which is connected to COVID-19's severe side effects and chronic inflammations (Muscogiuri et al., 2020; Valaskova et al., 2021).

The COVID-19 pandemic generated customers stock-piling behaviours, generating supply chain disruptions (Sheth, 2020; Lu, Wang and Li, 2021). Meanwhile, brick-and-mortar stores were confronted with various restrictions, as they had to change their opening hours, close earlier, limit the number of clients etc. Furthermore, only stores providing foodstuff and primary aid remained open (Brüggemann and Olbrich, 2022).

To overcome these challenges, food and non-food stores switched from physical customer service to online fulfilment (Lu, Wand and Li, 2021; Brüggemann and Olbrich, 2022; Nguyen Thi et al., 2022; Akar, 2024). Online shopping platforms played a crucial role in meeting consumers' behaviours and expectations during this period, supporting their daily needs (Kumar, Landge and Jaiswal, 2023). They adapted rapidly to the one-click shopping (Akar, 2024) and the shift from visiting physical stores to online ordering (Nguyen Thi et al., 2022).

Strategies implemented by retailers throughout the pandemic turned out to be useful in New Normal. Online shopping increased in popularity and widespread during COVID-19 pandemic, exhibiting a long-term effect on consumers' lifestyle, behavior and preferences. Individuals' tendency to choose online food retail and home delivery services grew constantly (Gupta and Mukherjee, 2022), developing in one of the most preferred ways of shopping (Akar, 2024; Conlin et al., 2024).

Online fresh food retail embraced a quick expansion recently and the range of categories and products became more and more generous (Lu, Wang and Li, 2021). Forecasts indicate a continuous increase in online grocery shopping in the coming years. Customers changed their acquisition habits from brick-and-

mortar stores to one-click ordering and home delivery (Dabija et al., 2024). Nevertheless, after the pandemic restrictions were lifted, some consumers returned to procuring groceries from physical stores. Numerous consumers still use both shopping channels (Brüggemann and Olbrich, 2022).

The positive online purchasing experience encountered by consumers during the later pandemic, fostered by smooth acquisitions, ease of payment, convenience etc. (Dabija et al., 2024) increased their familiarity with and habit of online shopping, being kept in the New Normal. Previous research (Kumar, Landge and Jaiswal, 2023) indicates that if the interruption is temporary and the substitute option (chosen during the disruptive period) is not appealing and appropriate, consumers will revert to their previous behaviours as the disturbance subsides. Online shopping has become more common for both food and non-food retail than it was before to the pandemic (Kumar, Landge and Jaiswal, 2023). Consumers' residence (urban, suburban, or rural) has been shown to influence the propensity for preferring online shopping (Unnikrishnan and Figliozzi, 2021). Online shopping appears to be unevenly distributed among affluent and impoverished individuals, having an urban or rural residence, who may otherwise be deprived of access to online payment methods (Shahzad et al., 2022). There is a prevailing sentiment among consumers that their consumption patterns may undergo lasting transformations because of recent crisis and disruptions (Kumar and Abdin, 2021).

2. Research methodology

A quantitative poll using an online questionnaire was conducted in 2023 to ascertain how Romanian urban and rural consumers behaved when it came to food purchases during the COVID-19 pandemic and the New Normal. Romania was chosen as a research context, as the country was severely hit by the initial waves of the COVID-19 pandemic, causing severe disruptions in supply chains and largely affecting both rural and urban consumers (Dascalu, 2020; Vinerean et al., 2022). Consumers highlighted a hoarding behavior when shopping (Lu, Wang and Li, 2021) and stockpiling (Sheth, 2020), which lead to stock-outs and difficulties on various food categories. Subsequently, consumers adapted to the new context, a trend towards online shopping being delimited (Brüggemann and Olbrich, 2022).

The research is based on convenience sampling, as the aim was to attract as many respondents as possible. This approach is frequently used in exploratory studies or in situations where access to a probability sample is limited. The questionnaire was distributed via social media platforms, but also to acquaintances and peers who could be approached in public spaces. Out of more than 1200 consumers approached, only 986 questionnaires could be retained for analysis because they were complete, respondents answering all questions. Of the questionnaires retained for analysis, 728 (73.83%) came from urban areas and 258 from rural areas (26.16%). 724 respondents (73.42%) are Millennials, and the rest belong to Generation Z. All items in the questionnaire were formulated on a 5-step Likert-type scale from strongly disagree (1) to strongly agree (5). Respondents participated voluntarily in the research and had to indicate various relevant socio-demographic characteristics. Following data collection, a number of statistical tests were performed on the data to confirm internal consistency, validity, and reliability (Culic, 2004; Brown, 2006). The values obtained from these analyses confirmed that the items in the questionnaire accurately measured the intended meaning, for example Cronbach Alpha coefficient values were above 0.765. The result of the Shapiro-Wilk (Shapiro and Wilk, 1965) test indicated a p-value of 0.03, suggesting that the data distribution significantly deviated from normality. Therefore, the non-parametric Mann-Whitney U test was considered appropriate for analyzing differences between groups.

The non-parametric statistical Mann-Whitney U test has been employed to examine differences in income and buying habits between two independent groups (rural versus urban consumers) and for the two situations (during the pandemic versus post-pandemic) when the data may not be normally distributed (Emerson, 2023). The test aids in identifying whether there are notable variations between the groups considered in important factors including frequency of purchase, spending habits, and preferred shopping channels. To determine whether the distributions differ significantly, the Mann-Whitney U test ranks data from both groups together, adds up the rankings for each group, and then computes the analysis. The null hypothesis states that there is no difference at all between the variable distributions of the two groups, while the alternative hypothesis suggests a significant difference (Oti, Olusola and Esemokumo, 2021). The Mann-Whitney U test offers a reliable way to evaluate differences without assuming equal variances or normality, which is appropriate given the nature of data, measuring behavioural inclinations rather than regularly distributed continuous variables.

3. Results and discussion

The research was extended by exploring the influence of the consumers' residence on the subjects' purchasing behaviour during the pandemic versus in the New Normal. By applying the Mann-Whitney U statistic test on the collected data, it was found that there were statistically significant differences in income, but not in the number of orders placed during and after the pandemic, according to respondents' residence. This suggests that their home background may have an influence on the income level, but not necessarily on purchasing behaviour in terms of placed orders. Significant differences were observed in some cases for the order value of online shopping during the pandemic versus the New Normal.

Table no. 1. Mann-Whitney U Results for income in urban areas (808 observations) versus rural areas (258 observations)

	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max	Mann-Whitney U	
				Lower Bound	Upper Bound			U	p-value
Urban	3,888.03	9,775.498	343.901	3,212.98	4,563.08	0	140,0	96309	0.004
Rural	4,417.85	16,232.232	1,010.575	2,427.79	6,407.91	0	200,0		

Table no. 1 contains the results of the analysis of the differences by residence (urban or rural) in terms of income. The mean income for urban respondents is EUR 781.27, while for rural ones it is EUR 887.73. This seemingly contradictory situation can be explained by the fact that within rural areas, the localities bordering large cities were also considered, where more affluent consumers who can afford a house or own one or more cars needed to commute to and from work have moved. The standard deviation is higher for rural consumers, indicating a higher variation in income. The Mann-Whitney U statistic test indicates a significant difference in income between the two residence means, with a p-value of 0.0046. The research continued with the analysis of resilience to acquisition during the pandemic, according to residence, the results of the analysis are shown in Table no. 2. By applying the Mann-Whitney U test, lower scores are observed in rural areas towards urban ones.

Table no. 2. Mann-Whitney U Results for urban versus rural during the pandemic

During the pandemic, I...		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Mann-Whitney U	
						Lower Bound	Upper Bound	U	p-value
...was able to face all the challenges	Urban	810	3.77	0.998	0.035	3.80	3.94	97472	0.038
	Rural	258	3.96	1.072	0.067	3.83	4.09		
...coped well with the stress	Urban	810	3.85	1.080	0.038	3.77	3.92	96055	0.041
	Rural	258	3.98	1.093	0.068	3.85	4.11		
...looked on the bright side	Urban	810	3.65	1.158	0.041	3.57	3.73	96222	0.047
	Rural	258	3.81	1.157	0.072	3.66	3.95		
...turned to family for the purchase of food necessary for daily living.	Urban	810	2.18	1.344	0.047	2.19	2.37	97081	0.037
	Rural	258	2.44	1.352	0.084	2.27	2.60		

Further one, the analysis tested the hypothesis of purchasing behaviour in New Normal. Based on the Mann-Whitney U test it was found that there were no different buying behaviours between urban versus rural consumers. In other words, home environment does not influence the buying behaviour in the New Normal.

From the results presented in Table no. 2, the analysis of purchasing behaviour during the COVID-19 pandemic, according to the home environment (urban or rural), there are some significant aspects. First, there is an increased propensity towards managing challenges and coping with stress: consumers in rural areas scored higher in managing challenges and coping with stress compared to those in urban areas. This

may suggest a greater ability of rural consumers to adapt to difficult situations and cope with stress. Managers could turn their attention to strategies that value these specific abilities of rural consumers (Zenic et al., 2020).

Table no. 3. Mann-Whitney U Results for urban versus rural during the New Normal

In the New Normal, I...		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Mann-Whitney U	
						Lower Bound	Upper Bound	U	p-value
…continued to shop online	Urban	810	3.01	1.362	0.048	2.92	3.11		
	Rural	258	2.94	1.378	0.086	2.77	3.11	101390	0.4628
...prefer physical shops	Urban	810	2.68	1.265	0.044	2.59	2.77		
	Rural	258	2.73	1.274	0.079	2.57	2.88	102118.5	0.572
...buy more frequently online	Urban	810	2.53	1.243	0.044	2.45	2.62		
	Rural	258	2.62	1.298	0.081	2.46	2.78	101290	0.446
...buy from online stores.	Urban	810	2.37	1.237	0.043	2.28	2.45		
	Rural	258	2.46	1.291	0.080	2.30	2.62	100728	0.367
...buy more food from online stores.	Urban	810	2.22	1.188	0.042	2.14	2.30		
	Rural	258	2.23	1.225	0.076	2.08	2.38	104373	0.977
...recommend shopping in online stores.	Urban	810	2.86	1.233	0.043	2.77	2.94		
	Rural	258	2.91	1.268	0.079	2.76	3.07	102465	0.629
...highlight to my friends the advantages of shopping in online stores.	Urban	810	2.70	1.245	0.044	2.62	2.79		
	Rural	258	2.76	1.286	0.080	2.60	2.92	102351.5	0.611
...buy online from the same retailers I purchased groceries during the pandemic.	Urban	810	2.71	1.271	0.045	2.62	2.80		
	Rural	258	2.68	1.312	0.082	2.52	2.84	102643.5	0.661
....buy most of my groceries online.	Urban	810	2.10	1.181	0.041	2.02	2.19		
	Rural	258	2.15	1.213	0.076	2.00	2.30	102646.5	0.653
....have increased my online purchases.	Urban	810	2.48	1.258	0.044	2.40	2.57		
	Rural	258	2.57	1.265	0.079	2.41	2.72	100681	0.363
...have returned to our pre-pandemic food shopping habits.	Urban	810	3.43	1.272	0.045	3.34	3.52		
	Rural	258	3.34	1.296	0.081	3.18	3.50	100592.5	0.353
...maintained my food shopping habits during the pandemic.	Urban	810	2.79	1.256	0.044	2.70	2.87		
	Rural	258	2.80	1.264	0.079	2.65	2.96	103619	0.836
...went back to shopping for groceries in physical stores.	Urban	810	3.88	1.189	0.042	3.80	3.97		
	Rural	258	3.75	1.279	0.080	3.59	3.90	99050	0.185

Rural consumers manage to positively and proactively approach coping positively and proactively during the COVID-19 pandemic, thus showing increased resilience to this disruption of daily activity and living. They also scored higher in positive thinking about living during the pandemic, basically they were more likely to find positives and opportunities in a difficult context. Managers could explore how this positive attitude can be reflected in marketing and communication strategies to boost consumer engagement and loyalty to marketed products and/or brands (Headey et al., 2022).

Rural consumers scored higher in their ability to identify the best solutions to difficult food procurement situations during the COVID-19 pandemic. This strategy may suggest an increased ability to solve challenges among rural consumers. Managers could take this into consideration when developing products and/or services, ensuring that they meet the specific needs and requirements of this segment of the population (Di Gennaro et al., 2020). Rural consumers also scored higher in online food shopping compared to their urban counterparts during the COVID-19 pandemic. This may suggest a more pronounced trend towards online purchasing in rural areas. Managers could explore the development and

promotion of online platforms tailored to the needs of rural consumers, thereby encouraging increased online shopping among them (Headey et al., 2022).

Rural consumers scored higher in food purchases based on the advice from family/relatives during the pandemic. This may indicate a close connection in the rural community and trust in the advice and preferences of family members. Managers can explore how to promote the shopping experience as a socializing or cooperative activity within the community, word-of-mouth could be a factor/vector to quickly and easily amplify brand and/or product purchase in this environment (Firoz and Talwar, 2021). The New Normal (see table 3) shows no significant differences between urban versus rural consumer behaviours in terms of how online shopping is conducted compared to the pandemic. This indicates that both urban and rural consumers are still interested in purchasing products online. Managers can maintain their efforts to promote and sustain their online shopping platforms in both environments (Kumar, Landge and Jaiswal, 2023; Akar, 2024).

In terms of preference for online shops, in the New Normal (see table 3) there are no significant differences in this respect between urban versus rural consumers. This indicates that urban and rural consumers have similar inclinations towards online shopping. Managers can continue to develop and improve online shopping experiences to attract and maintain this preference (Kumar, Landge and Jaiswal, 2023; Akar, 2024; Dabija et al., 2024). It is also found that there are no significant differences in the frequency of online shopping in urban versus rural areas. Basically, both consumer groups can become loyal towards grocery chains and increase online purchases. Managers can develop loyalty programs and customized offers to keep customers engaged and induce them to intensify their shopping quantities (Kumar and Abdin, 2021; Unnikrishnan and Figliozzi, 2021; Shahzad et al., 2022).

There are no significant differences in the trend towards online shopping in click-and-order versus brick-and-mortar stores between the two consumer groups. This result suggests that regardless of their residence, consumers may choose online shopping to fulfil their needs. Managers can promote the benefits and especially the convenience of online shopping to encourage this trend and to support the acquisition of their preferred brands and/or products (Dabija et al., 2024). Managers can explore ways to bring the quality, variety, and safety of food purchased online to the forefront (Lu, Wang and Li, 2021).

In the New Normal, no significant differences in recommending online store shopping to peers are observed between urban and rural consumers. This result suggests that both types of consumers can become promoters of online shopping. Managers can encourage this approach through referral programs and special offers for customers who bring other new customers (Sheth, 2020). In the New Normal, no significant differences in the return to pre-pandemic food purchasing habits between urban and rural consumers were observed. This result suggests that consumers in both settings have reverted to their pre-pandemic behaviors and their preference for the different stores, brands, and/or food they were buying before the pandemic (Brüggemann and Olbrich, 2022).

Conclusions

From a theoretical perspective, the results indicate a continuity of online shopping behaviour in urban and rural areas, as well as some uniformity in shopping preferences and tendencies between these two home environments. These findings can provide useful insights into developing marketing strategies tailored to the needs and preferences of consumers in different socio-economical contexts. An important result is that there are no significant differences between urban and rural consumers in terms of continuity and preference for online shopping. This suggests that both groups of consumers are equally open and interested in conducting their purchases through online platforms, regardless of their residence.

From a managerial perspective, it has been found that there are no significant differences in the propensity to revert to pre-pandemic buying habits. This means that food retailers marketing strategies developed to attract consumers online have been successful in retaining them in the long term and in preventing significant abandonment of online shopping in New Normal. The results underline the need to continue to invest in developing and improving consumers' online shopping experiences, irrespective of their residence. Managers can continue to develop strategies to maintain and increase online customer engagement, improve the user experience and offer personalized services that meet the needs and preferences of different consumer segments, both urban and rural. Significant differences between urban and rural consumers exist in managing challenges, dealing with stress, looking positively at things and finding the best solutions to situations where rural consumers seem to score higher. Online food shopping is less pronounced in urban areas compared to rural ones. These findings may provide relevant insights

for adjusting their marketing strategies, communications and product/service offerings to better align with the needs and preferences of consumers in different residences.

Although the studies provide useful insights into online shopping behavior, there are several limitations that need to be considered. First, the convenience sampling used in data collection may introduce a self-selection bias, which limits the representativeness of the results for the entire consumer population in Romania. Second, the uneven distribution of respondents between urban and rural areas may influence the generalizability of the results. Also, the exclusive use of an online questionnaire restricted the participation of people with internet access, thus excluding other categories of consumers. Another limitation is that the analysis focused on comparing two distinct groups (urban/rural) and did not explore in depth the dynamics of other demographic factors, such as age, income or education level, which can significantly influence purchasing behavior. In addition, consumer behavior was analyzed at a specific point in time, without assessing in detail changes over time or the effects of other crises, such as the energy crisis or armed conflicts.

Future studies could analyze consumer behavior in three distinct phases: the pre-pandemic period, the pandemic period, and the New Normal, to identify long-term changes in consumption habits. It would also be useful to compare the New Normal with the pre-pandemic period, both considered “normal” but with differences generated by the COVID-19 pandemic. In addition, it would be relevant to investigate the impact of other macroeconomic or geopolitical factors, such as the energy crisis or armed conflicts, on purchasing behavior. Finally, research could include cross-cultural and geographical comparisons to better understand the diversity of purchasing behavior and propose marketing strategies adapted to local contexts. The use of mixed methods, combining quantitative and qualitative analyses, could provide a deeper understanding of consumer motivations and preferences.

Future studies could consider analysing consumers switch behaviour before, during the pandemic versus in the New Normal, thus comparing three stages. One could also compare the New Normal with the pre-pandemic situation, both periods being free of pandemic restrictions and considered as 'normal', but considering the differences produced by the pandemic. Future studies should also consider the impact of other crises on consumption behaviour and food purchases, such as the energy crisis or the armed conflict between Russia and Ukraine or in other parts of the world, as well as by comparing cultures or geographical areas.

References

Akar, E., 2024. Digital consumerism in times of crisis: exploring the shift in online shopping behaviour. *British Food Journal*, 126(9), pp.3441–3462. https://doi.org/10.1108/bfj-01-2024-0021.

Braun, V. and Clarke, V., 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), pp.77–101.

Brüggemann, P. and Olbrich, R., 2022. The impact of COVID-19 pandemic restrictions on offline and online grocery shopping: New Normal or old habits? *Electronic Commerce Research*, 23, pp.2051–2072. https://doi.org/10.1007/s10660-022-09658-1.

Conlin, M., Harris-Lagoudakis, K., Haughey, C., Jung, S.Y. and Wich, H., 2024. The New Normal: Grocery shopping behavior changes before and after the COVID-19 vaccine. *Applied Economic Perspectives and Policy*, 46(3), pp.1241–1264. https://doi.org/10.1002/aepp.13429.

Culic, I. 2004. *Metode avansate în cercetarea socială. Analiza multivariată de interdependență*. Iași: Polirom.

Dabija, D.C., Câmpian, V., Philipp, B. and Grant, D., 2024. Did consumers retail purchasing expectations and behaviour switch due to the COVID-19 pandemic? *Journal of Marketing Analytics.* https://doi.org/10.1057/s41270-024-00344-9.

Dascalu, S., 2020. The Successes and Failures of the Initial COVID-19 Pandemic Response in Romania. *Frontiers in Public Health*, 8, 344. https://doi.org/10.3389/fpubh.2020.00344.

Di Gennaro, F., Pizzol, D., Marotta, C., Antunes, M., Racalbuto, V., Veronese, N. and Smith, L., 2020. Coronavirus Diseases (COVID-19) Current Status and Future Perspectives: A Narrative Review. *International Journal of Environmental Research and Public Health*, 17(8), 2690. https://doi.org/10.3390/ijerph17082690.

Emerson, R.W., 2023. Mann-Whitney U test and t-test. *Journal of Visual Impairment & Blindness*, 117(1), pp.99–100. https://doi.org/10.1177/0145482x221150592.

Firoz, A. and Talwar, P., 2022. COVID-19 and retinal degenerative diseases: Promising link "Kaempferol." *Current Opinion in Pharmacology*, 64, 102231. https://doi.org/10.1016/j.coph.2022.102231.

Gupta, A.S. and Mukherjee, J., 2022. Long-term changes in consumers' shopping behavior post-pandemic: an exploratory study. *International Journal of Retail & Distribution Management*, 50(12), pp.1518–1534. https://doi.org/10.1108/ijrdm-04-2022-0111.

Headey, D., Goudet, S., Isabel, L., Maffioli, E.M., Oo, T.Z. and Russell, T. 2022. Poverty and food insecurity during COVID-19: Phone-survey evidence from rural and urban Myanmar in 2020. *Global Food Security*, 100626. https://doi.org/10.1016/j.gfs.2022.100626.

Kumar, A., Landge, V. and Jaiswal, S., 2023. Changes in online and in-store shopping behaviour pre- and post-COVID-19: a case study from Indian city Nagpur. *Transportation Planning and Technology*, 46(6), pp.710–728. https://doi.org/10.1080/03081060.2023.2227178.

Kumar, R. and Abdin, Md.S., 2021. Impact of epidemics and pandemics on consumption pattern: evidence from Covid-19 pandemic in rural-urban India. *Asian Journal of Economics and Banking*, 5(1), pp.2–14. https://doi.org/10.1108/ajeb-12-2020-0109.

Lu, M., Wang, R. and Li, P., 2021. Comparative analysis of online fresh food shopping behavior during normal and COVID-19 crisis periods. *British Food Journal*, 124(3), pp.968–986. https://doi.org/10.1108/bfj-09-2020-0849.

Muscogiuri, G., Barrea, L., Savastano, S. and Colao, A. 2020. Nutritional recommendations for COVID-19 quarantine. *European Journal of Clinical Nutrition*, 74, pp.1–2. https://doi.org/10.1038/s41430-020-0635-2.

Nguyen Thi, B., Tran, T.L.A., Tran, T.T.H., Le, T.T., Tran, P.N.H. and Nguyen, M.H., 2022. Factors influencing continuance intention of online shopping of generation Y and Z during the New Normal in Vietnam. *Cogent Business & Management*, 9(1), 2143016. https://doi.org/10.1080/23311975.2022.2143016.

Oti, E., Olusola, M. and Esemokumo, P., 2021. Statistical Analysis of the Median Test and the Mann-Whitney U Test. *International Journal of Advanced Academic Research*, 7(9), pp.2488–9849.

Shapiro, S.S. and Wilk, M.B., 1965. An Analysis of Variance Test for Normality (Complete Samples). *Biometrika*, 52, pp.591–611. https://doi.org/10.1093/biomet/52.3-4.591.

Shahzad, M.A., Razzaq, A., Qing, P., Rizwan, M. and Faisal, M., 2022. Food availability and shopping channels during the disasters: Has the COVID-19 pandemic changed peoples' online food purchasing behavior? *International Journal of Disaster Risk Reduction*, 83, 103443. https://doi.org/10.1016/j.ijdrr.2022.103443.

Sheth, J., 2020. Impact of Covid-19 on Consumer Behavior: Will the Old Habits Return or Die? *Journal of Business Research*, 117(1), pp.280–283. https://doi.org/10.1016/j.jbusres.2020.05.059.

Unnikrishnan, A. and Figliozzi, M., 2021. Exploratory analysis of factors affecting levels of home deliveries before, during, and post- COVID-19. *Transportation Research Interdisciplinary Perspectives*, 10, 100402. https://doi.org/10.1016/j.trip.2021.100402.

Valaskova, K., Durana, P. and Adamko, P., 2021. Changes in Consumers' Purchase Patterns as a Consequence of the COVID-19 Pandemic. *Mathematics*, 9(15), 1788.

Vinerean, S., Budac, C., Baltador, L.A., Dabija, D.C., 2022. Assessing the Effect of COVID-19 Pandemic on M-Commerce Adoption: An Adapted UTAUT2 Approach. *Electronics*, 11(8), 1269. https://doi.org/10.3390/electronics11081269.

Zenic, N., Taiar, R., Gilic, B., Blazevic, M., Maric, D., Pojskic, H. and Sekulic, D., 2020. Levels and Changes of Physical Activity in Adolescents during the COVID-19 Pandemic: Contextualizing Urban vs. Rural Living Environment. *Applied Sciences*, 10(11), 3997. https://doi.org/10.3390/app10113997.

Consumers Perceptions and Attitudes toward Sustainable Consumption: Insights from Romania

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Abstract

This study aims to explore the perceptions and attitudes of Romanian consumers aged 25 to 34 from urban areas toward sustainable consumption, identifying the benefits that foster positive attitudes and the barriers that contribute to negative attitudes. Within this scope, a qualitative approach was employed, involving 20 in-depth interviews with business administration graduates residing in urban areas. Thematic analysis using QDA Miner software and word cloud visualization was used to identify key themes and sub-themes from the answers provided by interviewees, focusing on the benefits and barriers to sustainable consumption. Benefits included environmental (e.g., reduced carbon footprints), social (e.g., community awareness), economic (e.g., support for local businesses), and personal (e.g., improved quality of life) benefits, with personal fulfillment and health as key motivators. However, barriers were more prevalent, encompassing economic constraints (e.g., limited income, high price sensitivity), inadequate waste management infrastructure, limited knowledge and awareness (e.g., low environmental education, unclear eco-labels), cultural and social factors (e.g., traditional norms), and personal factors (e.g., skepticism, time constraints). These barriers significantly hinder the adoption of sustainable practices despite positive attitudes. This study contributes to the literature by providing a qualitative perspective on sustainable consumption in Romania, a relatively underexplored context, by offering insights into the interplay of benefits and barriers among Romanian consumers aged 25 to 34 from urban environments. The findings underline the need for policy interventions, such as improved recycling infrastructure and educational campaigns, to bridge the gap between awareness and action and promote sustainable consumption practices among Romanian consumers.

Keywords

Sustainable consumption, perceptions, attitudes, benefits, barriers, Romanian consumers

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Introduction

Since its emergence, the sustainable consumption concept has evolved in several directions and has become an important global issue, especially in recent decades. Sustainable consumption can be defined as consumption designed to satisfy basic needs while simultaneously minimizing the utilization of natural resources, reducing waste, and eliminating the use of materials that are harmful to the environment (Vergura et al., 2023). Additionally, sustainable consumption is conceptualized as the act of reducing the consumption of products and services in a manner that takes into account the needs of subsequent generations (Montreuil Carmona et al., 2024).

From a consumer's standpoint, sustainable consumption signifies the choices and actions made by individuals to meet their immediate necessities while minimizing negative environmental, societal, and economic impacts (Vergura et al., 2023), especially in the age of globalization (Toma, 2005). Related to sustainability and social responsibility (Toma, 2006; Toma, 2008), this behavior aims to preserve resources and enhance well-being for future generations and includes practices such as reducing waste through thoughtful consumption and opting for eco-friendly products made from sustainable materials (Hammad et al., 2019). Despite numerous studies examining the views of Romanian consumers aged 25 to 34 regarding sustainable consumption and practices, the majority of these investigations are predominantly quantitative (Tomșa et al., 2021; Gherheș and Fărcașiu, 2021). Consequently, there exists a significant need for qualitative research, which provides in-depth and comprehensive insights into complex phenomena by capturing the perspectives and motivations as they facilitate the exploration of subjective experiences, identify emerging themes, and enhance the understanding of the social, cultural, and behavioral dynamics associated with sustainable consumption. To address this identified gap, the authors conducted 20 in-depth interviews and utilized QDA Miner software for data analysis.

A variety of factors shape consumers' choices, especially when it comes to sustainability. For instance, economic aspects, such as income and product pricing, can significantly influence consumers purchasing decisions (Gherheș and Fărcașiu, 2021). When financial resources are limited, individuals often prioritize more affordable options, frequently at the expense of eco-friendly alternatives. Social influences are equally important in consumers' decision-making processes, encompassing peer pressure and cultural norms (Thanki et al., 2022). In the digital age, platforms such as social media amplify trends related to sustainability, fostering a heightened awareness and encouraging community support for eco-conscious practices (Diaconeasa et al., 2022). Personal factors also play a significant role, as individual values and levels of environmental awareness guide preferences toward sustainable options (Tomșa et al., 2021). Psychological factors introduce another layer of complexity; perceptions and motivations often lead to a healthy skepticism of greenwashing. More consumers are questioning the legitimacy of vague or misleading eco-claims, demanding transparency and accountability from brands that present themselves as sustainable (Santos, Coelho and Marques, 2024). Technological advancements, particularly the rise of e-commerce, have made it easier for consumers to discover and purchase sustainable products (Montreuil Carmona et al., 2024). Finally, demographic factors, especially age, significantly shape preferences. Millennials and Generation Z tend to demonstrate a greater awareness of environmental issues and a stronger commitment to sustainability compared to older generations (Casalegno, Candelo and Santoro, 2022). This generational shift reflects a broader societal movement toward increased environmental responsibility and an enhanced demand for sustainable living practices.

Building upon the theoretical framework previously established, the authors conducted a comprehensive literature review that examined the following aspects related to sustainable consumption: the meaning of the concept, its theoretical implications, and the factors that may influence consumers' adoption of sustainable consumption habits. Consequently, the authors developed the following research questions: (**Q1**) What are the benefits of sustainable consumption that may cultivate positive attitudes among consumers?; (**Q2**) What barriers to sustainable consumption may contribute to negative attitudes among consumers? This study attempts to address this research gap by proposing a new research framework for future investigation. The objective is to identify and analyze the perceptions and attitudes of Romanian consumers aged 25 to 34, who have graduated from business administration programs and live in urban areas, regarding sustainable consumption.

The findings suggest that, while the informants generally exhibited a favorable attitude toward sustainable consumption and demonstrated awareness of its benefits, they identified more barriers than advantages concerning sustainable consumption. Therefore, although Romanian consumers aged 25 to 34 in urban areas are receptive to environmentally responsible practices, the challenges and contextual constraints they encounter significantly reduce their propensity to engage in sustainable consumption. The purchase of sustainable goods is often impeded by consumers' perception of these products as expensive. This paper is structured as follows: the second section presents a review of the existing scientific literature, the third section details the materials and methods employed in the data collection and analysis process, the fourth section addresses the results and their interpretation, and the fifth section reveals the conclusions of the paper.

1. Review of the scientific literature

1.1. From sustainability to sustainable consumption

The origins of the concept of sustainability can be traced back to the 19th century when it was first used in Germany (Montreuil Carmona et al., 2024). Subsequent to this, the concept of sustainability underwent expansion in the United States of America (USA) with the seminal contribution of Gifford Pinchot, a pioneer of the American conservation movement (Ayar and Gürbüz, 2021). As initially theorized in relation to natural resources and agriculture, the concept has since been expanded to encompass a broader range of techniques that facilitate the consumption and sustainable management of resources. Moreover, numerous business organizations all over the world have designed and implemented not only new corporate and/or business strategies (Toma and Grădinaru, 2016), but also innovative sustainable business models (Toma and Tohănean, 2019) in order to become socially responsible companies (Toma, 2013; Marinescu and Toma, 2015).

At the United Nations Conference on the Human Environment held in Stockholm in 1972, sustainability was defined as a comprehensive approach that seeks to fulfill the needs of current and future generations (Haider, Shannon, and Moschis, 2022). Sustainable development is predicative on the understanding that present decisions have long-term repercussions, thereby emphasizing the necessity of achieving equilibrium between economic and social advancement and environmental conservation (Vergura et al., 2023). The Brundtland Commission of the United Nations defines sustainability as development that addresses the needs of the present without jeopardizing the capacity of future generations to address their own needs (Kostadinova, 2016). These increasing environmental concerns led to a related concept, namely sustainable consumption. First introduced at the Oslo Symposium in 1994, sustainable consumption emphasizes the importance of purchasing and using services and products in a way that effectively meets basic human needs while also enhancing quality of life (Haider, Shannon, and Moschis, 2022).

1.2. Consumers' perceptions and attitudes towards sustainable consumption

Consumers generally express a favorable attitude toward environmentally friendly practices, acknowledging their vital role in promoting environmental protection and fostering social responsibility. However, perspectives among consumers vary considerably (Trudel, 2019). Some feel a personal obligation to contribute to sustainability, considering that individual actions can lead to significant change (Milfont and Markowitz, 2016). In contrast, others argue that the responsibility for sustainable practices should primarily lie with governments and corporations, which possess greater resources and influence to effect systemic change (David Lee et al., 2016). Furthermore, perceptions of eco-friendly products differ widely. While some consumers associate these products with higher quality and ethical standards, viewing them as superior choices that align with their values, others remain skeptical and consider eco-friendly items to be no different from traditional products in terms of function or effectiveness (White, Habib and Hardisty, 2019). This diversity of attitudes highlights the complexity of consumer behavior regarding sustainability and reflects the ongoing debate about individual versus collective responsibility in addressing environmental challenges (Trudel, 2019; Imbrișcă and Toma, 2020).

Encouraging individuals to adopt sustainable behavior represents a significant challenge for our society today, as highlighted by the Ayar and Gürbüz (2021). Within the context of sustainable consumption, a significant issue arises: consumers often show reluctance to engage in practices that demand personal sacrifices, such as committing additional time, making extra effort, or changing established habits. This resistance may arise from various factors, including the perceived inconvenience of sustainable choices, the initial costs associated with more environmentally friendly options, or the absence of immediate rewards (Sheoran and Kumar, 2022). As a result, even when the ultimate goal is to benefit society by promoting sustainable practices and fostering a healthier, more sustainable future, individuals often prioritize their immediate needs and comfort over long-term advantages that contribute to the collective good (David Lee et al., 2016). This discrepancy creates a significant barrier to the widespread adoption of sustainable behaviors and underscores the need for innovative strategies to motivate and assist consumers in embracing these vital changes (Milfont and Markowitz, 2016).

2. Research methodology

A total of 20 Romanian consumers participated in this qualitative study. The informants were randomly selected from a group of 32 individuals and comprised of 10 males and 10 females. The participants were selected from among Romanian graduate students in business administration, specifically focusing on

individuals aged 25 to 34 who reside in urban areas. As graduate students in business administration, they are familiar with the concept of sustainability and its practices. Moreover, individuals in the early stages of their professional careers typically possess requisite financial resources and a significant level of financial independence. In-depth interviews were conducted to address the research question. The interview guide included the following questions: How would you define sustainability?; What does making sustainable choices mean to you?; What are the benefits of sustainable consumption?; What factors may hinder you from making sustainable consumption choices?"

To explore the benefits and barriers to sustainable consumption among Romanian consumers, online word cloud software was used to visualize the key themes that emerged from participant responses. A thematic analysis was further conducted to investigate the perceptions and attitudes of the informants concerning sustainable consumption. Thematic maps were developed to identify and report significant themes within the data. Initial codes were derived from informants' responses and organized into potential themes; these were then refined further. The analysis began with transcribing the interviewees' answers, followed by repeated readings to familiarize ourselves with the content. Significant lines related to the research questions were identified and summarized in participants' words. Each of these summaries was assigned a concise code name to encapsulate its essence and facilitate effective data management using the QDA Miner software. The identified codes were then grouped into themes, the definition of which came from data extracts relevant to these themes. This approach resulted in two distinct themes that reflect the perceptions and attitudes of Romanian consumers aged 25 to 34, thereby providing insights into factors influencing sustainability consumption choices.

3. Results and discussion

The analysis of word clouds led to a better understanding of how individuals perceive sustainable consumption as a concept and a practice. Through the analysis of thematic maps derived from the informants' responses, the authors were able to identify key factors influencing sustainable consumption and explore the potential implications of sustainable decision-making. As illustrated in Figure no. 1, the term **digitalization** emerged as the most frequently mentioned word associated with sustainability, highlighting the growing importance of technology in shaping sustainable behavior.

Figure no. 1. Terms associated with the sustainability concept

Given the respondents' tech-savvy nature and high activity on digital platforms, most informants associate sustainability with innovations such as e-commerce platforms for promoting eco-friendly products, digital tools, or smart mobile applications for optimizing energy use. Urban environments, with superior access to high-speed internet and technological infrastructure, reinforce this perception, making digital solutions more visible and accessible. The emphasis on digitization indicates that consumers perceive technology as a facilitator of sustainable behavior, enabling informed choices and efficient use of resources: "Digitalization promotes the development and utilization of technologies under the aspect of sustainability" (Respondent 11; age 31; male). Furthermore, the increasing integration of digital solutions into sustainability initiatives on a global scale might have influenced respondents' strong association of sustainability with digitalization.

Following digitalization, other terms associated with sustainability were as follows: **cost**, **the environment**, **waste**, **resources**, and **management**. Cost indicates an awareness of the economic implications of sustainable practices, suggesting that financial barriers or incentives have a significant impact on consumer behavior. Environment and waste indicate a strong concern for environmental impacts, with consumers likely to associate sustainability with reducing pollution and minimizing waste through recycling or circular economy practices. Resources indicate a recognition of the necessity to conserve natural resources such as

water. Management reflects a belief in structured approaches such as policies or corporate strategies to achieve sustainability goals. Additionally, it refers to how one plans the income and expenses of a household. In a nutshell, the aforementioned terms illustrate that most informants perceive sustainability as a complex interplay of economic, environmental, and personal factors.

On the other hand, as shown in Figure no. 2, the term **choice** emerged as the most frequently mentioned word associated with sustainable consumption, followed by **product** and **expensive** among participants. The participant's emphasis on choice may reflect a wider cultural shift among younger urban Romanians towards individual responsibility in addressing environmental challenges: "Sustainable consumption is a choice that each of us should make" (Respondent 2; age 26; female). Furthermore, it may indicate that the informants attach significant importance to autonomy with regard to sustainable consumption. The emphasis on product reveals a focus on the tangible aspects of sustainability, such as the quality, origin, or environmental friendliness of goods: "Sustainability is linked to green products. Examples include smart home systems that save energy" (Respondent 8; age 29; male). The term expensive underlines the perception that sustainable products are often more expensive, which can be a barrier for individuals despite their interest in sustainable consumption: "Sustainability is expensive. I know it is for the greater good, but many cannot afford to make sustainable choices" (Respondent 8; age 29; male). Sustainable consumption was perceived by most informants as a conscious effort to align their purchasing habits with environmental and ethical values.

Figure no. 2. Terms associated with the sustainable consumption concept

3.1. Reviewed theme no. 1: Benefits of sustainable consumption (positive attitudes)

The authors have identified the benefits of sustainable consumption as one of the two themes that emerged during the in-depth interview sessions. The analysis of the informant's responses yielded three potential sub-themes: environmental, social, economic, and personal benefits. In the context of *personal benefits*, **fulfillment** has emerged as a significant motivational factor. One participant highlighted, "If we all take steps to consume sustainably, our children and grandchildren will benefit from an even better future. Contributing to this collective effort provides me with a sense of fulfillment" (Respondent 19; age 32; female). Most informants stated that engaging in environmentally responsible behaviors enhances their sense of purpose and personal satisfaction. **Health** considerations also play a crucial role in sustainable consumption choices, with many participants favoring organic foods and natural products. One informant stated, "Sustainable consumption refers to purchasing healthier, natural products produced in conditions benefiting consumers and the environment" (Respondent 5; age 28; female).

Furthermore, sustainable consumption was frequently associated with an improved **quality of life**: "Sustainable consumption enhances the quality of life. We can eat healthier and breathe in cleaner air" (Respondent 13; age 26; male). Concerning *environmental benefits*, the interviewees demonstrated a strong awareness of the broader ecological impacts of their choices. Commonly cited outcomes of sustainable consumption include the **reduction of carbon footprints**, **the preservation of natural resources**, and the **minimization of pollution**. "I often encounter advertisements from companies on social media that emphasize carbon footprint reduction. Sustainable consumption involves making choices that minimize our impact on the environment and its resources" (Respondent 7; age 33; male). Regarding *social benefits*, several informants emphasized that sustainability fosters education and awareness at both individual and collective levels. One participant highlighted, "My children's kindergarten has initiated a community garden, which serves as an excellent opportunity to educate everyone, particularly the children, concerning the importance of sustainable agriculture. While at kindergarten, they only consume products grown in this garden. Making sustainable choices is essential and requires both education and collaboration. These choices contribute to a better society" (Respondent 15; age 30; female). In terms of *economic benefits* associated with sustainable consumption choices, supporting **local consumption** was perceived as a means

to support the development of local businesses, decrease reliance on imports, and cultivate stronger community ties: “I usually opt for purchasing locally made products, including clothes and food, as this reduces our reliance on imported goods” (Respondent 17; age 34; female).

3.2. Reviewed theme no. 2: Barriers to sustainable consumption (negative attitudes)

The second theme that emerged during the in-depth interview sessions was barriers to sustainable consumption. The analysis of the informant's responses yielded three potential sub-themes: **economic factors** (limited income, high price sensitivity, and limited government incentives); **infrastructure** (limited waste management infrastructure); **knowledge and awareness** (lack of awareness, low environmental education, and lack of labeling awareness); **cultural and social factors** (cultural norms and low trust in institutions); **personal factors** (skepticism toward green products, time constraints, and short-term thinking).

The *financial constraints* hinder most informants from making sustainable consumption choices. All interviewees indicated that their **limited income** significantly influences their purchasing behavior, despite their willingness to acquire sustainable goods (e.g., green products, perceiving them as healthier options): "I am familiar with the benefits of green products for personal health and the environment. However, my current income constraints limit my ability to purchase these items. As a result, I often opt for products that are on sale" (Respondent 20; age 27; male). Eco-friendly products are often more expensive than conventional ones for several reasons. These include environmentally friendly production methods, strict certification processes, and higher costs associated with sustainable sourcing. Many Romanian consumers tend to be **price-sensitive**. Although higher prices are frequently linked to better quality, when financial constraints arise, individuals often choose lower-quality alternatives. This creates a paradox where, despite their intentions to adopt environmentally responsible practices, they are often undermined by economic pressures, ultimately undermining their commitment to sustainable living.

Moreover, **inadequate waste management infrastructure** has been identified as a barrier to the sustainable disposal of products. For instance, one informant highlighted, “Disposing of goods in an environmentally friendly way is challenging due to a lack of necessary infrastructure” (Respondent 16; age 31; male). Another significant barrier to sustainable consumption identified among participants was the **lack of knowledge and awareness**: “I am not familiar with the criteria that determine whether a product is sustainable. I seek to make more informed choices; however, I do not know where to begin or what specific information to look for on product labels” (Respondent 1; age 27; male). This knowledge gap is accentuated by minimal exposure to **environmental education**, which restricts the development of a foundational understanding of sustainability principles and their practical implications. Furthermore, **difficulties in comprehending eco-labels and certifications** hinder consumers’ ability to identify and trust sustainable products, as the complexity or ambiguity of such labeling systems often leads to confusion or skepticism.

Cultural and social factors further impede sustainable consumption choices among informants. Deeply embedded cultural norms rooted in **traditional consumption patterns** often favor conventional, non-sustainable products over their eco-friendly alternatives: “During my childhood, the concept of organic or sustainable products was not something that was given any thought. It is not part of our culture to prioritize sustainability, so I continue to buy and use the products I am familiar with” (Respondent 4; age 29; male). These established habits, shaped by historical and socioeconomic contexts, lead to resistance to the adoption of newer, more sustainable options, as consumers may perceive such changes as inconsistent with established practices. Additionally, **widespread skepticism toward authorities and business practices** regarding sustainability initiatives further undermines engagement with sustainable consumption.

Personal factors also pose impediments to sustainable consumption choices among informants. For instance, as stated by most interviewees, **time constraints** associated with busy urban lifestyles limit the opportunity for these consumers to research and evaluate sustainable products, thereby prioritizing convenience over environmental considerations: “Understanding how to make informed and sustainable consumption choices is crucial, yet time is a limited resource” (Respondent 9; age 32; female). In addition, a propensity for short-term thinking, where immediate needs take priority over long-term environmental benefits, undermines the adoption of sustainable consumption practices.

While the informants demonstrated a generally positive attitude toward sustainable consumption and exhibited familiarity with its associated advantages, they also identified a greater number of barriers than benefits. The predominance of these barriers underscores the notion that positive attitudes alone are insufficient to catalyze meaningful changes in consumption patterns.

Conclusions

Sustainable consumption has become a pivotal theme in the global conversation concerning environmental responsibility and resource management. Numerous institutions have proposed ways to motivate individuals and companies to engage in sustainable consumption practices. However, most consumers continue to engage in unsustainable practices characterized by excessive consumption.

A qualitative research approach was employed, which resulted in several contributions that are in line with the aim of this paper. From a theoretical point of view, the initial contribution addresses the identified research gap, namely the necessity to identify and analyze the perceptions and attitudes of Romanian consumers in a qualitative manner, concerning the benefits and barriers to sustainable consumption. The present study examined sustainable consumption, focusing on its primary benefits and barriers for consumers. The analysis yielded two key themes: the benefits of sustainable consumption (fostering positive attitudes towards sustainable consumption) and the obstacles in adopting sustainable consumption practices (fostering negative attitudes towards sustainable consumption). Informants noted improvements in quality of life, environmental protection, and community growth as benefits of sustainable consumption. However, they highlighted several barriers, such as financial issues, lack of waste management infrastructure, limited knowledge, cultural consumptions beliefs, and financial and time constraints. The identified barriers are more significant in terms of their impact than the benefits. This suggests a disparity between the knowledge individuals have and the actions they take.

From a practical point of view, this research highlights the importance of government policies and actions in the sustainable consumption domain. The government should facilitate the adoption of sustainable habits among consumers through the implementation of awareness campaigns. Furthermore, the government should introduce specific legislation that imposes sustainable consumption on an individual level. Public higher education institutions should consider incorporating courses centered on sustainable consumption into their curricula. This initiative aims to enhance students' awareness of sustainable consumption practices and foster a deeper understanding of their significance in contemporary society.

This study provides important insights into the perceptions and attitudes of Romanian consumers regarding sustainable consumption. Nevertheless, it is imperative to acknowledge several limitations inherent in this research. Due to the exploratory and qualitative nature of the study, the findings may be influenced by participant biases linked to the chosen research methodology. Furthermore, the study was conducted among Romanian consumers, residing in urban areas only, aged 25 to 34.

Despite these limitations, the current research highlights critical issues concerning Romanian consumers' attitudes and perceptions towards sustainable consumption. Considering the relatively even demographic distribution between rural and urban areas in Romania, there is a significant opportunity to extend this study to include rural regions. Additionally, it would be beneficial to investigate other age groups, such as those aged 35 to 44 and 45 to 55. These expansions could provide further valuable insights and improve the general understanding of sustainable consumption practices within the Romanian context.

References

Ayar, I. and Gürbüz, A., 2021. Sustainable consumption intentions of consumers in Turkey: A research within the theory of planned behavior. *Sage Open*, 11(3), https://doi.org/10.1177/21582440211047563.

Casalegno, C., Candelo, E. and Santoro, G. 2022. Exploring the antecedents of green and sustainable purchase behaviour: A comparison among different generations. *Psychology & Marketing*, *39*(5), pp.1007-1021. https://doi.org/10.1002/mar.21637.

David Lee, J., Bahl, A., Black, G.S., Duber-Smith, D.C. and Vowles, N.S., 2016. Sustainable and non-sustainable consumer behavior in young adults. *Young Consumers*, 17(1), pp.78-93. https://doi.org/10.1108/YC-08-2015-00548 .

Diaconeasa, M.C., Popescu, G., Maehle, N., Nelgen, S. and Capitello, R., 2022. Media discourse on sustainable consumption in Europe. *Environmental Communication*, 16(3), pp.352-370. https://doi.org/10.1080/17524032.2021.1999295.

Gherheș, V. and Fărcașiu, M.A., 2021. Sustainable behavior among Romanian students: A perspective on electricity consumption in households. *Sustainability*, 13(16), p.9357. https://doi.org/10.3390/su13169357.

Haider, M., Shannon, R. and Moschis, G.P., 2022. Sustainable consumption research and the role of marketing: A review of the literature (1976–2021). *Sustainability*, 14(7), p.3999. https://doi.org/10.3390/su14073999.

Hammad, H., Muster, V., El-Bassiouny, N.M. and Schaefer, M., 2019. Status and sustainability: Can conspicuous motives foster sustainable consumption in newly industrialized countries? *Journal of Fashion Marketing and Management*, 23(4), pp.537-550. https://doi.org/10.1108/JFMM-06-2019-0115.

Imbrișcă, C. and Toma, S.G., 2020. Social responsibility, a key dimension in developing a sustainable higher education institution: The case of students' motivation. *Amfiteatru Economic*, 22(54), pp.447-461. https://doi.org/10.24818/EA/2020/54/447.

Kostadinova, E. 2016. Sustainable consumer behavior: Literature overview. *Economic Alternatives*, (2), pp.224-234.

Marinescu, P. and Toma, S.G., 2015. *Management*. București: Editura Universității din București.

Milfont, T.L. and Markowitz, E., 2016. Sustainable consumer behavior: A multilevel perspective. *Current Opinion in Psychology*, 10, pp.112-117. https://doi.org/10.1016/j.copsyc.2015.12.016.

Montreuil Carmona, L.J., Barretto, A.G.P. and Bacinello, E., 2024. Does intention translate into actual purchase? Analysis of inducers of sustainable consumption in higher education students. *Young Consumers*, 25(1), pp.45-64. https://doi.org/10.1108/YC-03-2023-1710.

Santos, C., Coelho, A. and Marques, A.M.A., 2024. Unmasking supplier greenwashing: how information sharing and green trust shape clients' sustainability. *Baltic Journal of Management*, 19(4), pp.455-472. https://doi.org/10.1108/BJM-01-2024-0032.

Sheoran, M. and Kumar, D., 2022. Benchmarking the barriers of sustainable consumer behaviour. *Social Responsibility Journal,* 18(1), pp.19-42. https://doi.org/10.1108/SRJ-05-2020-0203.

Thanki, H., Shah, S., Oza, A., Vizureanu, P. and Burduhos-Nergis, D.D., 2022. Sustainable consumption: Will they buy it again? Factors influencing the intention to repurchase organic food grain. *Foods*, *11*(19), p.3046. https://doi.org/10.3390/foods11193046.

Toma, S.G. and Grădinaru, C., 2016. From military strategy to business strategy. *Strategii Manageriale*, 31(1), pp.227-233.

Toma, S.G. and Tohănean, D., 2019. Green business models: The case of a German automaker. *Quality-Access to Success*, 20(S2), pp.635-640.

Toma, S.G., 2005. Fordism, postfordism and globalization. *Amfiteatru Economic*, 7(17), pp.135-138.

Toma, S.G., 2006. From quality to the corporate social responsibility. *Amfiteatru Economic*, 8(20), pp.145-149.

Toma, S.G., 2008. Social responsibility and corporate citizenship in 21st century. *Amfiteatru Economic*, 10(23), pp.80-85.

Toma, S.G., 2013. *Economia Întreprinderii*. București: Editura Universității din București.

Tomșa, M.M., Romonți-Maniu, A.I. and Scridon, M.A., 2021. Is sustainable consumption translated into ethical consumer behavior? *Sustainability*, 13(6), p.3466. https://doi.org/10.3390/su13063466.

Trudel, R., 2019. Sustainable consumer behavior. *Consumer Psychology Review*, 2(1), pp.85-96. https://doi.org/10.1002/arcp.1045.

Vergura, D.T., Zerbini, C., Luceri, B. and Palladino, R., 2023. Investigating sustainable consumption behaviors: A bibliometric analysis. *British Food Journal*, *125*(13), pp.253-276. https://doi.org/10.1108/BFJ-06-2022-0491.

White, K., Habib, R. and Hardisty, D. J. 2019. How to SHIFT consumer behaviors to be more sustainable: A literature review and guiding framework. *Journal of Marketing*, 83(3), pp.22-49. https://doi.org/10.1177/0022242919825649.

A Bibliometric Analysis of Anti-Consumption, Voluntary Simplicity, and Sustainable Consumption Trends in the Literature (2020 – 2025)

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Abstract

This paper examines the research on anti-consumption, voluntary simplicity, and sustainable consumption using a bibliometric approach. With increasing concern in society over climate change, consumer fatigue, and values-based living mirrored in online trends like No-Buy 2025, this study aims to identify key trends, research domains, and thematic development in research conducted between 2020 and 2025.

A total of 3,365 records were obtained via the Web of Science Core Collection using a specific search strategy. Co-occurrence mapping and visualizing relations between keywords was done by VOSviewer software, and performance metrics such as publication quantity, citation frequency, document type, and fields of research were examined to assess the development of the field.

The results demonstrate a consistent rate of publications over the period between 2020 and 2024, declining in 2025 – brought on likely by indexing lag. "Sustainable consumption" was the single most dominant idea core, with environmental science, psychology, and business studies converged. Keyword map analysis revealed four general thematic clusters: systemic measures towards sustainability, psychological, and motivational influences, change through identity-oriented consumption, and decision-making practices. Terms such as "digital minimalism," "TikTok," and "no-buy challenge" reflect increasing academic interest in online culture and consumption shifts led by Gen Z.

This study contributes to a methodologically accurate overview of the tendency in the literature, summarizing existing as well as emerging paradigms for research. The results are of key value to sustainability proponents, teachers and policymakers by establishing areas of research with significant impacts and uncovering where consumer trends intersect with environmental and social objectives.

Keywords

Sustainable consumption, anti-consumption, voluntary simplicity, bibliometric analysis, consumer behavior, VOSviewer.

DOI: 10.24818/BASIQ/2025/11/026

Introduction

There has been a clear tendency among consumer culture in recent times marked by increased rejection of mainstream consumption patterns. This shift can be observed not only in written academic works but also in conventional public debate and social consumer movements such as No-Buy 2025. Driven and shared via social media platforms such as TikTok and Instagram, this movement encourages individuals to forego purchasing non-essential goods and services for quite a significant time frame – typically an entire year. Though the trend on the surface appears to respond to digital consumer fatigue, economic instability, and

environmental devastation, it is a symptom of broader societal and psychological rethinking of materialism and meaning-seeking beyond consumption.

These changing behaviors overlap with principles long discussed in academic literature – most notably anti-consumption, voluntary simplicity, and sustainable consumption. Anti-consumption is a conscious avoidance or diminishment of consumption habits; voluntary simplicity highlights a mindful way of life based on minimalism and individual values; and sustainable consumption highlights long-term environmental and social responsibility in buying choices. Research on these phenomena has grown significantly over the past two decades. Most recently, between 2020 and 2025, a definitive increase in scope and interdisciplinarity in the research has been seen, as global crises and digital culture fuel changes in consumer behavior.

This paper employs a bibliometric analysis to examine the academic evolution of these topics. Drawing on evidence extracted from the Web of Science Core Collection and mapped using VOSviewer, the study reveals leading publication patterns, influential topics, and emerging domains of research. The objectives are twofold: (1) to map the scholarly intellectual landscape and related topics of anti-consumption, and (2) to ascertain the degree to which new research reflects the nature of emerging consumption patterns, e.g., digital and youth – driven movements.

The organization of the paper is as follows: The first section presents a review of the scientific literature, the second section explains the methodological approach and data collection methodology used for the bibliometric analysis, and the third section presents the findings, namely performance metrics, subject field distribution, and keyword co-occurrence map. Section 4 comprises a combined discussion and conclusion paragraph, explaining the findings in both academic innovation and broader societal terms, and making recommendations for future research and practice.

1. Review of the scientific literature

Anti-consumption and sustainable consumption are themes that are always developing in consumer research. Anti-consumption encompasses a variety of practices including rejection, reduction, and reuse of goods (Black and Cherrier, 2010). It can be motivated by a variety of factors including environmental concerns, ethical concerns, and economic reasons (Rodrigues and Carvalho, 2023).The concept of anti-consumption has expanded from being solely environment-based to accepting broader socio-environmental concerns (Haider et al., 2022). It's most commonly linked with the search for authenticity, as research has shown that some consumers turn to anti-consumption when they cannot achieve authenticity through mainstream consumption behaviors (Zavestoski, 2002).

Sustainable consumption, however, has expanded from product-oriented to more comprehensive sustainable behaviors (Araújo et al., 2021). It is being remarketed increasingly as a means of quality-of-life improvement rather than environmental defense (Haider et al., 2022). This framework includes both personal well-being and environmental sustainability components.

Such concepts are likely to overlap and supplement each other. For instance, sustainability-oriented anti-consumption (SRAC) has directly linked anti-consumption activity with sustainable economic development (Seegebarth et al., 2016). Recent research is pointing towards the fact that sustainable consumption can result from anti-consumption views, as exemplified by increased adoption of secondhand consumption by consumers who adopt sustainability (Gilal et al., 2024).

Both ideas are linked with positive results to personal well-being. Research has identified that anti-consumption behaviors don't decrease quality of life and can, in fact, enhance it (Hüttel et al., 2021). This defies conventional thinking that less consumption automatically means less satisfaction. Voluntary simplicity is a life choice by which one voluntarily abridges material acquisition with preference to intrinsic values and life quality (Hook et al., 2021).

Moreover, voluntary simplicity is specially distinguished from other anti-consumption and sustainable consumption because of its ethical foundation, particularly its focus on the consequence of action and not only universal rules (Peifer et al., 2019). Voluntary simplicity has been shown to be connected with well-being positively, meaning that simplifying consumption does not always decrease life satisfaction (Hook et al., 2021).Voluntary simplicity adoption can be influenced by income, age, and whether it is self-initiated or imposed (Hook et al., 2021). It is not just less consumption, but rather a quality of life choice with regard to concern for society and the environment.

2. Methodology

This article aims to provide a comprehensive bibliographic analysis of studies on anti-consumption, sustainable consumption, and voluntary simplicity. First, relevant research is collected from a science Web database using a standard retrieval methodology (Gusenbauer and Haddaway, 2020). Subsequently, analysis of the main features of these publications, including annual distribution, type of publication, research and the number of references, was conducted.

In addition to data collection and preliminary analysis, the study will use VOSviewer for further bibliographic analysis. VOSviewer is a special software tool that builds and visualizes bibliometric networks. These networks enable the visualization of various relationships between the collected documents (van Eck et al., 2010).

Finally, the current problems, future trends, challenges and limitations will be discussed. The methodology framework of the paper shall be seen in Figure no. 1.

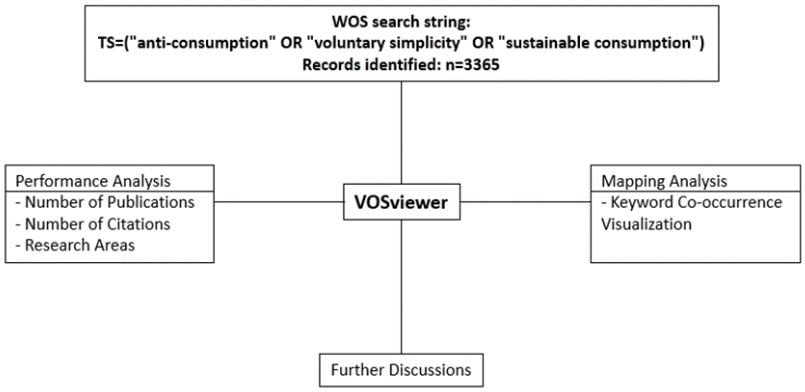

Figure no. 1. The Framework of the study
Source: authors' own creation based on the PRISMA statement (Moher et al., 2009) and Nicolescu and Barbu (2024)

2.1. Data collection process

To retrieve and collect reliable literature, the WoS core collection is used as the data source in this paper. The retrieval settings are: TS=("anti-consumption" OR "voluntary simplicity" OR "sustainable consumption"); and Publication years: between 2020 and 2025. On 1st of May 2025, 3365 publications were retrieved. Data including titles, abstracts, and keywords was exported in a .csv format for further analysis.

Drawing on the retrieved data and the analytical approach outlined earlier, several findings emerge from the bibliometric analysis of scholarly work related to anti-consumption, voluntary simplicity, and sustainable consumption. These findings are presented in accordance with three analytical dimensions adapted from Zhang et al. (2022): 1 - performance analysis - distribution by document types and research areas, and 2 - identification of the journals that published the most articles on these topics.

3. Results

3.1 Performance analysis

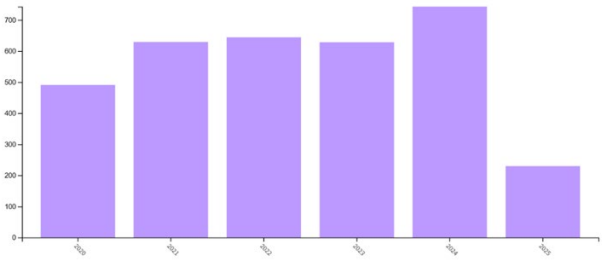

Figure no. 2. Number of publications by year
Source: WoS based on author's input

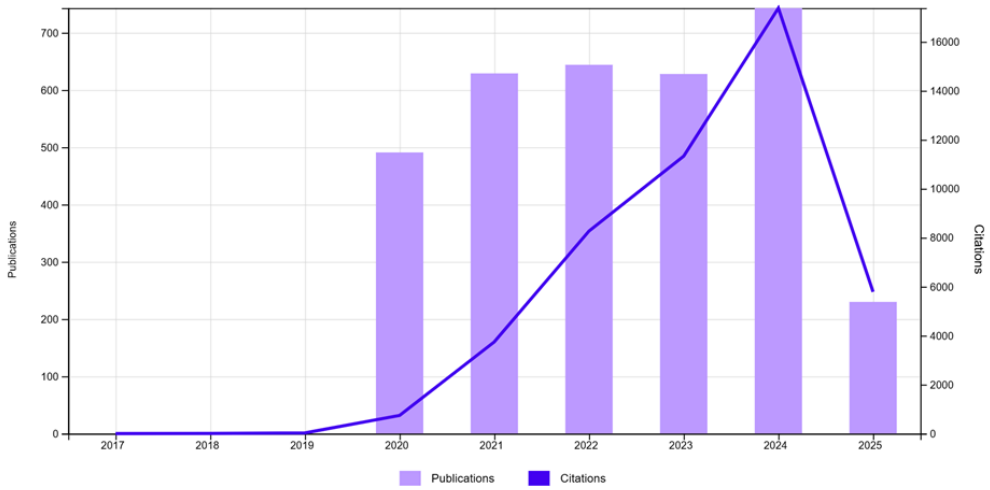

Figure no. 3. Number of publications by year
Source: WoS based on author's input

The bibliometric data marks a steady and dramatic increase in academic interest in anti-consumption, simple living, and sustainable consumption between 2020 and 2024. As it is observable in Figures no. 2 and no. 3, the number of publications rose from some 490 articles in 2020 to over 700 publications in 2024, marking an increasing academic focus on such topics. This growing trend shows heightened awareness of sustainability issues and mounting pressure to achieve shifting consumer behavior in this era, particularly as influenced by global crises such as the COVID-19 pandemic, inflationary pressures, and environmental catastrophes.

Most strikingly, in 2025 there is a dramatic drop in publications with production dropping to about 230 articles. This decline could be accounted for by lags in database indexing or by a natural peak in the current wave of investigation, rather than declining significance.

Patterns of citations, as shown by Figure no. 1, show a corresponding trend as the number of publications but with an even sharper peak. Overall citations grew significantly between 2020 and 2024 and reached a high point of over 17,000 citations in 2024, which corresponds to the year with the highest number of publications. This establishes that literature from these years not only was bountiful in terms of numbers but also effective and extensive enough to be used regularly in academia.

Nevertheless, a sharp drop in citations in 2025 - to a value of around 6,000 – represents both the lag time in the accumulation of citation and perhaps shifting attention to near or emerging subjects. That the amount of citation in 2024 is so great is indicative of the truth that impactful writings published during and after the pandemic had a tremendous impact on research discourse in consumer studies and sustainability.

3.2 Types and Research Areas of Publications

Table no. 1. Document types distribution

Document Type	Record Count	% of 3,365
Article	2,960	87.964%
Review Article	242	7.192%
Early Access	153	4.547%
Proceeding Paper	96	2.853%
Editorial Material	51	1.516%
Book Chapters	44	1.308%
Book Review	7	0.208%
Meeting Abstract	6	0.178%
Book	4	0.119%
Data Paper	4	0.119%
Correction	3	0.089%
Retracted Publication	2	0.059%

Source: authors' own creation based on data from WOS

The distribution of document types in the dataset reflects the prevalence of peer-reviewed scholarly literature in the field of anti-consumption, sustainable consumption, and voluntary simplicity. As can be seen from Table no. 1, articles constitute the majority with 2960 records or 87.96% of the total. This confirms

that most of the research work in this field appears in the form of standard full-length academic articles, indicating a mature and well-established research field.

Review articles comprise 7.19% of the dataset (242 records), marking a high level of synthesis effort intended to map existing knowledge and identify theoretical and methodological gaps. This suggests the field is not simply producing new empirical findings but is also actively engaged in consolidation and critique.

Early access articles (4.55%) suggest active publishing and contemporaneous scholarly activity with the topic in 2025, indicating that it is still lively. Proceedings articles (2.85%) suggest that conference-based dissemination is also a small but worthwhile contribution, likely to be responsible for the initial dissemination of new ideas.

Other formats such as editorial articles (1.52%), book sections (1.31%), and books (0.12%) are small but reflective of the interdisciplinarity and multiplicity of formats of interest in the subject matter. Occasional formats like book reviews, conference abstracts, data papers, corrections, and retracted articles each constitute less than 0.25% of the total, which is to be expected and typical in bibliometric distributions.

In general, the data set is predominantly dominated by peer-reviewed journal articles, underlining the scientific intensity and academic depth in researching post-consumption behaviors and sustainability topics. The relatively high rate of reviews also indicates a discipline in theoretical development and conceptual elaboration.

Figure no 4. Research areas of publication
Source: authors' own creation based on data from WOS

The interdisciplinary nature of anti-consumption, sustainable consumption, and voluntary simplicity research is revealed in Figure no. 4, which is formatted as a treemap visualization. The most common topic category is Environmental Sciences & Ecology with 1,459 articles, and this is employed to validate environmental sustainability as the overall context in which these phenomena are under research. This is a long-standing problem with ecological deterioration, global warming, and natural resource depletion.

Science & Technology – Other Topics (1,107 publications) is second, with high levels of cross-disciplinary research, frequently involving innovation, circular economy thinking, and systems thinking. Business & Economics is third at 969 publications, with specific interest in consumption trends and where they intersect with marketing, sustainable business models, and economic change. The other disciplines involved are Engineering (345), in the sense of eco-design and technological effectiveness, and Psychology (140), which suggests higher levels of research in attitudes, motivation, and identity on the part of consumers. Social Sciences (174) and Sociology (83) introduce the wider cultural and structural concern, highlighting the involvement of social norms and institutions in framing consumption.

Further debate from Food Science & Technology (147) and Agriculture (120) puts further emphasis on rural consumption and sustainable food systems. In the background is Energy & Fuels (73) that highlights how anti-consumption aids in solving the problem of energy consumption as well as environmental problems. Generally, the subject category distribution illustrates a wide and extensive research setting in which environmental, technological, economic, and psychosocial factors meet to counteract overconsumption and shifts in sustainability.

Table no 2. Top 10 journals with the most published articles

Journal	Publications
Sustainability	456
Journal of Cleaner Production	175
Sustainable Production and Consumption	84
British Food Journal	49
Journal of Retailing and Consumer Services	47
Cleaner and Responsible Consumption	45
Business Strategy and the Environment	43
Environment Development and Sustainability	41
Frontiers in Sustainability	41
International Journal of Consumer Studies	41

Source: authors' own creation based on data from WOS

The data in Table no. 2 indicates to leading journals publishing research work in sustainability and allied areas. The journal Sustainability stands highly with 456 articles, reflecting its leading position and broad range of coverage in the research community in sustainability. The Journal of Cleaner Production ranks well below at 175 publications, covering clean production and sustainable industrial development. Sustainable Consumption and Production (84 articles) and Responsible and Cleaner Consumption (45 articles) are some of the journals that indicate how high academic interest is in sustainable consumption practices and consumption behavior. Moreover, the British Food Journal (49 articles) and Journal of Retailing and Consumer Services (47 articles) indicate journals with articles on combining consumer behavior, retailing, and sustainability. Together, these journals reflect the interdisciplinary, consumerist, and varied character of current sustainability research.

3.3. Bibliometric analysis

Bibliometric tools are often used by researchers to analyse trends such as publication counts and keyword co-occurences so as to gain insights into the developing trends across academic fields (Moral-Muñoz et al., 2020). In the parts that follow, VOSviewer will be used to visually represent the co-occurrence of keywords The aim is to identify the relationships between keywords and the fundamental concepts in the literature by representing their co-occurrence visually.

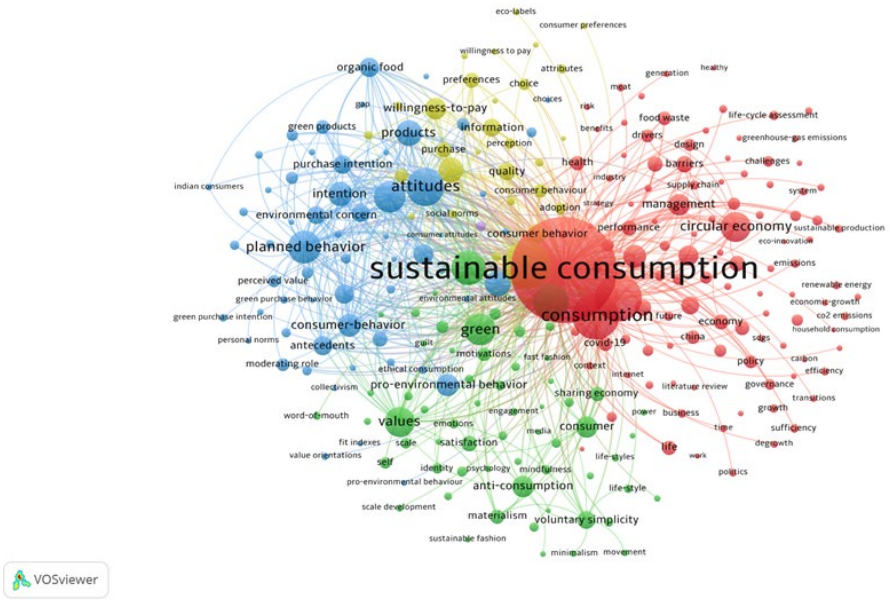

Figure no. 5. Keyword co-occurrence visualisation
Source: VOSviewer based on authors' input

As it can be seen in Figure no. 5, the keyword co-occurrence analysis identified four main thematic clusters in the 2020-2025 literature on sustainable consumption. The dominant themes are systemic circular economy strategies, behavior-oriented sustainability frameworks, identity-oriented anti-consumption, and consumer decision-making processes. The central role of 'sustainable consumption' reflects its interdisciplinary relevance, representing a meeting point for environmental, psychological, and economic perspectives.

In addition to the four dominant thematic clusters in the keyword co-occurrence map, several emerging or niche areas are captured as smaller, peripheral nodes. Keywords such as "Covid-19," "social media," "digital minimalism," "zero waste," "TikTok," and "no-buy challenge" – while less frequent – suggest the growing influence of real-time societal transformation and digital media on sustainable consumption discourse. Their relatively peripheral positions on the map indicate that these topics are not yet strongly integrated into the central scholarly discussion, but their presence is an indication of increasing academic interest.

Discussion and Conclusion

This bibliometric review shows the academic trajectory of anti-consumption, voluntary simplicity, and sustainable consumption between 2020 and 2025. The results capture a growing and more interdisciplinary topic area, as contributions are received from environmental science, psychology, business, engineering, and social sciences. Keyword co-occurrence analysis resulted in four dominant thematic clusters: systemic sustainability initiatives (e.g., circular economy), behavioral forces (e.g., attitudes, intentions), values of lifestyle (e.g., anti-consumption, identity), and consumer choice-making (e.g., preferences, perceptions).

"Sustainable consumption" holds the intellectual center of the field as an overarching term, which traverses diverse research streams. In contrast, "anti-consumption" and "voluntary simplicity" sound more disciplinary subfields that are most often bound with ethical living, identity, or personal wellbeing. Their location suggests that although there has been growing academic endorsement of these concepts, they hold a somewhat exterior role to mainstream core sustainability debate.

Subject analysis throughout these findings is in line with a robust environmental science presence, but also strong representation in business and psychology – tell-tale indicator of shifts toward applied, consumer-oriented research. The diversity of document types, led by peer-reviewed articles and literature reviews, reflects both empirical density and theoretical syntheses throughout the field.

Interestingly, the emergence of buzzwords such as "digital minimalism," "TikTok," and "no-buy challenge" signals a recognition of growing new, digitally networked consumer social movements. They symbolize the responsiveness of the academic frame to emerging real-time social movement trends, particularly those driven by Gen Z as well as web-based communities.

Finally, this review demonstrates that research on sustainable consumption is growing in scale and complexity. Future studies would be helped by more research into digital consumer culture, inter-generational relationships, and longitudinal examinations of value-based living and systemic change. While academic thinking can certainly offer critical analysis alongside practical counsel, social media trends like No-Buy 2025 for its part can make consumerism react against ingrained consumption behaviors.

References

Araújo, A.C.M., Oliveira, V.M. and Correia, S.E.N., 2021. Sustainable Consumption: Thematic Evolution from 1999 to 2019. *Revista de Administração Mackenzie*, 22(2). https://doi.org/10.1590/1678-6971/eramg210209.

Black, I.R. and Cherrier, H., 2010. Anti-consumption as part of living a sustainable lifestyle: daily practices, contextual motivations and subjective values. Journal of Consumer Behaviour, 9(6), pp.437–453. https://doi.org/10.1002/cb.337.

Gilal, F.G., Shaikh, A.R., Yang, Z., Gilal, R.G., & Gilal, N.G., 2024. Secondhand consumption: A systematic literature review and future research agenda. *International Journal of Consumer Studies*, 48(3). https://doi.org/10.1111/ijcs.13059

Gusenbauer, M. and Haddaway, N.R., 2020. Which Academic Search Systems Are Suitable for Systematic Reviews or meta-analyses? Evaluating Retrieval Qualities of Google Scholar, PubMed, and 26 Other Resources. Research Synthesis Methods, 11(2), pp.181–217. https://doi.org/10.1002/jrsm.1378.

Haider, M., Shannon, R. and Moschis, G.P., 2022. Sustainable Consumption Research and the Role of Marketing: A Review of the Literature (1976–2021). Sustainability, 14(7), p.3999. https://doi.org/10.3390/su14073999.

Hook, J.N., Hodge, A.S., Zhang, H., Van Tongeren, D.R. and Davis, D.E., 2021. Minimalism, voluntary simplicity, and well-being: A systematic review of the empirical literature. The Journal of Positive Psychology, 18(1), pp.1–12. https://doi.org/10.1080/17439760.2021.1991450.

Moher, D., Liberati, A., Tetzlaff, J. and Altman, D.G., 2009. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Medicine, 6(7). https://doi.org/10.1371/journal.pmed.1000097.

Moral-Muñoz, J.A., Herrera-Viedma, E., Santisteban-Espejo, A. and Cobo, M.J., 2020. Software tools for conducting bibliometric analysis in science: An up-to-date review. El Profesional de la Información, 29(1). https://doi.org/10.3145/epi.2020.ene.03.

Nicolescu, L. and Barbu, A., 2024. Mega Events and Their Impact on Country Image: A Comprehensive Bibliometric Analysis. Proceedings of the International Conference on Economics and Social Sciences. https://doi.org/10.24818/icess/2024/072.

Peifer, J.L., Chugani, S. and Roos, J.M., 2019. The ethical underpinnings of nonmaterialistic values and voluntary simplicity behavior in the United States. Psychology & Marketing, 37(2), pp.232–249. https://doi.org/10.1002/mar.21277.

Rodrigues, L. and Carvalho, D., 2023. Anti-consumption: an integrative review to understand the current state of scientific production. Fórum Ambiental da Alta Paulista, 19(2). https://doi.org/10.17271/1980082719220233469.

Seegebarth, B., Peyer, M., Balderjahn, I. and Wiedmann, K.P., 2015. The Sustainability Roots of Anticonsumption Lifestyles and Initial Insights Regarding Their Effects on Consumers' Well-Being. Journal of Consumer Affairs, 50(1), pp.68–99. https://doi.org/10.1111/joca.12077.

van Eck, N.J. and Waltman, L., 2010. Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics, 84(2), pp.523–538. https://doi.org/10.1007/s11192-009-0146-3.

Zavestoski, S., 2002. The social-psychological bases of anticonsumption attitudes. Psychology and Marketing, 19(2), pp.149–165. doi:https://doi.org/10.1002/mar.10007.

Zhang, L., Ling, J. and Lin, M., 2022. Artificial intelligence in renewable energy: A comprehensive bibliometric analysis. Energy Reports, 8, pp.14072–14088. https://doi.org/10.1016/j.egyr.2022.10.347.

Ziesemer, F., Hüttel, A. and Balderjahn, I., 2021. Young People as Drivers or Inhibitors of the Sustainability Movement: The Case of Anti-Consumption. Journal of Consumer Policy, 44(3), pp.427–453. https://doi.org/10.1007/s10603-021-09489-x

Fighting Corruption and Building the Path towards a Green Public Administration in the EU

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Abstract

The main purpose of our current research is to identify the direct link that the current state of central public administration might have on enhancing corruption in the EU countries. The obtained results are going to be considered and discussed in the context of the current trend towards sustainable development and the need of a green public administration in order to achieve the existing targets (such as carbon neutrality and the rest of the SDGs). Thus, the actions implemented across the EU related to green development tend to have a small intensity impact in the context of corruption, especially in developing countries. Thus, our current research focused on analyzing the data from 25 European countries between 2014 and 2025 in order to quantify the impact of employment and remuneration in the central public administration on the overall corruption perception. The methodology involved creating a linear regression model using the collected data from Eurostat. Our results indicated that 69.66% of the variation in the corruption perception index can be explained by the number of employees in the central public administration and their average remuneration. The strongest correlation was identified between the average remuneration of the employees in this area of public administration and the corruption index (0.829). The relationship between these two variables translates in an increase with 0.95 in the corruption index at an increase with 1 Euro in the average remuneration. On the other hand, the link between the number of employees from central public administration and corruption index is significantly weaker, with a correlation coefficient of only 0.05. The direct link and the economic interpretation indicates that an increase with one employee in the central public administration will trigger an increase with 0.00003 in the total value of the corruption index.

The novelty of our research is determined by the specificity of the independent variables included in our regression analysis (oriented on the central public administration). The results have significant implication for both theory and practice, as they suggest that even in the context of the most recent policy development for sustainable growth, the EU region still needs additional support for fighting corruption, with an increased focus on the less developed countries.

Keywords

Corruption, Public administration, Green development, Remuneration, Salary discrepancies, Central Public Administration Employment

DOI: 10.24818/BASIQ/2025/11/028

Introduction

The green development subject seems to be very common in the current global context, especially in the light of the SDGs and the actions that most countries tend to implement in order to achieve better resource allocation. However, in the light of these trends, corruption remains deeply rooted in the collective perception (in some specific regions more than in others), affecting the quality and efficiency of green actions towards sustainability. In this context, our current research focuses on identifying how corruption

can translate into the public administration efficiency and quality, and the main areas impacted by high level of corruptions. Liu and Lyu (2024) state that economic corruption tends to restrict the path towards green development, especially in the context of increasing mineral trade volumes.

The link between corruption and lower green implemented actions is highlighted by Sultana et al. (2023) in his study, where based on evidence from Sahoo et al. (2021), he demonstrates how controlling corruption (especially in developing countries) tends to generate a negative impact on the increase in the carbon emissions (extremely relevant in the context of carbon neutrality). On the same note, Fuinhas et al. (2023) state in their study how weak corruption control links to high levels of carbon emissions and low sustainable practices related to renewable energy or the use of biofuels. Their perception indicates how controlling corruption and promotion green public administration can translate in a better allocation of financial resources, promoting increased spending in the research and development areas that can significantly contribute to implementing more sustainable practices. Focusing on the business environment He, Chen and Zhang (2024) indicate that anti-corruption actions tend to lower the negative impact that economic growth initiatives and targets of private companies might have on the environment, by enhancing the efficiency and intensity of green corporate investments. Additionally, researches such as Ulman (2014) identify the direct correlation between national competitiveness and corruption levels. As we consider remuneration and financial incentive, one of the main determinants of corruption and lower moral standards (Quan et al, 2023), based on studies such as Podobnik et al (2015) that indicates the direct link between salary discrepancies and corruption levels, we identified that the reviewed research have a main gap related to how these elements tend to be reflected in public administrations.

Thus, considering the data related to 25 EU countries in the las 10 years (between 2015 and 2024), we observed the relationship between corruption levels (measured through corruption perception index – CPI), the number of employees from central public administration and heir average remuneration though a linear regression model. Our results indicated that, even if the overall impact of the independent variables of the model (related to central public administration) on the fluctuation of the CPI is small, there is a direct influence on corruption. In addition, similarly with the research performed by Podobnik et al. (2015), our data indicated that countries with a lower average remuneration tend to register lower corruption levels. Based on the obtained results, potential limitations and future areas of research are discussed in the last section of the current paper, addressing the potential need of including in the regression model an economic development related variable along with a variable that can measure the current progress of each country related to the SDGs.

1. Review of the scientific literature

The path in building effective government systems, as stated by Bader et al. (2019), is in enhancing the role that civil society organization have in fighting corruption, through constant transparency and accountability. Even if the perception illustrated by the author is focused on Ukraine and does not emphasize the green approach, an interesting perspective illustrated in the research refers to the impact that anti-corruption actions and efforts can have on civil society growth. However, resource constrains may represent a significant limitation in the role that civil society organizations might have in fighting corruption and enhancing transparency, as most of them tend to operate with small financial funding, and volunteers. Bader et al. (2019) identifies the need of potential external funding in order to improve the performance and capability of the civil society organization; however, this option might interfere with the direct connection with the local communities. Another important study, that offer important information, even if it's not focused on the EU corruption state (Zhou and Li, 2021) illustrates the interconnections between governance, sustainable or green development and corruption. The research indicates how economic development in China was strongly correlated with environmental pollution, which underlines the need of a governance in line with the current trends towards sustainability that does not compromise any potential progress for economic development. The exact impact that corruption tends to have on green development is highlighted by Marques and Matos (2025), stating that governance is weaken by corruption, which directly impact all environmental actions and efforts long term, as it's redirects the focus from stability towards additional personal interests. On the other hand, a focused governance and an effective public administration consider the needs of investments and resource allocation in order to utilize renewable sources and enhance sustainability.

On the same note Mohammad and Roseli (2024), demonstrate in their study that countries with high levels of corruption tend to implement fewer sustainable projects, as they often face lack of funding, restrained budgets or other constrains. This research identifies the direct correlation between high corruption and low

levels of sustainable initiatives and actions towards green development. A study performed by Quan et al. (2023) outlines also the main actions that corruption can trigger in order to lower overall public interest for green development. One of the main actions identified by the authors refer to lowering moral standards and the overall public demand for green and sustainable products or services.

Even if some of the above-indicated studies highlight that, countries that are more corrupt tend to be less focused on green initiatives and sustainability, Ulman (2014) outline in his research that there is a direct connection between national competitiveness, green development and low corruption levels. In his investigation, the author defines national competitiveness through employment rates, overall living standards and productivity and measures these aspects along with the corruption perception index (CPI) for a total of 106 countries. His results indicate that more than 73% of the corruption perception index can be explained by the variation of the global competitively index of the country, with a direct and positive correlation between the two variables. Another research, performed by Podobnik et al. (2015) demonstrates how European countries with higher wage gap tend to have higher corruption levels. The examples indicated by the authors are countries such as Greece where the large salary differences trigger higher corruption levels (quantified through CPI) and Sweden, where lower salary disproportions correlate with lower corruption levels.

2. Research methodology

Starting from the research performed by Mohammad and Roseli (2024), where high levels of corruption were correlated to fewer actions towards sustainable development, out current research identified the need to deeply investigate the role that the human resource plays in this equation. In addition, remuneration was another element identified as one of the main reasons for corruption or corruption spread, which is why we decided to consider it as one of the main variables of our study. The base for this consideration was the study of Podobnik et al. (2015), which showed that higher salary discrepancies tend to trigger higher corruption rates within a country. Similar, we wanted to focus the salary discrepancies only on the public administration sector, in order to capture more insights and complete the existing researches. As the study performed by Bader et al. (2019) indicated that civil society organization that fight corruption tend to have low resource allocation, we considered interesting to analyze how the human resources in public administration and their financial motivation (remuneration) correlates to the overall corruption level of a country. As this last concept tends to have more areas of evaluation, we have decided to consider in our study the perceived corruption measured through the corruption perception index.

In order to fill the research gaps identified in the reviewed literature, our current research aims to investigate the link between the number of employees in public administration, their average remuneration and the perceived corruption of the overall public sector. In order to perform the analysis we have created a linear regression model, as out initial assumption considered that between the analyzed concepts there is a direct and linear relationship. Our model includes two independent variable and one dependent variable quantifying the perceived corruption of the public sector through the corruption perception index (CPI) provided by Eurostat (2025). The analysis is going to be focused on the EU countries between 2015 and 2024 (10 years). The independent variables of the model will include the national civil servants in central public administration (NCSCPA) and the average remuneration of national civil servants in central public administration (AR). Figure no. 1 indicates the evolution of the number NCSCPA and CPI in the observed period across the EU, in order to present an overall picture of the current state of each EU country.

Therefore, based on the above-mentioned researches, our current study is going to include two initial hypothesis (null and alternative), which are going to be tested within our regression model by implementing the F test:

Null hypothesis (H_0): The evolution of the number of national public servants in the central public administration and their average remuneration has no overall impact on the corruption perception index across the EU countries.

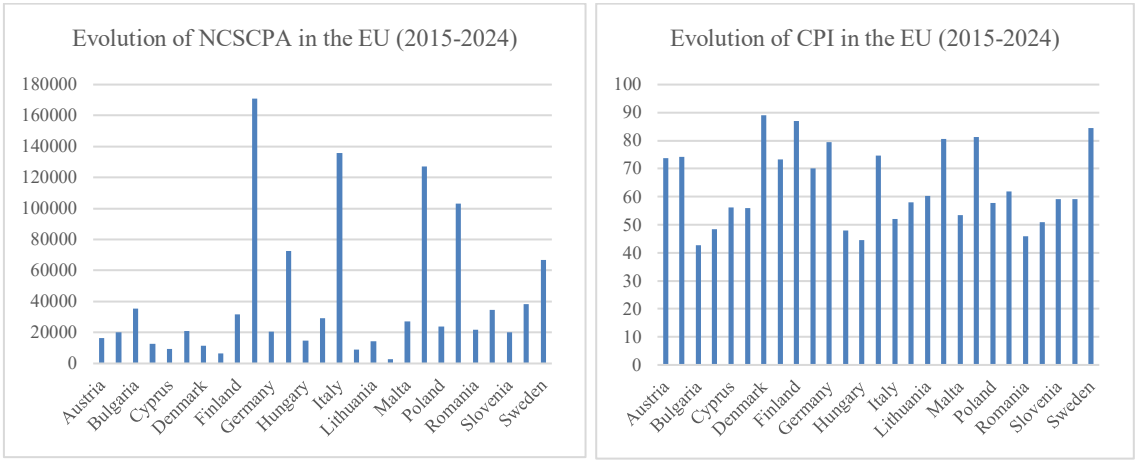
Alternative hypothesis (H_1): The fluctuation in the number of national public servants in the central public administration and their average remuneration has a significant impact on the overall variance of the corruption perception index across the EU member states.

Table no. 1. Variable description

Variable	Abbreviation	Conceptualization	Source	Unit of measurement
National civil servants in central public administration	NCSCPA	This indicator presents the total staff numbers from central public administration, illustrated as headcount	Eurostat (2024). National civil servants in central public administration Years: 2015-2024	Number of parsons
Average remuneration of national civil servants in central public administration	AR	This represents a specific indicator that calculates the average annual remuneration of the persons that work as national civil servants in central public administration. It includes in its calculation indicators such as gross remuneration, statutory deductions, state benefits, consumer price indices, gross domestic product	Eurostat (2025). Average remuneration of national civil servants in central public administration Years: 2015-2024	Euro
Corruption Perceptions Index.	CPI	Represents a complex index, created based on surveys and different assessments from 13 sources. It indicates how citizens perceive the level of corruption in the public sector. The rankings are between 0 and 100. The interpretation of this indicator implies that a 0 value suggests a highly corrupted public sector, while a score closer to 100 reveals a corruption clean public sector.	Eurostat (2025). Corruption Perceptions Index. Years: 2015-2024	Number

Source: Authors' own research.

Considering our dataset, the evolution of the variables is presented in Fig 1 and 2, providing a visual representation of the main countries with highest corruption level, number of civil servants from central public administration and remuneration levels. Additionally, Table 1 indicates elements such as variable conceptualization, abbreviation, main data source and units of measurement, for a more effective understanding of the concepts.



a) b)

Figure no. 1. a) Evolution of NCSCPA in the EU (2015-2024) b) Evolution of CPI in the EU (2015-2024)

Source: Eurostat (2024). National civil servants in central public administration and Eurostat (2025). Corruption Perceptions Index.

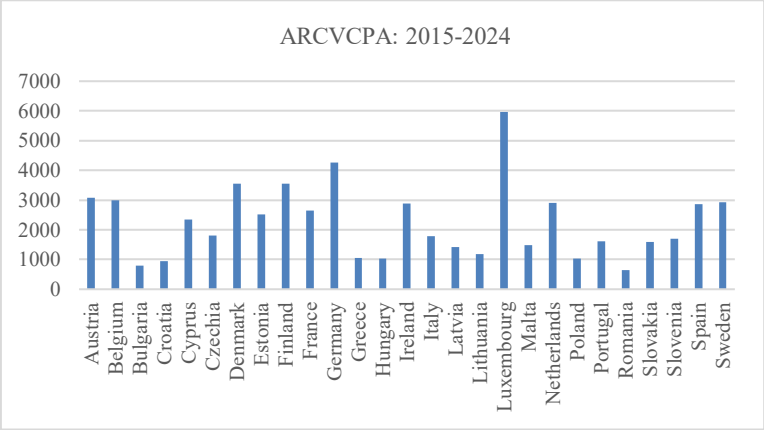


Figure no. 2 ARCVCPA: 2015-2024

Source: Eurostat (2025). Average remuneration of national civil servants in central public administration

Based on the integrated data and on our initial hypothesis, our regression model has the following initial format:

$$CPI = \alpha + \beta 1 * NCSCPA + \beta 2 * AR \quad (1)$$

Where:

CPI = Corruption perception index
$NCSCPA$ = National civil servants in central public administration
AR = Average remuneration of national civil servants in central public administration

This linear regression model quantifies the impact that the CPI experiences in the context of the fluctuation of both NCSCPA and AR. The assumption of the model is that the both the impact and the evolution of the variables has a linear trend, which was confirmed through the Augmented Dickey-Fuller (ADF) test.

The dataset consists of all three variables from 2015 until 2025 for all 27 EU countries, as per the data available on Eurostat website (2024, 2025). Table 2 includes the descriptive statistics of each variable. Based on the data analysis, we observed that the average number of NCSCPA is 40,608.85, with a minimum of 2,830.2 registered in Luxembourg and a maximum of 170,800.70 in France. The average remuneration of these civil servants is 2,241.43 Euro, with a minimum of 642,38 Euro in Romania and a maximum of 5,967.74 in Luxembourg. Therefore, even if this region has the lowest number of public servants in central public administration, the average remuneration is the highest compared with the rest of the EU member states. In terms of corruption perception index, the average value registered across the EU between 2015 and 2024 is 63.79, indicating a moderate to low corruption perception among EU citizens (based on the interpretation of the index, which suggests that a score closer to 100 indicates a corruption clean public sector). The lowest CPI is registered in Bulgaria (42.7), suggesting that this represents the country with the highest perceived corruption in the public sector, while Denmark has the highest value (89), registering the most corruption free public sector .

Table no. 2. Descriptive statistics

Variable	Obs.	Mean	Std. dev.	Min.	Max.
NCSCPA	27	40,608.85	43,840.70	2,830.20	170,800.70
AR	27	2,241.43	1,226.71	642.38	5,967.74
CPI	27	63.79	14.11	42.70	89.00

Source: Authors' own research.

3. Results and discussion

In terms of correlation, the link between the AR and CPI registers the highest value of the Pearson correlation coefficient (approximately 0.83). This positive high value of the coefficient indicates that the two variables are strongly and directly correlated. In other words, when there is an increase in the AR, the

CPI will increase as well. The direction of the relationship between these two variables is supported also by the mode coefficient (β2=0.0095). However, the intensity of the link is not as strong as indicated by the Pearson coefficient. The value of β2 indicates that at an increase with 1 Euro in the AR, the CPI will increase its value with 0.0095. Integrating in our interpretation the metadata of the CPI, we can conclude that when the average remuneration of the NCSCPA increases with 1 Euro, the perceived corruption of the public sector will decrease with 0.0095. The relationship between NCSCPA and CPI, on the other hand, has a very low Pearson correlation coefficient associated (0.05), indicating that even if there is a direct link between the two variables, the intensity of the impact is extremely low. This interpretation is supported also by the model coefficient associated with the NCVCPA (β1= 0.00003). The value of this coefficient indicates that at an increase with one person in the number of national civil servants in CPA, the value of the CPI will increase with 0.00003. Therefore, if the number of the CSCPA increases with 1 person, the perceived corruption in the public sector will decrease overall with 0.00003.

Table no. 3. Pearson and model coefficients

Coefficient	Value
Intercept (α)	41.08
NCSCPA (β1)	0.00003
AR (β2)	0.0095
Pearson coefficient (AR and CPI)	0.83
Pearson coefficient (NCSCPA and CPI)	0.05

Source: Authors' own research

The value of the determination coefficient ($R^2 = 0.69$) indicates that approximately 69% of the variation in the CPI can be explained by analyzing the fluctuation of NCSCPA and AR. This result suggests that the two independent variables included in our regression model explain a significant part of the dependent variable represented by the CPI. However, the remaining percentage indicates that there is room for potential development of the model, increasing the complexity by introducing additional independent variables. Our model is confirmed to be statistical representative, based on the value of the significance F indicator, which is lower than 5% (Table no. 4) and the value of F calculated, which is significantly higher compared with statistical F. Therefore, our evidence supports the decision to reject the null hypothesis of the model and accept the alternative one (H_1). Taking into consideration this general conclusion, we can admit that there is a significant impact of the number of national civil servants in the central public administration and their remuneration on the perceived corruption among EU countries.

Table no. 4. Model results

Statistic	Value
R2	0,69
F calculated	27.55
F statistic	3.42
Significance F	0.0000006

Source: Authors' own research

Based on our results, the linear regression model has the following format:

$$CPI = 41.08 + 0.00003 * NCSCPA + 0.0095 * AR \quad (2)$$

Conclusions

The fact that the correlation coefficient between CPI and AR has the highest value (0.829), potentially indicates that a higher value of corruption can trigger higher levels of remuneration of public servants in the central public administration. This result is in line with the research performed by Marques and Matos (2025), stating that corruption can redirect the focus from green development to other personal interests (such as personal remuneration in this case). Additional potential research in this area can focus on including economic development (measured through GDP per capita for example), or national competitively, considering the model of Ulman (2014) , in our linear regression model, in order to observe if the focus on remuneration prevents effective action or funds allocation towards areas related to sustainable development. Additionally, the high value of the determination coefficient of our model indicates that 69% of the variation in the CPI can be explained by the number of employees in the central

public administration and their average remuneration, which, by the sign of the model coefficients and the Pearson correlation coefficients, translates in a direct link between the variables. Thus, a higher number of employees and higher remuneration levels directly correlate to higher corruption levels. Of course, the low values obtained for the model coefficients might rise a question related to model representatively, however the value of VIF does not indicate a concern for our study, indicating that the results are reliable, even if the model coefficients have low values.

Therefore, the direct impact of the average remuneration of employees in the central public administration on the corruption levels, based on the model coefficient is of only 0.95, indicating that when the AR increases with 1 Euro, the value of the CPI will increase with 0.95. On the other hand, as demonstrated through the research, the link between the number of employees in the area of central public administration and CPI is even lower, as the increase with 1 person in the NCSCPA generates an increase of 0.00003 in the CPI. However, we need to highlight the specificity of the independent variables included in the current model, meaning that aspects related to remuneration and employment in the central public administration, even if correlated with CPI, are not elements with high influence on the corruption level of a country. The aim of our study was to outline that green public administration starts from basic aspects such as remuneration and people (employment), emphasizing that in countries where lower moral standards are a part of the overall culture (due to historical and political influence), as stated by Quan et al. (2023), register high levels of CPI.

In this context, the EU contains a high range of countries, all with different economic development and historic and political background. These elements contribute, as stated before, to how deeply rooted corruption is in the overall governance of the countries and how visible it is even in the most specific area (such as central public administration). The results of our current study suggest that, even in the light of the most recent trends and policy development for sustainable growth, the EU region still needs additional support for fighting corruption (especially in the less developed countries). This support can translate in additional regulation or policies that can prevent corruption especially in the central public administration, building the path towards integration more sustainable approaches.

However, one of the main limitation of our study refers to the number of variables considered for defining the current state of public administration. Thus, the variables were only focused on central public administration and measured only the number of employees and their average remuneration, due to data availability. However, additional insights, such as recruitment process quality would be helpful in creating a more in depth perspective. In addition, as stated above, a variable related to economic development would be needed in order to better understand how the corruption phenomena restricts (or not) economic development (especially through budget restrictions). Lastly, based on data availability, aspects related to SDGs current progress for each specific country can be included in the model, in order to offer a perspective on how corruption might restrain the overall green efforts of a country.

References

Bader, M., Huss, O., Meleshevych, A., Nesterenko, O., 2019. Civil Society Against Corruption in Ukraine: Pathways to Impact. *Kyiv-Mohyla Law and Politics Journal,* (5), pp.1-35 https://doi.org/10.18523/kmlpj189975.2019-5.1-35

Eurostat, 2024. *National civil servants in central public administration*, [online] Available at: <https://ec.europa.eu/eurostat/databrowser/view/prc_rem_nr/default/table?lang=en> [Accessed 12 April 2025].

Eurostat, 2025. *Average remuneration of national civil servants in central public administration,* [online] Available at: <https://ec.europa.eu/eurostat/databrowser/view/prc_rem_avg/default/table?lang=en> [Accessed 12 April 2025].

Eurostat, 2025. *Corruption Perceptions Index*, [online] Available at: <https://ec.europa.eu/eurostat/databrowser/view/sdg_16_50/default/table?lang=en>[Accessed 12 April 2025].

Fuinhas, J.A., Silva, N., and Shirazi, M., 2023. On the link between shadow economy and carbon dioxide emissions: an analysis of homogeneous groups of countries. *Environmental Science and Pollution Research*, 30(53), pp.114336-114357. https://doi.org/10.1007/s11356-023-30385-z

He, Y., Chen, H., Zhang, T., 2024. Exploring the impact of economic and environmental target constraints on and the green investment efficiency of firms: The moderating role of anti-corruption. *International Review of Economics & Finance* (96), p.103687. https://doi.org/10.1016/j.iref.2024.103687.

Liu, B. and Lyu, Y., 2024. Economic corruption, green recovery, and mineral trade relationships in emerging economies. *Resources Policy* (90). https://doi.org/10.1016/j.resourpol.2024.104725

Marques, A.C. and Matos, R., 2025. The repercussions of corruption on green growth: Evidence from BRICS+ countries. *Sustainable Futures* (9) https://doi.org/10.1016/j.sftr.2025.100542.

Mohammad, W.M. and Roseli, E.S., 2024. Bridging the green gap: Unveiling the complex interplay of national cultural dimensions, management effectiveness and corruption in driving green innovations. *Journal of Climate Finance* (9) https://doi.org/10.1016/j.jclimf.2024.100050

Podobnik, B., Vukovic, V. and Stanley, H.E., 2015. Does the Wage Gap between Private and Public Sectors Encourage Political Corruption? *PLoS ONE* 10(10) https://doi.org/10.1371/journal.pone.0141211

Quan, X., Zhang, K., Zhong, R. and Zhu, Y., 2023. Political corruption and green innovation. *Pacific-Basin Finance Journal* (82), p. 102169. https://doi.org/10.1016/j.pacfin.2023.102169

Sahoo, M., Sethi, N. and Padilla, M.A.E., 2023. Unpacking the dynamics of information and communication technology, control of corruption and sustainability in green development in developing economies: New evidence. *Renewable Energy* (216) https://doi.org/10.1016/j.renene.2023.119088

Ulman, S.R., 2014. The Impact of the National Competitiveness on the Perception of Corruption. *Procedia Economics and Finance*, 15, Pp.1002-1009. https://doi.org/10.1016/S2212-5671(14)00660-1

Zhou, A. and Li, J., 2021. Impact of anti-corruption and environmental regulation on the green development of China's manufacturing industry. *Sustainable Production and Consumption* (27), pp.1994-1960 https://doi.org/10.1016/j.spc.2021.04.031.

Sultana, T., Hossain, M.S., Voumik, L.C., Raihan, A., 2023. Democracy, green energy, trade, and environmental progress in South Asia: Advanced quantile regression perspective. *Heliyon* 9(10). https://doi.org/10.1016/j.heliyon.2023.e20488

Sahoo, M., Sethi, N., 2021. The intermittent effects of renewable energy on ecological footprint: evidence from developing countries. *Environ. Sci. Pollut. Control Ser*. 28(40), pp. 56401-56417. https://doi.org/10.1007/s11356-021-14600-3

The Technological Feast: Innovations Reshaping Our Plates - New Approaches of Food Industry

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Abstract

Food practices and beliefs surrounding what and how we eat are on the verge of profound transformation in an era of population explosion and urbanization. This article demonstrates how technological advances and a growing awareness of nutrition are driving new approaches that could completely transform our relationship with food, from production to consumption, in the next 10 years. The food industry is not only a witness, but also an active adopter of the spread of digitalization, artificial intelligence (AI), and automation in the food value chain, from production and processing to transportation and consumption. The article examines the theoretical paradox of the coexistence of food and the global era of digital transformation. Using forecasting trends and the theoretical concepts of industrial innovation and strategic necessity of the food industry, it argues for the long-term application possibilities of the Internet of Things (IoT) tools introduced so far. The development of digital technology in the food and hospitality industry, as well as in food and gastronomic tourism, is increasingly providing convenience, making the previously unattainable a reality, while potentially increasing productivity and improving quality of life.

Keywords

Technology, food industry, innovation, digital transition, metaverse, sustainability.

DOI: 10.24818/BASIQ/2025/11/036

Introduction

The food industry is facing unprecedented challenges in an era of population explosion and mass urbanization. A thorough understanding of the meaning of food, service, operations, and customer experience, as well as an overview of the essential process that can be created in the future by integrating existing technologies and brands along with increasingly fierce competition, is essential for success. This approach must be consistent not only with customer values, but also with the broader business philosophy of market players. Di Renzo et al. (2020) prove in their research that eating habits resulting from the COVID-19 pandemic have changed across different ages. School closures and home confinement developed unhealthy eating habits in healthy adolescents; routine changes, modifications to dietary habits, and quality may be even more significant. Technology is no longer something that exists outside the kitchen. Today, technology is becoming an integral part of creating a new food culture. It is actively revolutionizing every stage of the food system. The world of food technology is undergoing profound changes, driven not only by innovation in production and transportation, but also by fundamental changes in consumer values and behavior, characterized by the increasing integration of technological devices into everyday life.

Food processing involves all the processes required to transform raw or harvested food into new products, ensuring their safety, palatability and shelf life, a process that has changed dramatically to meet consumer preferences. Marino et al (2021) point out that consumer demand for foods with a longer shelf life and better taste has contributed to the increasing availability of processed foods. Ingredients high in sugar, fat

and salt also affect the nutritional value of UPF foods. Being cheap, fast and tasty are demands that manufacturers are responding to relatively quickly.

However, we cannot ignore the fact that health consciousness and personalized nutrition are becoming increasingly popular among consumers. Furthermore, we are also seeing that some consumers are not only looking for an affordable and convenient way of living, but are also demanding transparency, sustainability and ethical source from their suppliers, in addition to superior customer experience. These push factors put additional pressure on manufacturers in the processed food market. All these can only be competitively addressed through technological improvements. The 'smart food' is based on the introduction of high levels of automation and digitalization to increase productivity, production efficiency, and food quality and safety (Chen et al., 2017; Echegaray et al, 2022). Among the various innovations of Industry 4.0, robots, artificial intelligence, big data, cloud computing, blockchain and smart sensors are considered as the main contributors to smart food prices (Figure 1).

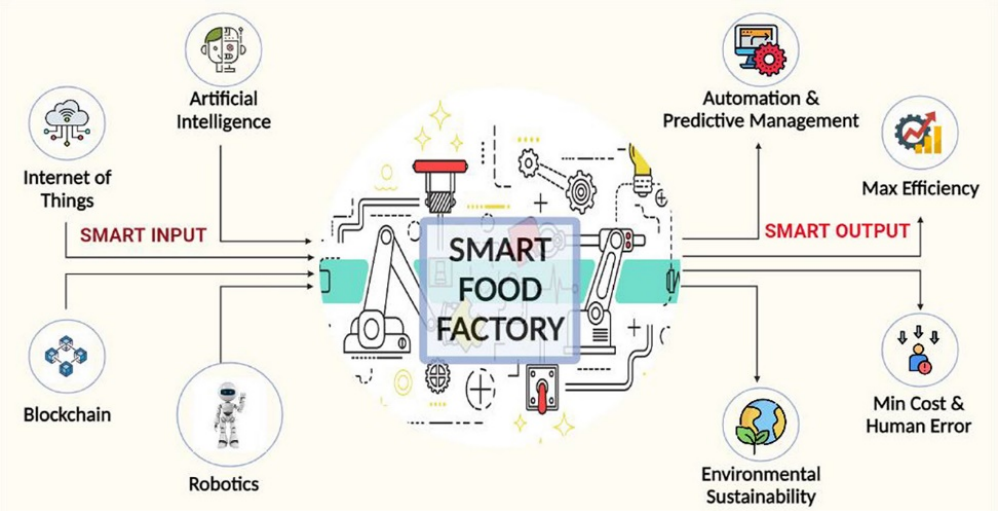

Figure no. 1. Key enablers of the digital transformation in smart factories

Source: Hassoun et al., 2023

Because of the increasing importance of technology, the analysis and forecasting of technology trends and futures are significant. In this article, the forecasting method explores the theoretical paradox of the coexistence of food and the era of digital transformation. Understanding this evolving food landscape is crucial in the context of global challenges such as population growth, climate change, and the pressing need for efficient and sustainable resource utilization. The theme uses the theoretical concepts of industrial innovation and strategic necessity to argue that new IoT tools do not necessarily make the "smart" performance of food more efficient but inevitably expand the conceptual framework of sustainability.

2. Literature review

2.1. Theories of digital transition

Just as the internet or IoT did for businesses in the 1990s, digitalization, robotics, AI, and the metaverse are creating a new competitive landscape for businesses in the 21st century. Competitive strategies now need to include building a virtual presence, creating immersive customer experiences, developing digital communities, and exploring new monetization models (Golmgrein, 2024) through virtual goods and services. Based on existing theories of competitive advantage, companies need to identify unique value propositions and create an effective business strategy, as well as choose the most suitable monetization model for customers. Freeman (1996), in his conceptualization of national innovation systems, sees innovation to sustainable development and advocates a holistic approach to understanding innovation processes. Bharadwaj et al. (2013) argue that the shift to digitalization is a key strategic choice and an inevitable choice for companies to modernize their management and information systems. According to Buhalis and Cheng (2020), the term "smart" is increasingly used as a prefix for developments based on a combination of automated data collection, open and big data systems, and artificial intelligence. However,

for an effective transition and successful operation, it is inevitable that postmodern food enterprises choose a strategy based on the right aspects.

The difference between sustainable and smart business concepts lies in the primary goals and methods: smart factories focus on technological innovation to optimize operations, while sustainable food systems focus on holistic approaches to ensure environmental and social sustainability. However, for consumers, these two concepts are not diverging, but are increasingly intertwined by the middle of the 21st century.

2.2. Competitiveness and digitalization

The early literature traditionally considered the food industry as a slow-response sector, with low research intensity and rather conservative in terms of the type of innovations (Martinez and Briz, 2000), as it mostly focused on minimizing production costs, keeping prices low and paying little attention to consumer needs and rapidly changing expectations.

Today, we see the food industry undergoing a process known as "chain reversal": production costs remain a priority, but there is also a focus on food safety and quality, and along the consumer segments, on health, well-being and satisfaction. Consumers now say what they want to eat (Aguilera, 2006). An innovative approach and a willingness to take risks, as well as the choice of an effective strategy based on digital technology, are essential for the success of a business. Recent decades have seen significant progress in the theoretical formulation of the reasons behind organizational success. Digitalization, the increasing use of digital technologies across all aspects of business and society, profoundly impacts competitiveness theories. Porter (1980) established that the reasons for business success depend fundamentally on the structure of industrial sectors and the competitive forces affecting them.

According to Porter (1980), technological change also plays an important role in competitive advantage because it creates new competitive opportunities and because its ubiquity in the value chain plays a central role in existing competitive strategy. In his view, “information technology” (IT) and “information systems” are particularly important because all activities create and use information. He emphasizes that modern information systems technology plays a particularly important role in scheduling, controlling, optimizing, measuring, and otherwise coordinating all kinds of activities. He adds that office or administrative technologies, although often neglected or subsumed under the umbrella term of information systems, also have an important role.

Wernerfelt (1984) and Baierle et al. (2001) argue that the original cause of competitive advantage lies in the company's possession of specific resources that are both capable of generating value and are rarely or hardly imitated or substituted by solutions obtained from the IT field. Bharadwaj et al. (2013) and Powell and Dent-Micallef (2017) have also analyzed how IT affects competitive advantage. In their opinion, industry competitive advantage was supported by a combination of low conflict levels, open communication, organizational flexibility, and IT planning integration within individual companies. According to Addo (2010), automation has become a key element as a result. Automation does not mean replacing human work with simple machines but rather integrating machines into a self-directed system that can perform a certain process without human assistance. We are living in the era of the Fourth Industrial Revolution (IR4.0), an era characterized by breakthroughs in emerging technologies such as robotics, AI, nanotechnology, quantum computing, IoT, fifth-generation (5G) wireless technologies, and self-driving vehicles, all of which will impact how we create and distribute value and change the way we live, work, and interact (Schwab, 2017; Bendig et al., 2022).

In short, technology is no longer just a kitchen tool; it is becoming an integral part of the creation of a new food chain and food culture. Digitalization is the measure of business success from farm to fork, and these technological innovations built on the internet are revolutionizing every stage of the food system.

2.3. The metaverse sustainability paradigm

2.3.1. Technology and food sustainability

The metaverse has many meanings from a gaming platform, a virtual retail destination, a training tool, an advertising channel, a digital classroom, a new gateway to digital experiences. Ritterbush and Teichmann’s (2023) analysis yielded two possible definitions of the term metaverse: One provides broader applicability, and a second provides a stronger focus on applicability to the current contemporary events of technology corporations. The metaverse, a network of immersive virtual worlds, presents a paradox within the context of sustainability. While offering digital alternatives that could potentially lessen physical footprint, its underlying technological infrastructure demands significant energy and resources. Metaverse incorporates advanced technologies such as virtual reality (VR) and augmented reality (AR), offering immersive digital

worlds. It provides a platform for various industries to expand their business beyond traditional physical borders.

Based on Kuhn's paradigm theory, the concept of metaverse sustainability is now supported by Mihalic (2024). The idea is to create a sort of higher-level internet, superimposed on the physical world. People connected to the metaverse are part of the physical world, but they can see and interact with things that others do not see, because they belong to a virtual world (Song and Chung, 2021). According to De Giovanni (2023), the metaverse is often viewed as a potential arena for sustainability, representing a new interface between digital transformation and sustainable consumption. The sustainable metaverse necessitates a conscious design approach, integrating principles of a circular economy for hardware and prioritizing energy efficiency. Social sustainability, ensuring equitable access and inclusive virtual spaces, is also crucial for a truly sustainable metaverse, echoing tenets of social equity within sustainability frameworks.

At the end, the metaverse sustainability paradigm requires a multi-faceted approach. It demands sustainable technological choices in its creation, prioritizing energy efficiency, using eco-friendly materials, and designing for longevity and recyclability. It also necessitates the development of sustainable practices within the metaverse, encouraging virtual behaviors that mirror real-world environmental consciousness. Moreover, ensuring social sustainability within these digital spaces, promoting inclusivity and equitable access, is vital for a holistic paradigm.

2.3.2. Environmental sustainability

The capability of making well-informed decisions to use resources and services more efficiently has a significant impact on sustainability and equal access (Appio et al., 2021; Ardito et al., 2018). Defining the future impact of digitalization and the metaverse on the environment is not at all simple. Observing the different points of view on the subject, however, the metaphor of promises and bets resonates again, perhaps even more glaringly (Boyd and Ellison, 2008; Kottler et al., 2023). The metaverse could have a laboratory with high potential for earth and climate sciences. By creating a digital twin of the planet by satellite data and combining these models with the sophisticated intelligence of the metaverse, it will in fact be possible to develop and test more effective solutions to combat climate change in the long term (Gaggioli, 2017).

Recognition that the involvement of the metaverse as a space (environment) in the interests of individual stakeholders is having an increasingly greater impact. In contrast to traditional “on-site tourism”, this trend is often referred to as a “virtual kitchen”, “virtual cooking classes with world-renowned chefs”, “virtual wine tours”, “virtual spirits tasting”, “nutrition-based online food ordering”, “virtual plant-based gardening and tasting”, “printing food in 3D”, “metaverse consumption”, and “metaverse food and wine tourism”. Digitalization also facilitates greater collaboration among stakeholders in the agrifood value chain. Farmers, food producers, distributors, and consumers can now connect with one another through virtual platforms and social media channels, allowing for greater sharing of knowledge and best practices. This connectivity can enhance the efficiency and sustainability of food production. For instance, indoor farmers are already using AR technologies to digitize and monitor plant biology, growth, and data.

2.4. Evolving consumer behaviors

Consumers are increasingly prioritizing convenience in their food choices, largely due to the demands of their fast-paced lifestyles. This has led to a significant surge in the popularity of online ordering platforms and food delivery applications, which have partnered with a wide array of restaurants to provide consumers with easy access to meals without the need to leave their homes. The COVID-19 pandemic further accelerated this trend, resulting in rapid growth in e-commerce and online food delivery services as people adapted to lockdowns and social distancing measures. This strong demand for convenience is a major catalyst for the expansion of online food ordering and delivery services. Zhou et al. (2023), who investigated the effect of higher ultra-processed food (UPF) during the pandemic, found that the UPF consumption in the diet was associated with a significantly increased risk. Their findings suggest that this association could be partly mediated by the effect of UPF consumption on BMI. They also point out that public health interventions to improve nutrition and poor metabolic health may be important for reducing the burden of the health insurance system.

This fundamental shift in consumer behavior has necessitated that food businesses adapt their operational models by significantly enhancing their online order fulfilment capabilities and fully embracing various digital platforms. The exceptionally high growth rate projected for the delivery segment underscores the profound significance of this evolving consumer preference. There is a growing trend of health consciousness among consumers, leading to an increased demand for healthier food options. People are becoming more aware of the link between their diet and their overall well-being, resulting in a greater

interest in functional foods that are fortified with essential vitamins and minerals. This heightened awareness is also driving a rising demand for food products that are organic and nutrient-dense and offer specific health benefits.

Consequently, there is an increasing consumption of low-calorie, plant-based, gluten-free foods, reflecting a broader shift toward healthier eating habits. This growing awareness of health and wellness is a significant driver influencing the demand for food products that contributes to overall well-being. This trend is actively shaping product development strategies within the food industry, as food processors are reformulating their existing product lines and introducing entirely new products specifically designed to cater to the needs and preferences of health-conscious consumers. Consumers are demonstrating a growing desire for greater transparency and traceability in their food supply chains, wanting to know more and be sure about the origin of their food, the methods used in its production, and the specific ingredients it contains. To access this information, they are increasingly relying on product labels, dedicated mobile applications, and technologies like blockchain. This increasing preference for transparency and traceability indicates a growing level of skepticism among consumers toward traditional food systems and a desire for greater control over the food choices they make. Digital technologies are emerging as critical tools for meeting this demand, fostering greater trust and accountability within the food industry by providing verifiable information about the food supply chain.

3. Research methodology

The article uses the theoretical concept of strategic necessity to support the idea that in the process of digital transformation, the smart performance of the food and gastronomy tourism sector through new IT tools does not necessarily become more efficient, but it inevitably expands the conceptual framework of sustainability and prompts closer cooperation (Gössling, 2021). At the same time, it inevitably requires a more sustainable approach (Madanaguli, 2023). Forecasting as methodology seeks to anticipate the future based on historical and current knowledge and trends. Coates (1994) pointed out that the forecast is a simple or complex look at the qualities and probabilities of a future event or trend that futurists differentiate between the forecast, which is generally not point-specific to time or place, and the prediction, a specific, usually quantitative statement about some future outcome.

The forecasting trends are complex. The food system can be better understood when its three contexts are examined separately: the food industry, food consumption, and technology as change. It is necessary to understand the interconnection of all three. The purposes in food trend forecasting focus is on change and how it intertwines with culture and industry. For Polányi, the “great transformation” indicates a shift in emphasis where the economy separates from society, but the logic of the state no longer satisfies the needs of society; society will resist this tendency and try to re-insert it into social relations by reconciling goals and means (Polanyi; 1944). Clemons, Reddi and Row (1993) support the duality with the strategic necessity hypothesis and Solow (1987) with the concept of technological paradox, claiming that new IT tools do not automatically improve a company's performance where they are used. It is only one way of establishing a commitment relationship that management is heavily involved in the introduction and development of technological resources that are necessary to increase member satisfaction.

4. Results and discussion

Integrating technology into the food system offers a novel opportunity to educate society. By connecting consumers with the stories behind their food, we foster global dialogue and advocate for sustainable practices. Technology is no longer just a tool in the kitchen; it is becoming an integral part of creating a new eating culture. Innovations brought about by digitalization are revolutionizing every part of the food system, from farm to fork. To address challenges in customer and supply chains and to remain competitive, the food industry is increasingly turning to the integration of technological innovations from production to communication. Modern data and AI have become a significant factor in future strategies. Companies are using IoT combined with AI to increase efficiency, improve customer service, reduce costs and increase revenues.

4.1. Precision agriculture

According to the U.S. Government Accountability Office’s *Precision Agriculture Report* (2024), agriculture is using technologies such as GPS and automation to make farms more efficient. For example, farmers can use automated steering systems to precisely seed fields, and activity monitors can help dairy farmers collect data on the health of their cows. Using sensors, AI, and data analytics, precision agriculture

optimizes resource use, reduces waste, and increases crop yields. It can also reduce seasonal labor challenges by tailoring irrigation and fertilization to the exact needs of each crop, leading to more sustainable and productive farming.

4.2. Advanced food processing, smart kitchens

There is growing recognition that everyone is different and needs different treatments and nutrients. Genetics and personalized nutrition can help people live healthier lives and improve performance and recovery. TNO, Wageningen University and Research Institute, and partners have developed an innovative mobile mini factory to produce 3D-printed food. Field studies show that the 3D printing system can successfully optimize nutrition for performance or recovery, tailored to individual needs, preferences, and daily circumstances, and has been tested on various target groups such as (elite) athletes, hospital patients, people with serious illnesses, the elderly, and people rehabilitating at home after an accident or surgery. Many people already believe that internet-based smart kitchen innovation will make meal preparation easier. They may be right, as developers of home robots and artificial intelligence hope that the integration of artificial intelligence, IoT, and genetic testing will pave the way for smart kitchens that can recommend recipes, track nutritional intelligence, and even offer personalized meal plans for each member of a family or organization based on an individual's DNA and health data.

4.3. Food delivery platforms and e-commerce

One of the most compelling ways to engage consumers over time is using technology, such as QR codes on food packaging. These codes can reveal stories about the origins of food through a website, providing insight into the lives of farmers and the methods they use. This initiative not only educates consumers but also fosters a sense of connection to the food they consume. Incorporating a QR code into the communication of a product or service shows that the business has successfully embarked on a journey toward understanding more conscious purchasing decisions. Since Covid-19, restaurants offering delivery have necessarily reached out to digital technology, as former guests sought home delivery options, and catering establishments sought survival opportunities through social media and websites. After the pandemic, restaurants' online ordering platforms remained in a hybrid form and became a separate business as a virtual restaurant with secure payment options. Covid-19 also brought to life a new form of service, ghost kitchens, which are not based on previous clientele, but offer a fast, efficient, diverse solution for busy guests with home delivery. Ghost kitchens reduce overhead costs exclusively for the operation of the cooking kitchen to increase profitability, thus offering a competitive offer behind digital systems.

4.4. Robotics and automation

Patel (2024) states that while automation of food preparation has obvious business benefits, such as lower labor costs and recipes prepared with greater accuracy and consistency, society seems to be reluctant and resistant to the digital transformation of the food market. The impact of IoT on consumer psychology is largely unexplored. For example, an early survey by OpenTable found that more than two-thirds of customers strongly dislike the presence of bots and chatbots during their dining experience (OpenTable, 2017). While consumers are ignorant or reluctant, businesses are increasingly open to automation in food preparation and are quickly adopting the tools and software available to them. Companies are also actively participating in experiments that promise to increase efficiency and productivity. Automation not only increases production speed but also reduces errors and improves food safety by minimizing human contact. Not to mention that automation can improve working conditions by reducing physically demanding, monotonous and dangerous tasks, as robotics in food processing plants are used to perform repetitive and labor-intensive tasks that previously relied on human labor, offering many opportunities for error.

4.5. Personalized nutrition

The growing global awareness of the connection between diet and health is a powerful driver of the new eating culture. Advances in food technology have made it possible to personalize nutritional plans to meet the unique needs of everyone, considering a variety of factors, such as their genetic makeup, lifestyle, and specific dietary preferences. One of the most exciting developments in this area is the use of DNA-based diets. By analyzing an individual's genetic profile, scientists can identify the specific genetic variations that influence how their body processes different nutrients. This valuable information can then be used to create personalized eating plans that optimize nutrient intake and minimize the risk of developing certain health conditions. This trend is fueled by remarkable advances in genetic testing capabilities, the proliferation of wearable health monitoring technologies, and the increasing sophistication of data analytics tools.

Conclusions

The integration of technology is also transforming traditional dining thinking. Digital tools, including online ordering platforms, smart kitchen appliances, service providers and even smart homeowners, are widely used to optimize daily operations and/or reduce costs. Automation is playing an increasingly important role in large-scale manufacturing and restaurant kitchens, where cooking and food preparation technologies are used. The emergence of robot waiters and chefs in some establishments further illustrates this trend. Artificial intelligence is also making its way into both commercial and home kitchens, helping with recipe suggestions and healthier food choices. Technology helps to shape the global conversation about drivers and opportunities for new eating habits while increasing consumer awareness. The continuous and rapid development and exchange of technology also makes the development of global and national data protection policies increasingly unavoidable. On the other hand, by learning about data, consumers can collectively influence the food industry towards fairer operations and more sustainable practices. The commitment to transparency and sustainability can transform the output of food production. In summary, the integration of technology into the food system offers a unique opportunity to positively influence society, if used correctly by those involved.

References

Addo, A.K., 2010. Urban and peri-urban agriculture in developing countries studied using remote sensing and in situ methods. *Remote Sensing*, 2(2), pp.497-513. https://doi.org/10.3390/rs2020497.

Aguilera, J.M., 2006. Seligman lecture 2005 food product engineering: building the right structures. *Journal of the Science of Food and Agriculture*, 86(8), pp.1147-1155. https://doi.org/10.1002/jsfa.2468.

Appio, F.P., Frattini, F., Petruzzelli, A.M. and Neirotti, P., 2021. Digital transformation and innovation management: A synthesis of existing research and an agenda for future studies. *Journal of Product Innovation Management*, 38(1), pp.4-20. https://doi.org/10.1111/jpim.12562.

Ardito, L., Petruzzelli, A.M., Panniello, U. and Garavelli, A.C., 2018. Towards Industry 4.0: Mapping digital technologies for supply chain management-marketing integration. *Business process Management Iournal*, 25(2), pp.323-346. https://doi.org/10.1108/.

Baierle, I.C., da Silva, F.T., de Faria Correa, R.G., Schaefer, J.L., Da Costa, M.B., Benitez, G.B. and Barney, J.B., 2001. Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. *Journal of Management*, 27(6), pp.643-650. https://doi.org/10.1016/s0149-2063(01)00115-5.

Bendig, E., Erb, B., Schulze-Thuesing, L. and Baumeister, H., 2022. The next generation: Chatbots in clinical psychology and psychotherapy to foster mental health–a scoping review. *Verhaltenstherapie*, 32(Suppl. 1), pp.64-76. https://doi.org/10.1159/000501812.

Bharadwaj, A., El Sawy, O.A., Pavlou, P.A. and Venkatraman, N Anandhi., 2013. Digital business strategy: Toward a next generation of insights. *MIS Quarterly,* 37(2) pp.471-482. https://doi.org/10.25300/misq/2013/37:2.3.

Boyd, D. and Ellison, N., 2008. Social network sites: Definition and conception. *Journal of Computer Mediated Communication*, *13*(1), pp.210-230.

Buhalis, D. and Cheng., 2020. Exploring the use of chatbots in hotels: technology providers' perspective. Information and Communication Technologies in Tourism 2020. *Proceedings of the International Conference in Surrey, United Kingdom. Springer International Publishing.* https://doi.org/10.1007/978-3-030-36737-4_19.

Chen, B., Wan, J., Shu, L., Li, P., Mukherjee, M. and Yin, B., 2017. Smart factory of industry 4.0: Key technologies, application case, and challenges. *IEEE Access,* 6, pp.6505–6519. https://doi.org/10.1109/ACCESS.2017.2783682.

Clemons, E.K., Reddi, S.P., and Row, M.C., 1993. The impact of information technology on the organization of economic activity: The "move to the middle" hypothesis. *Journal of Management Information Systems,* 10(2), pp.9-35. https://doi.org/10.1080/07421222.1993.11517998.

Coates, J. F., Mahaffie, J. B., and Hines, A., 1994. Technological Forecasting: 1970-1993. *Technological Forecasting and social change*, *47*, 23-23.

De Giovanni, P., 2023. Sustainability of the Metaverse: A transition to Industry 5.0. *Sustainability*, 15(7), p.6079. https://doi.org/10.3390/su15076079.

Di Renzo, L., Gualtieri, P., Pivari, F., Soldati, L., Attinà, A., Cinelli, G., 2020. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *Journal of Translational Medicine,* 18, p.229. https://doi.org/10.1186/s12967-020-02399-5.

Echegaray, N., Hassoun, A., Jagtap, S., Tetteh-Caesar, M., Kumar, M., Tomasevic, I., 2022. Meat 4.0: principles and applications of industry 4.0 technologies in the meat industry. *Applied Science,* 12, p.6986. https://doi.org/10.3390/electronics11111742.

Freeman, C., 1996. The greening of technology and models of innovation. *Technological Forecasting and Social Change,* 53(1), pp. 27-39. https://doi.org/10.1016/0040-1625(96)00060-1 .

Gaggioli, A., 2017. An open research community for studying virtual reality experience. *CyberPsychology, Behavior & Social Networking*, 20(2), pp.138-139. https://doi.org/10.1089/cyber.2017.29063.csi.

Golmgrein, I., 2023. A comprehensive overview of monetization strategies in creative industries. *International Journal of Latest Engineering and Management Research (IJLEMR)*, 8(10.56581), pp.90-100. https://doi.org.10.56581/IJLEMR.8.4.90-100.

Gössling, S., 2021. Tourism, technology and ICT: A critical review of affordances and concessions. *Journal of Sustainable Tourism,* 29(5), pp.733-750. https://doi.org/10.1080/09669582.2021.1873353.

Hassoun, A., Marvin, H.J., Bouzembrak, Y., Barba, F.J., Castagnini, J.M., Pallarés, N. and Regenstein, J.M., 2023. Digital transformation in the agri-food industry: Recent applications and the role of the COVID-19 pandemic. *Frontiers in Sustainable Food Systems,* 7, p.1217813. https://doi.org/10.3389/fsufs.2023.1217813.

Kottler, B., Fischer, S., Strauss, E., Bulatov, D. and Helmholz, P., 2023. Parameter Optimization for a Thermal Simulation of an Urban Area. *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, *10*, pp.271-278. https://doi.org/10.5194/isprs-annals-X-1-W1-2023-271-2023

Madanaguli, A., Dhir, A., Joseph, R.P., Albishri, N.A. and Srivastava, S., 2023. Environmental sustainability practices and strategies in the rural tourism and hospitality sector: A systematic literature review and suggestions for future research. *Scandinavian Journal of Hospitality and Tourism*, 23(1), pp.1-28. https://doi.org/10.1080/15022250.2023.2174179.

Marino, M., Puppo, F., Del Bo', C., Vinelli, V., Riso, P., Porrini, M. and Martini, D., 2021. A systematic review of worldwide consumption of ultra-processed foods: Findings and criticisms. *Nutrients*, 13(8), p. 2778. https://doi.org/10.3390/nu13082778.

Martinez, M.G. and Briz, J., 2000. Innovation in the Spanish food & drink industry. *The International Food and Agribusiness Management Review*, 3(2), pp.155-176. https://doi.org/10.1016/S1096-7508(00)00033-1.

Mihalic, T. (2024). Metaversal sustainability: conceptualisation within the sustainable tourism paradigm. *Tourism Review*. *doi: 10.1108/TR-09-2023-0609*

Patel, M.K., Rani, R., Sohel, A. and Chauhan, A., 2024. Significant research and technology landscape on electrostatically charged sprays for agro-food and health industry. *Journal of Physics: Conference Series,* 2702(1) p.012013. https://doi.org/10.1088/1742-6596/2702/1/012013.

Polanyi, K. and MacIver, R.M., 1944. *The Great Transformation (Vol. 2, p. 145).* Boston: Beacon Press https://doi.org/10.2307/2144137.

Porter, M.E., 1980. Techniques for analyzing industries and competitors. *Competitive Strategy.* New York: Free Press.

Powell and Dent-Micallef 2017 Powell, T. C. & Dent-Micallef, A. 1997. Information technology as competitive advantage: The role of human, business, and technology resources. *Strategic Management Journal, 18(5), 375-405. https://doi.org/10.1002/(sici)1097-0266(199705)18:5%3C375::aid-smj876%3E3.3.co;2-z*

OpenTable Research Survey Explores Diner Sentiment Toward Technology Use Before, During and After the Meal 05/23/ 2017 *Hospitality Technology* https://hospitalitytech.com/opentable-research-survey-explores-diner-sentiment-toward-technology-use-during-and-after-meal

Solow, B. L. 1987. Capitalism and slavery in the exceedingly long run. *Journal of Interdisciplinary History*, 17(4), 711-737.

Song, S. W., and Chung, D. H. 2021. Explication and rational conceptualization of metaverse. *Informatization policy*, 28(3), 3-22.

Schwab, Klaus. 2017. The fourth industrial revolution. *Crown Currency*, https://doi.org/10.32920/24242932

Ritterbusch, G. D., and Teichmann, M. R. 2023. Defining the metaverse: A systematic literature review. *Ieee Access*, *11*, 12368-12377. *doi*: 10.1080/14626261003786251.

U.S. Government Accountability Office's Precision Agriculture Report (2024) *TECHNOLOGY ASSESSMENT Precision Agriculture Benefits and Challenges for Technology Adoption and Use* GAO-24-105962, *download*: 28/04/ 2025 https://www.gao.gov/assets/d24105962.pdf

Wernerfelt, Birger. 1984. "A resource-based view of the firm." *Strategic management journal 5.2: 171-180. https://doi.org/10.1002/smj.4250050207*

Zhou, L., Li, H., Zhang, S., Yang, H., Ma, Y., and Wang, Y. 2023. Impact of ultra-processed food intake on the risk of COVID-19: a prospective cohort study. *European Journal of Nutrition*, *62*(1), 275-287. https://doi.org/10.1007/s00394-022-02982-0

Food Style Between Cultural Heritage and a Sustainable Future: An Analysis of Consumer Behavior

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Abstract

The growing public interest in health, the environment, and food sustainability has brought to the forefront the need for a deeper understanding of dietary habits and how consumers perceive and integrate traditional and organic products into their daily diets. This article analyzes the attitudes of Romanian consumers toward these categories of products, in a context where sustainable eating is no longer merely a personal choice, but a strategic direction of public interest. The research methodology used is quantitative, employing a structured questionnaire administered to consumers in Romania. The data collected aimed to highlight the particularities of respondents' dietary styles by investigating consumption behavior: perceptions, frequency of consumption, level of information, and motivations behind food choices. Statistical analysis allowed for the identification of relationships between respondents' knowledge and consumption behaviors, as well as the main barriers to choosing organic and traditional products. The results reveal a growing interest in sustainable foods, but also a series of obstacles such as limited access, higher prices, and lack of adequate information. Clear differences emerge between consumer segments, influenced by demographic and socio-economic factors. Thus, this research provides an original contribution by highlighting the connection between consumer perceptions and market realities, offering a solid foundation for developing educational strategies and awareness campaigns aimed at promoting more responsible and health-oriented consumption.

Keywords

Sustainability; organic products; traditional products; dietary pattern; consumer behavior.

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Introduction

Globally, the food industry represents a key pillar of the economy, supporting the livelihoods of millions of people (Popa et al., 2025). Food markets are undergoing a significant transformation driven by rapid technological advancements, changes in consumer preferences, and growing concerns about sustainability. These transformative forces affect the entire food chain — from agricultural producers and the processing industry to distributors, retailers, and consumers—bringing both significant challenges and opportunities for adaptation and innovation (Guș e, 2025). Cultural heritage is a powerful catalyst for sustainable regional development, acting as the essence that defines and shapes regions. It is a vital driver of sustainable regional growth, contributing not only to the preservation of local identity but also to the social and economic revitalization of a country's regions (Chukwurah et al., 2025). It functions as a defining element that shapes the distinct character of each area, inspiring responsible public policies, attracting investments, and stimulating sustainable development. Vermeir et al. (2020) conducted an analysis of sustainable organic food consumption and observed that, although many consumers hold favorable attitudes toward sustainable products, these attitudes do not necessarily translate into purchasing and consumption behaviors. Changing dietary patterns and food preferences, which are deeply rooted in culture and lifestyle, remains a difficult process. This research explores how sustainability and tradition shape consumer behavior in the agri-food

sector, offering insight into consumer preferences and expectations regarding the authenticity and ecological impact of food.

1. Scientific Literature Review – Contemporary Perceptions and Perspectives on the Relationship Between Agriculture, Food, Cultural Identity, and Sustainability in Consumer Behavior

Sustainability in food behavior is based on choices that integrate the consumption of ecological, traditional, and local products, reflecting concerns for a healthy eating style, environmental protection, and local economic development. According to the Food and Agriculture Organization (FAO), these products play a key role in supporting local economies by strengthening the resilience of farming communities and raising consumer awareness regarding the origin and quality of food, helping to shape a sustainable eating style. The natural, authentic, but also seasonal and regional character of these products not only enhances the freshness and nutritional value of food, but also strengthens the direct relationship between producers and consumers, promoting a more transparent and equitable food system (Sandri, Broccolo and Piredda, 2025). The integration of cultural heritage into sustainable regional development processes is an evolving approach, reflecting the growing international recognition of its strategic value. The international community increasingly sees it as an essential and innovative element in regional planning, capable of generating sustainable solutions and contributing to strengthening territorial identity, social cohesion, and economic competitiveness (Chukwurah et al., 2025). European consumers define traditional food products as those that are "frequently consumed or associated with specific holidays and/or seasons, passed down through generations, made in a characteristic way, according to culinary heritage, processed naturally, remarkable and recognized for their sensory properties, linked to a specific local area, region, or country" (Vanhonacker et al., 2010, p.454). Similarly, Peulić et al. (2023) believe that traditional food products stand out through unique characteristics and exceptional quality, offering a sensory experience that connects consumers to the cultural heritage, history, and identity of a specific region. In Europe, the only formal definition available for traditional food products comes from the Ministry of Agriculture of Italy (1999), which describes traditional food products as "agri-food products whose methods of processing, preservation, and aging have been consolidated over time, according to consistent and uniform local customs." In specialized literature, there are multiple definitions, but they all converge on the same idea, namely that a traditional product is a food product made from local raw materials, which does not contain food additives, follows a traditional recipe, and a traditional production and/or processing method, distinguishing it from other similar products in the same category (MADR, 2013).

Promoting the consumption of traditional foods can play a significant role in accelerating progress towards sustainable development goals. These food products, typically made from natural ingredients sourced locally, are not only accessible and easy to distribute on a large scale, but also contribute to strengthening local economies by supporting small producers. Furthermore, traditional foods resonate with the taste preferences and eating styles of a significant portion of consumers, which gives them a high potential for adoption among new generations, thus fostering sustainability both economically and culturally (Kristia, Kovács and Erdey, 2024). On the other hand, according to FAO's definition, ecological products come from agricultural systems that aim to conserve biodiversity, protect ecosystems, and maintain consumer health. These systems exclude the use of synthetic chemical pesticides and genetically modified organisms, focusing on natural agricultural methods such as crop rotation and the use of organic fertilizers. Recent research highlights that organic farming is more profitable, providing food with comparable or superior nutritional value to that of conventional farming. Additionally, ecological farming practices generate important social benefits and ecosystem services (Sandri, Broccolo and Piredda, 2025). Cachero-Martínez (2020) argues that a product can only be considered organic if it is obtained through a process that respects the soil, maintains its nutrient balance, and excludes the use of chemicals. Consuming these products contributes to protecting the health of consumers as well as farmers and workers involved in production, reducing their constant exposure to chemicals. Huang et al. (2023) offer a broader definition, describing organic products as goods or services generated through the interaction between natural ecosystems and human activities, aimed at promoting human well-being through biological processes. Moreover, sustainable diets are dietary models characterized by minimal environmental impact and the ability to support long-term food security, nutrition, and human health, both for current and future generations. These diets promote biodiversity protection and ecosystem conservation, while being culturally adapted, economically accessible, and equitable. They contribute to the efficient and responsible use of natural and human resources and offer adequate nutritional intake, as well as a healthy eating style (FAO, 2010).

The consumption of traditional foods is driven by the diversification of offerings, with the number of traditional products increasing significantly, by about 15.7% between 2020–2024, according to data from

the Catalog of Certified Products and Activities from the Ministry of Agriculture and Rural Development (MADR, 2025). To promote unified regional development, additional support measures for small producers in underrepresented counties are necessary to ensure the equitable valorization of national gastronomic heritage. A solid gastronomic culture and the growing interest in certifying local products are aspects that contribute to strengthening the value of regional products. Regarding the number of certified ecological operators, it increased 4.45 times in 2023 compared to 2010, after a decline between 2012–2017 due to high costs and strict certification requirements, according to data from the Government of Romania (2025). The resurgence was supported by market stabilization, improved European subsidies (compensatory payments of up to 620 euros per hectare for land undergoing conversion), and growing consumer interest in healthy foods, both nationally and internationally (MADR, 2019, p.6). Additionally, the area of agricultural land dedicated to ecological crops showed an upward trend, being approximately 3.8 times larger in 2023 than the 2010 reference level (Fibl Statistics, 2023). This evolution can be explained by financial support through subsidies and funds under the Common Agricultural Policy, increased consumer interest in healthy food products, the need to adapt to climate change through sustainable agricultural practices (such as crop rotation and the use of natural fertilizers), and improved access to international markets. Although the area of land dedicated to organic crops in Romania increased between 2008 and 2022, it still remains significantly below the European average, where many countries exceed 10-15% of total agricultural land (European Court of Auditors, 2024). According to specialists and farmers, this gap is attributed to the difficulties encountered in transitioning from conventional to organic farming. Romania is among the eight EU member states where organic farming occupies less than 5% of agricultural land, far from the European target of 25% by 2030, set by the "Farm to Fork" strategy (European Council, 2025). Between 2021 and 2023 (Figure no. 1), the largest increases in organic areas were recorded in the "Pastures and Meadows" (+32.5%) and "Cereals" (+23.6%) categories, while "Fresh Vegetables" saw the smallest increase (+17.2%). This dynamic reflects the economic advantages of less expensive crops, better supported by subsidies, compared to vegetables, which involve higher costs, labor-intensive work, and more complex logistics, as well as higher sensitivity to weather conditions, but also the cumulative influence of major factors: the impact of the pandemic on labor and supply chains, unpredictable weather conditions (such as drought and extreme events), rising input costs, and changes in subsidy policies.

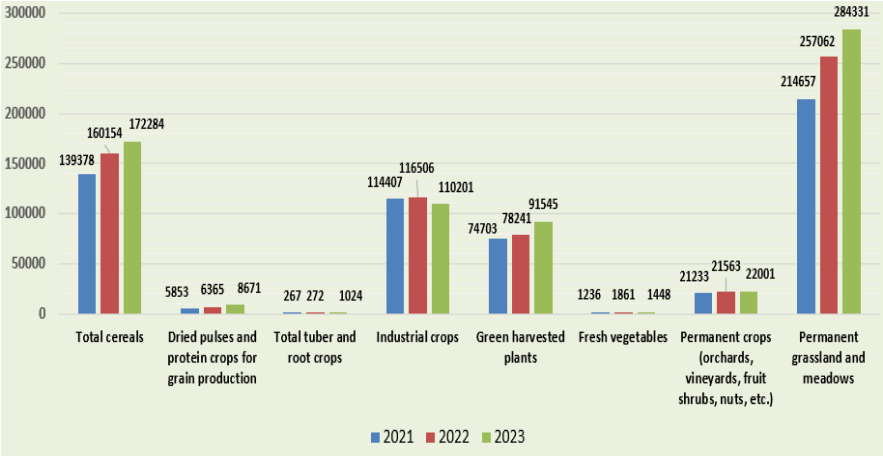

Figure no. 1. Evolution of areas for the main categories of organic agricultural crops (ha)
Source: GOV.RO, 2025

At the same time, if we were to refer to the value of organic product sales, we can say that it has grown consistently, with periods of rapid expansion, indicating a positive trend in their adoption. This growth is due to the increasing demand, consumer awareness of the ecological benefits for health and the environment, shifts toward sustainability, and favorable economic measures. In parallel, strategic investments and appropriate policies could significantly contribute to strengthening Romania's role in European agriculture, supporting the expansion of the supply and increasing the accessibility of organic products on an increasingly larger market.

2. Research Methodology

This paper analyzes consumer perception of traditional and organic products, aiming to assess the extent to which these products are integrated into daily diets. The main objectives of the paper are: evaluating the

consumption behavior of these products, gathering consumer opinions on quality and value for money, identifying influencing factors in purchasing decisions, analyzing the perceived advantages and disadvantages of organic and traditional products, and investigating consumer interest in additional information about sustainability. To obtain the necessary data for the research, the quantitative survey method was used, applied through a structured investigative technique, specifically the self-administered questionnaire, distributed online using the Google Forms platform. Sampling was carried out using the convenience method and the "snowball" technique. The research instrument included a total of 27 questions, seven of which addressed socio-demographic aspects. Data collection took place between February 17–24, 2025. The analysis aimed to establish the relationship between independent variables (residence environment, education level, and the influence of information from the media) and consumption habits of organic and traditional products, treated as dependent variables (perception of availability, frequency of purchase, and the importance of labeling). The obtained data were processed and analyzed using Microsoft Excel, applying the CORREL function to determine correlation coefficients for hypothesis testing. Based on these specific objectives, three main research hypotheses were formulated:

- **Hypothesis 1 (H1):** There is a strong positive correlation between the residence environment and the perception of the availability of organic products compared to traditional ones.
- **Hypothesis 2 (H2):** There is a weak positive correlation between the influence of information from the media and the frequency of purchasing organic products.
- **Hypothesis 3 (H3):** There is a strong positive correlation between the education level and the importance given to reading product labels before purchasing.

3. Results and Discussion

Following the outline of the socio-demographic profile of consumers (men, aged 18-24, with university education, from urban areas, with monthly incomes between 2001-4000 RON, from the capital and nearby areas), as shown in table no. 1, it was found that one-third of them buy organic products weekly, while a quarter purchase them once a month. The majority of consumers (73%) prefer supermarkets for their accessibility, variety, and good prices. Online stores and local fairs attract 9% each, proximity stores 5%, while alternative sources (bio vending machines, eco restaurants, health food stores) each attract only 1%, indicating low interest in these options. The majority of respondents (45%) do not perceive significant quality-price differences between organic and traditional products. However, 29% consider organic products superior in terms of quality, while 26% prefer traditional products for a better quality-price ratio. Additionally, most respondents (57%) consider organic products as accessible as traditional ones, while 35% find them harder to locate, indicating differences in accessibility depending on location or sales channel.

Table no. 1. Socio-demographic profile of respondents

Variables	**Percentage (%)**	**Variables**	**Percentage (%)**
Gender		Monthly Income	
Female	43	Below 2,000 RON	18
Male	55	2.001-4.000 RON	40
Prefer not to answer	2	4.001-6.000 RON	28
Age		6.001-8.000 RON	6
18-24 years	73	Over 8,000 RON	8
25-34 years	18	**Geographic Region**	
35-44 years	8	North-East	8
45-54 years	1	South-East	12
Highest Level of Education		South Muntenia	17
High School	30	South-West Oltenia	8
Post-secondary School	2	West	7
University	60	North-West	1
University (Master's/Doctorate/Post-doctorate)	8	Center	11
Residence Area		Bucharest-Ilfov	36
Urban	67,7		
Rural	32,3		

For the evaluation of traditional and organic products, as well as for the analysis of the frequency of organic product consumption, the Likert scale was used, adapted according to the context. In the case of evaluating the attributes of the products (flavor, taste, appearance, smell, health), a scale from 1 to 5 was used, where each point reflected the perceived level of appreciation. The scores were calculated by multiplying each rating on the scale by the number of responses received, and the resulting values were summed and divided by the total number of respondents. In the analysis of consumption frequency, the Likert scale was used with four levels: "never," "occasionally," "frequently," and "always," coded numerically from 1 to 4, following the same methodology for calculating the average scores.

In evaluating organic products by consumers (Figure no. 2), the criterion "health" recorded the highest score (4.19), ranking first among the five criteria analyzed, highlighting the major importance placed on health benefits in the consumer decision-making process. In the secondary plan, sensory determinants were rated in a clear sequence, with "taste" (3.81) in the immediate next position, followed by "appearance" (3.72), "flavor" (3.41), and "smell" (3.32). These results indicate that, although health is the primary criterion in consumer perception, the sensory characteristics of organic products remain significant elements in the evaluation and selection process.

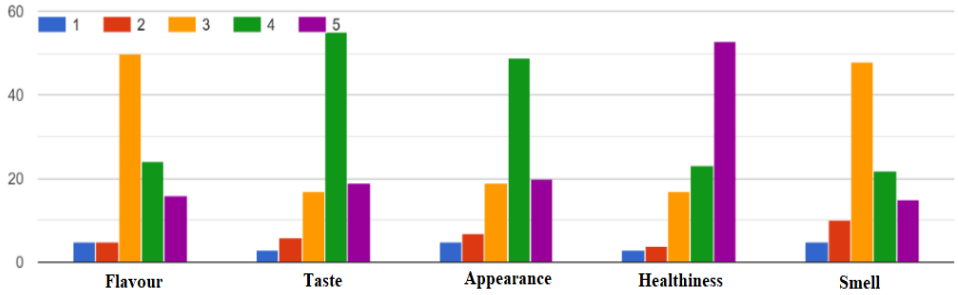

Figure no. 2. Evaluation of organic products by consumers

In the evaluation of traditional products (Figure no. 3), the score analysis reveals that "taste" (average score of 3.87) is the most appreciated criterion by consumers, with this preference being associated with the pleasure of consumption and the perception of an authentic flavor characteristic of traditional products. The aroma (3.73) and visual appearance (3.67) of traditional products are also well regarded, while the smell (3.53) receives more moderate ratings, possibly due to variations between products or the more pronounced intensity typical of traditional preparations. In contrast, the "health" dimension recorded the lowest score (3.36) for traditional products, suggesting that, despite their high taste value, they are not perceived as particularly healthy food options, possibly due to the presence of ingredients that do not contribute favorably to a balanced diet.

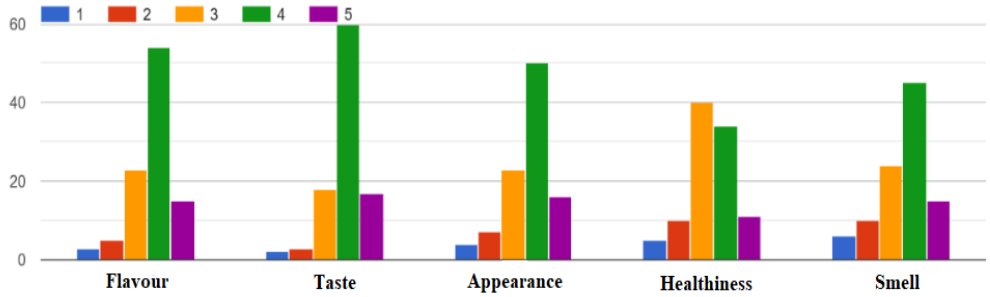

Figure no. 3. Evaluation of traditional products by consumers

As shown in figure no. 4, organic vegetables and fruits are the categories most frequently integrated into the respondents' diet, with average scores of 2.58 and 2.57, respectively. On the opposite end, the consumption of organic bakery products and meat is at a lower level, recording the lowest average scores—2.18 and 2.24. The significant differences observed between the analyzed categories may reflect the presence of limiting factors, such as higher prices for certain organic products, limited availability in local retail networks, or a lower familiarity of consumers with these types of products, due to insufficiently established eating practices.

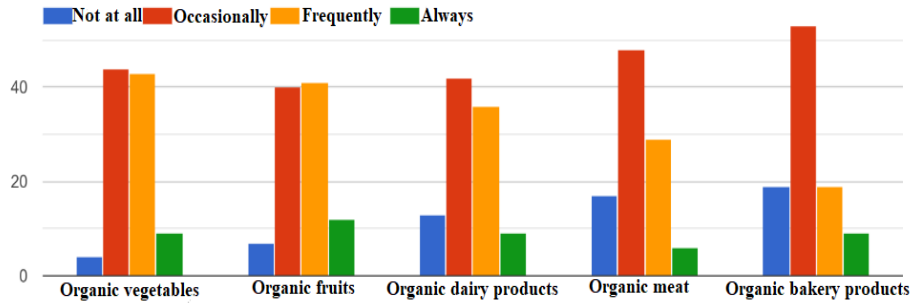

Figure no. 4. Frequency of consumption of organic products

The scores obtained for each category of traditional products indicate a moderate level of integration into the respondents' diet (Figure no. 5). The highest values were recorded for traditional meat products (2.93), suggesting frequent and consistent consumption. The next category with the highest consumption frequency is traditional vegetables (2.91), reflecting their essential role in the daily diet. Traditional fruits (2.87) and traditional dairy products (2.75) are consumed to a slightly lesser extent, but still represent significant elements of the diet. In contrast, traditional bakery products recorded the lowest score (2.67), which may suggest a more limited integration into daily eating habits, possibly due to their replacement by modern alternatives.

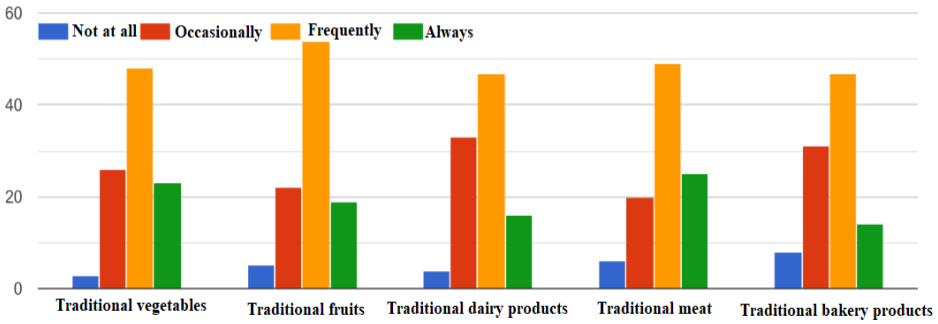

Figure no. 5. Frequency of consumption of traditional products

Organic products are valued for their health and environmental benefits, being perceived as having superior quality and better taste. However, high prices, limited availability, and greater perishability constitute significant obstacles for consumers, limiting their widespread adoption. Additionally, the process of identifying and selecting these products can be time-consuming. On the other hand, traditional products are attractive due to their accessibility, familiar taste, and lower price. They are easy to find, support the local economy, and preserve traditions. However, concerns about their environmental impact and health risks may create hesitation among consumers. The media moderately influences the purchasing decisions of the majority of respondents (57%), while 22% are more skeptical. Most respondents (72%) read product labels, indicating an interest in understanding their composition and origin. However, 28% do not pay enough attention to labeling, which can affect informed and safe purchasing choices. Transparency, certifications, and positive reviews can help increase consumer trust. Organic product producers and retailers should improve the availability of these products by diversifying distribution channels and conducting educational campaigns. A significant number of respondents (71%) show moderate interest in sustainability, while only 16% are very interested in this topic. Also, the season influences consumer preferences, with 13% of respondents being highly influenced by holidays in their consumption choices, associating certain products with specific events. Another 52% are moderately influenced by the season, choosing organic or traditional products more frequently during festive periods, but not exclusively.

To test the three initial research hypotheses, correlation coefficients were calculated to establish the direction and strength of the relationships between the identified variables. The analysis revealed that two of the hypotheses were validated, supported by the obtained and processed data, while one was invalidated, as follows:

- **H1** was validated, highlighting a strong positive correlation between the place of residence and the perception of the availability of organic products compared to traditional ones ($r = 0.8767$); thus, consumers living in urban areas tend to perceive greater availability of organic products compared to traditional ones, unlike those living in rural areas.

- **H2** was validated, indicating a positive but weak correlation between the influence of the media and the frequency of organic product purchases (r = 0.2344). This means that as exposure to media information about organic products increases, the frequency of their purchase also increases, but this relationship is weak in intensity, influenced by other relevant factors, such as price, product availability, personal values, or social influences.
- **H3** was invalidated, with no significant correlation between the level of education and the importance given to reading labels (r = -0.0132); thus, consumers with a higher level of education tend to pay more attention to label information for better understanding.

Conclusions

Traditional food products continue to be perceived by consumers as authentic and associated with a familiar taste, with their choices influenced by economic, cultural, and social factors. However, in recent years, organic products have experienced a significant increase in popularity globally, marking a notable shift in consumer behavior. This transition, accelerated by the pandemic context, has led to a deeper reflection on eating habits and the environmental impact of individual consumption behavior. The study validates the idea that eco-consumerism is on the rise, as reflected by the one-third proportion of respondents who frequently purchase organic products. This trend highlights the growing interest in a healthy, sustainable, and ethical lifestyle. However, a considerable portion of consumers remains loyal to traditional products, citing reasons such as lower prices, greater availability (especially in areas with a limited supply of organic products), and a familiar taste that has been consolidated over time.

Although many respondents would like to integrate organic products more frequently into their daily diets, they condition this on factors such as lower prices, expanded supply, clear and transparent certifications, recommendations from other consumers, and access to information about the origin of the products. Openness to sustainable consumption is also supported by the high interest expressed in sustainability information, both for organic and traditional products.

To stimulate the consumption of organic and sustainable products, measures such as subsidies for local producers, diversification of distribution channels (including online), public education campaigns, promotion of official certifications, and the development of marketing strategies that emphasize the taste and quality of these products are recommended. The main limitation of the study arises from the small sample size, with the research based on 100 questionnaires, which nonetheless allowed for a better understanding of the addressed issue, generating new ideas and offering depth and flexibility in interpreting the results. A future research direction could involve longitudinal studies that track changes in the consumption behavior of organic and traditional foods over the long term, correlated with economic and social development. Such research could contribute to understanding how urbanization, living standards, and other economic variables influence the choice of sustainable products.

References

Cachero-Martínez, S., 2020. Consumer Behaviour towards Organic Products: The Moderating Role of Environmental Concern. *Journal of Risk and Financial Management*, 13(12), p.330. https://doi.org/10.3390/jrfm13120330.

Chukwurah, G.O., Okeke, F.O., Isimah, M.O., Enoguanbhor, E.C., Awe, F.C., Nnaemeka-Okeke, R.C., Guo, S., Nwafor, I.V. and Okeke, C.A., 2025**.** Cultural Influence of Local Food Heritage on Sustainable Development. *World*, *6*, 10. https://doi.org/10.3390/world6010010.

European Council, 2025. *De la fermă la consumator* [online]. Available: < https://www.consilium.europa.eu/ro/policies/from-farm-to-fork/ > [Accessed 15 April 2025]

European Court of Auditors, 2024. *Agricultura ecologică în UE: lacune și inconsecvențe frânează succesul politicii* [online]. Available: < https://www.eca.europa.eu/ECAPublications/SR-2024-19/SR-2024-19_RO.pdf > [Accessed 13 April 2025].

FAO, 2010. Sustainable diets and biodiversity: directions and solutions for policy, research and action, *Proceedings of the International Scientific Symposium "Sustainable diets and biodiversity"*, 3-5

November 2010, Rome. [online] Available: < https://openknowledge.fao.org/handle/20.500.14283/i3022e> [Accessed 26 March 2025]

Fibl Statistics, 2023. *Key indicators* [online]. Available: https://statistics.fibl.org/europe/key-indicators.html [Accessed 26 March 2025].

GOV.RO, 2025. *Dinamica operatorilor si a suprafetelor in agricultura ecologica* [online]. Available: < https://madr.ro/agricultura-ecologica/dinamica-operatorilor-si-a-suprafetelor-in-agricultura-ecologica.html > [Accessed 14 April 2025].

Guşe, G.R., 2025. Food Market Shifts – Challenges for Food Chain Actors. *Amfiteatru Economic*, 27(69), pp. 285-290. https://doi.org/10.24818/EA/2025/69/285.

Huang, Y., Ma, R., Zhou, W., Yuan, Y., Ren, J. and Cao, Y., 2023. Risk assessment and regulation between the supply and demand of ecological products: A comprehensive framework and case study. *Ecological Indicators*, 154, 110617. https://doi.org/10.1016/j.ecolind.2023.110617.

Kristia, K., Kovács, S. and Erdey, L., 2024. Generation Z's appetite for traditional food: unveiling the interplay of sustainability values as higher order construct and food influencers in Indonesia. *Discov Sustain* 5, 493. https://doi.org/10.1007/s43621-024-00714-4.

Ministerul Agriculturii și Dezvoltării Rurale (MADR), 2013. *Ordinul nr. 724/2013 privind atestarea produselor tradiționale* [online]. Available: < https://www.madr.ro/docs/ind-alimentara/produse-traditionale/ordin-privind-atestarea-produselor-tradi%C8%9Bionale.pdf >[Accessed 20 February 2025].

Ministerul Agriculturii și Dezvoltării Rurale (MADR), 2019. *Ghid informativ pentru beneficiarii Măsurii 11 – Agricultura ecologică în cadrul PNDR 2014–2020* [online]. Available: < https://apia.org.ro/files/pages_files/Ghid_informativ_masura_11_2019.pdf > [Accessed 18 March 2025].

Ministerul Agriculturii și Dezvoltării Rurale (MADR), 2025. *Catalogul Produselor și Activităților Certificate [*online]. Available: < https://cpac.afir.info/ToateProdusele > [Accessed 25 March 2025].

Ministerul Agriculturii, 1999. *Decretul Legislativ din 30 aprilie 1998, articolul 8* [online]. Available: < > https://www.politicheagricole.it/flex/files/2/8/3/D.6e040e389358226b4c8e/Decreto_Legislativo_30_aprile_1998__n._173.pdf > [Accessed 6 February 2025].

Peulić, T., Marić, A., Maravić, N., Novaković, A., Kalenjuk Pivarski, B., Čabarkapa, I., Lazarević, J., Šmugović, S. and Ikonić, P., 2023. Consumer Attitudes and Preferences towards Traditional Food Products in Vojvodina. *Sustainability*, 15(16), 12420. https://doi.org/10.3390/su151612420.

Popa, I., Stănescu, S.-G., Duică, A., Molnar, E.I. and Duică, M.C., 2025. Cost Optimisation of Supply Chains in the Food Industry: Cost Function Modelling. *Amfiteatru Economic,* 27(69), pp. 293-312. https://doi.org/10.24818/EA/2025/69/293.

Sandri, E.; Broccolo, A.; Piredda, M., 2025. Analysis of the Importance of Food Sustainability and the Consumption of Organic and Local Products in the Spanish Population. *Sustainability*, *17*, 991. https://doi.org/10.3390/su17030991.

Vanhonacker, F., Verbeke, W., Guerrero, L., Claret, A., Contel, M., Scalvedi, L., Żakowska-Biemans, S. and Gutkowska, K., 2010. How European consumers define the concept of traditional food: evidence from a survey in six countries. *Agribusiness*, 26(4), pp.453-476. https://doi.org/10.1002/agr.20241.

Vermeir, I., Weijters, B., De Houwer, J., Geuens, M., Slabbinck, H., Spruyt, A., Van Kerckhove, A., Van Lippevelde, W., De Steur, H. and Verbeke, W., 2020. Environmentally Sustainable Food Consumption: A Review and Research Agenda From a Goal-Directed Perspective. *Frontiers in Psychology*,11. https://doi.org/10.3389/fpsyg.2020.01603.

The Role of Plant-Based Foods in Building a Healthy and Ecologically Responsible Lifestyle

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Abstract

In the context of climate change and global concerns regarding environmental sustainability, the food sector plays a crucial role in reducing ecological impact. Conventional food systems, based on animal-derived products, are associated with significant greenhouse gas emissions and the depletion of natural resources. In contrast, plant-based foods offer an environmentally friendly alternative, while also promoting a health-conscious and responsible lifestyle. This article is based on quantitative research conducted among Romanian consumers through the application of a self-administered questionnaire. The main aim of the study is to explore consumer perceptions of plant-based diets and to identify the factors that either facilitate or hinder their adoption as part of a sustainable diet. The study highlighted a significant interest among Romanian consumers in plant-based products, considering their effects on health and the environment. However, several major barriers to adoption were identified, including higher costs, perceived inadequate taste, and uncertainty regarding the nutritional value of such products. In addition, limited access to plant-based alternatives and the lack of adequate informational flow are significant factors contributing to the persistence of traditional dietary behaviors. The study makes a valuable contribution to the academic literature by identifying the main barriers and opportunities in the transition towards a plant-based diet at the national level, as well as by emphasizing informational gaps that influence consumer decision-making. These findings provide a deep understanding of the complexity of dietary behavior change within Romania's socio-economic context. The results can inform the development of effective public policies and tailored marketing strategies that support plant-based food consumption. Educational campaigns and measures aimed at improving access to sustainable products can contribute to changing dietary habits by promoting a responsible lifestyle from both an environmental and public health perspective.

Keywords

Plant-based foods, responsible lifestyle, health and ecology, consumer behavior.

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Introduction

Passiou et al. (2023) argue that the global food system is under increasing pressure to meet the food demand generated by rapid population growth, without compromising ecosystem balance. Moreover, the simultaneous crises of climate change and public health deterioration—driven by the industrialization of agriculture and the widespread adoption of diets based on ultra-processed foods—are undermining both environmental sustainability, through increased agricultural emissions, deforestation, and food waste, and population well-being, by promoting an imbalanced and nutritionally deficient food consumption pattern (Mambrini et al., 2025). In this context, concerns regarding human health and environmental protection have led to significant transformations in food systems, both globally and locally. According to Eisen and

Brown (2022), these changes are reflected in technological advancements in food production, as well as in a significant shift in consumption habits, marked by a growing interest in plant-based foods.

However, Dagevos and Verbeke (2022) point out that in industrialized Western societies, the market for high-protein food products is still dominated by those of animal origin, and traditional market structures continue to promote meat consumption as a normalized component of the diet. In this context, market actors play a crucial role in facilitating the transition toward more sustainable food systems, and one of the main challenges they face is promoting plant-based foods and dietary practices in a way that appeals to an increasing number of consumers (Aschemann-Witzel et al., 2021).

Plant-based foods can represent a viable solution to support the transition to new dietary models that foster a lifestyle that is both health-conscious and ecologically responsible, helping to mitigate the difficulties associated with dietary restructuring (Alae-Carew, 2022). This article extends the scope of research in the field by focusing on the connection between ecology, health, and responsible consumer lifestyles in Romania, as there are gaps in previous studies from this perspective. The growing interest in plant-based food consumption requires further investigation, starting from the analysis of consumers' perceptions and behaviors towards such products, in order to determine the role of plant-based foods in promoting health and supporting a sustainable future.

1. Review of the scientific literature

A study conducted by Faber et al. (2020) compared consumer perceptions of three dietary categories associated with plant-based eating ("vegan," "vegetarian," and "plant-based") and found that the term "plant-based" was generally viewed more favorably than the other two. The vegetarian diet is characterized by diversity in dietary practices, with the common feature being the exclusion of products derived from slaughtered animals, namely meat (McEvoy, Temple and Woodside, 2012). In contrast, the vegan diet includes exclusively plant-based foods such as fruits, vegetables, grains, oilseeds, and legumes (Bobe, Procopie and Bucur, 2025). The term "plant-based," which is increasingly used, proves to be more ambiguous. In the context of plant-based diets (Storz, 2022), some individuals perceive them as including only plant-derived foods, while others define them as being predominantly composed of plant-based ingredients. Other authors classify plant-based diets based on their specific composition, such as: semi-vegetarian (a regular diet with reduced portions or frequency of animal products), pescatarian (which includes fish, with or without eggs and dairy), lacto-ovo-vegetarian (including eggs and dairy), and vegan (Williams and Patel, 2020).

The adoption of alternative vegetarian diets is often influenced by health considerations, while concerns about animal welfare and environmental impact also contribute to supporting these dietary choices. In this context, new plant-based food products are being promoted as viable alternatives to animal-derived foods, responding to consumers' individual dietary preferences. The scientific literature highlights a number of key drivers behind the consumption of plant-based products, such as trust, ethical and ecological motivations, along with significant barriers, including cost, taste, and lack of information (Rini et al., 2025).

Among the main factors supporting the transition to a plant-based diet are the health benefits, as such diets are associated with a reduced risk of chronic diseases due to their high content of fiber, vitamins, and antioxidants. Ecological arguments emphasize the role of plant-based food consumption in promoting sustainability, given its lower environmental impact compared to animal-based products. Scientific research reinforces and validates the positive effects of environmentally and socially responsible behavior, as well as its benefits for human health. Therefore, Figure no. 1 provides an integrative perspective on the multiple benefits of plant-based foods, linking individual behaviors and lifestyle choices with social implications and sustainability.

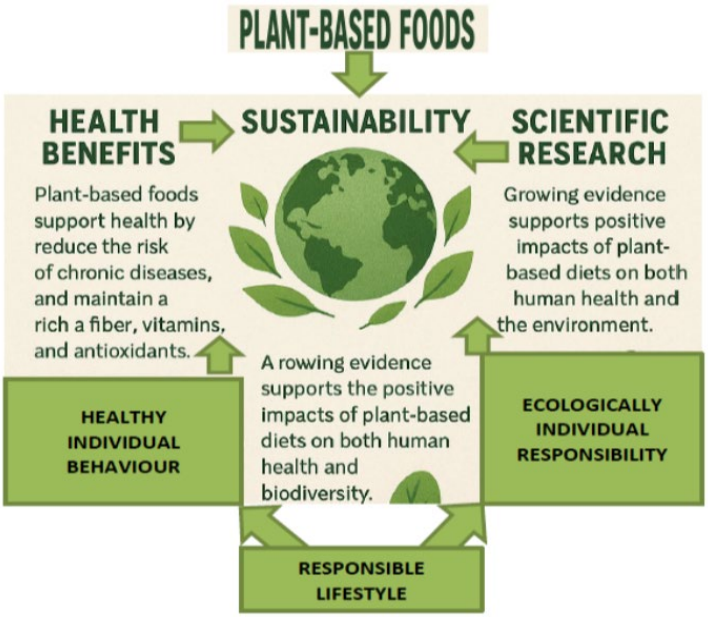

Figure no. 1. Impact of the plant-based foods on a responsible lifestyle
Source: our representation

The plant-based food market in Romania is relatively small and still developing, compared to other countries in Europe. Currently, it focuses primarily on plant-based dairy and meat substitutes, which are the only categories for which official statistics are available. However, sales data indicate a rapid increase in consumer demand, signaling that the market is expanding (Gfi, Europe, 2023). According to data provided by Statista (2025), the plant-based food market in Romania has experienced significant growth in recent years. In 2021, sales were 35.14% higher compared to 2020, and in 2022, the increase compared to the same reference year reached 66.84%. This evolution reflects an emerging trend among Romanian consumers toward adopting diets that include plant-based alternatives, indicating a growing inclination towards responsible and conscious consumption practices. Changes in consumption behavior not only reflect a diversification of food preferences but also a heightened concern regarding health and environmental impact.

According to data presented by Euromonitor (2025), plant-based dairy alternatives have proven to be the most popular category of dairy products purchased by Romanian consumers. In 2024, sales of these products reached 178.4 million RON, representing a remarkable increase of 3.6 times compared to 2018 levels. This significant growth suggests a major shift in Romanian food preferences, with consumers increasingly attracted to plant-based alternatives to traditional dairy products. The second most popular category in sales is plant-based yogurt substitutes, which have shown a remarkable jump, reaching a value of 43.2 million RON by the end of 2024. This represents an approximately sevenfold increase compared to sales in 2018, while plant-based cheese substitutes take the third position, with sales reaching 6.7 million RON in 2024, compared to an estimated 0.5 million RON in 2018. The significant increases in sales demonstrate an important shift in the Romanian food market, moving toward greater diversification and wider acceptance of plant-based products.

The plant-based dairy alternative market in Romania is dominated by Danone, which holds 68.6% of the total market share, enjoying a significant advantage over its competitors (Figure no. 2). Since 2016, Danone Romania has included plant-based products under the Alpro brand in its portfolio, contributing to the growing popularity of this segment (Danone Romania, 2025).

The growth dynamics of plant-based meat substitutes follow a similar trend to those of dairy alternatives, registering a 43% increase in 2021 and an 82.9% increase in 2022 compared to 2020. This reflects a significant change in consumer behavior, driven by factors such as health concerns, food innovation, and ecological awareness. According to the Gfi Europe report (2023), the most popular plant-based meat alternatives in Romania are processed plant-based products (replacing burgers, minced meat, and nuggets), which account for 85% of sales by value, followed by plant-based pâtés, which represent 15%.

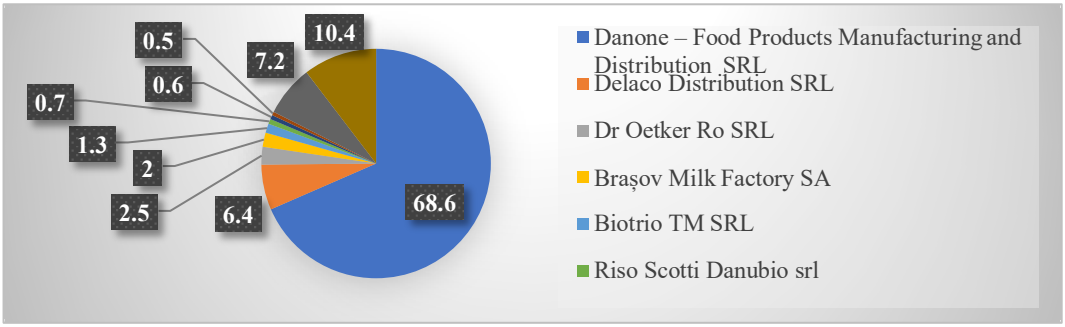

Figure no. 2. Market Shares of Companies for Plant-Based Dairy Alternatives - 2024
Source: Euromonitor International, 2024

This dynamic can be explained by the frequent focus of promotional campaigns on the three main rationales that underpin the motivation for adopting plant-based diets: health benefits, environmental impact, and animal rights considerations (Hopwood et al., 2020). The motivational complexity of eating behavior calls for a reevaluation of public policies and awareness strategies that align with the growing interest in an ecologically and health-conscious responsible lifestyle.

2. Research Methodology

This study aims to understand how sustainable food choices can contribute to building conscious, informed, and balanced daily practices in the context of transitioning to a healthy lifestyle. This approach seeks to integrate consumers' perceptions of plant-based food consumption with social and ecological responsibility in nutrition. The premises of this study are based on the results of a previous qualitative research project regarding young people's perceptions of vegan diets, conducted within the university environment in Romania. This previous study highlighted the multiple dimensions of motivation for choosing a vegan diet, particularly with respect to ethical, health, and environmental considerations (Bobe, Procopie, and Bucur, 2025). Building upon the themes identified as research directions, the present study aims to expand the analysis by exploring the role of plant-based foods in shaping a responsible lifestyle, both in terms of individual health and ecological impact.

For data collection in this study, a quantitative research methodology was adopted, using a self-administered questionnaire as the main tool. The questionnaire was distributed online via the Google Forms platform, which allowed for the rapid collection of responses. Participants were selected using a convenience sampling method, utilizing the "snowball" technique, where initial respondents were encouraged to share the questionnaire within their social networks. This strategy facilitated the expansion of the database in a short period of time and with limited resources, but it also limits the generalizability of the conclusions to the entire population. The questionnaire consisted of 23 items, including questions dedicated to collecting socio-demographic information. The data collection process took place over a period of six days, from February 23 to February 28, 2025. The goal of the paper is to examine the role of plant-based foods in promoting health and supporting a sustainable future by analyzing consumers' perceptions and behaviors towards these products. The main objectives of the research include: the analysis of socio-economic factors that influence the frequency of plant-based product consumption, the investigation of the role of nutritional counseling in shaping positive perceptions regarding the nutritional value of plant-based products, as well as the exploration of plant-based food consumption behavior in the context of adopting a responsible lifestyle. The obtained data were processed and analyzed using Microsoft Excel, applying the CORREL function to determine correlation coefficients in order to test the formulated hypotheses. Based on these specific objectives, three main research hypotheses were formulated:

- **Hypothesis 1 (H1):** It is hypothesized that there is a strong, positive correlation between the level of monthly income and the frequency of plant-based product consumption.
- **Hypothesis 2 (H2):** It is hypothesized that there is a strong, positive correlation between consulting a nutrition specialist and a positive perception of the nutritional value of plant-based products.
- **Hypothesis 3 (H3):** It is hypothesized that there is a moderate, positive correlation between the level of education and the frequency of plant-based product consumption.

3. Results and discussion

The sample consists of 100 respondents, of which 52% are female. The majority are young individuals aged between 18 and 34 years (88%), with higher education (74%, of which 66% have a bachelor's degree and 8% have a master's/doctorate/postdoctoral degree). Most live in urban areas (66%), 45% have an income between 2.001-4.000 RON, and 27% have an income between 4.001-6.000 RON, according to Table no. 1.

Table no. 1. Socio-demographic profile of respondents

Variables	Percentage (%)	Variables	Percentage (%)
Gender		**Monthly Income**	
Woman	52	Below 2. 000 RON	18
Man	46	2.001-4.000 RON	45
Prefer not to answer	2	4.001-6.000 RON	27
Age		6.001-8.000 RON	7
18-24 years	52	Above 8.000 RON	0
25-34 years	36	**Residence Area**	
35-44 years	7	Urban	66
45-54 years	5	Rural	34
Last level of education completed			
High school	20		
Post-secondary school	6		
University	66		
University (Master's/Doctorate/Post-doctorate)	8		

Based on the processed responses, it is noteworthy that 17% of respondents frequently consume plant-based products, 52% consume them occasionally, 15% have tried them in the past but no longer consume them, and 16% do not consume them at all. These results show that, although not all respondents are regular consumers, the majority are open to plant-based alternatives, especially dairy and meat substitutes: plant-based milk is the most popular, followed by plant-based cheeses and plant-based meat, then oils and plant-based yogurts. Consumers are increasingly interested in how foods can support health through functional and nutritional benefits. The responses from the survey show that many are aware of the advantages of plant-based products, particularly for health, chronic disease prevention, and improving digestion. Additionally, 35% of respondents recognize the positive environmental impact, highlighting that these foods produce lower emissions, use fewer resources, and pollute less than animal-based products.

One of the main disadvantages associated with plant-based products, according to consumer perceptions, is the high price. The current cost-of-living crisis exacerbates this issue, causing many consumers to abandon plant-based alternatives in favor of more affordable options. About 46% of respondents consider a vegan diet to be too expensive. Moreover, 41% of participants express concerns about possible nutritional deficiencies associated with plant-based diets, especially in the absence of proper planning. Essential nutrients such as iron, calcium, and vitamin B12, commonly found in animal-based foods, may be lacking in an unbalanced plant-based diet. However, these risks can be mitigated by careful food selection. Another negative aspect, mentioned by 27% of respondents, is the degree of processing of some plant-based products, which may contain added sugar, salt, or oil, thus deviating from their natural form.

The study also aimed to identify the main barriers to consuming plant-based products. Beyond price, considered the primary constraint, a significant obstacle is the taste and texture of these products, which differ from those of animal-based foods in terms of sensory profile and physicochemical properties. To support the continued development of this segment, technological advances are needed to produce plant-based products that are as close as possible to their animal-based counterparts, both in terms of taste and texture. Another major impediment is the lack of consumer awareness regarding the nutritional benefits of plant-based products and the proper ways to integrate them into a balanced diet. A lack of knowledge may cause reluctance in adopting a plant-based diet and reduce the diversity of food choices, contributing to consumer uncertainty in decision-making.

Overall, the results indicate a general openness among respondents to include plant-based foods in a balanced diet, though without the conviction that they should be consumed daily. Thus, 34% of participants believe these products should be consumed several times a week. On the other hand, 11% of respondents do not have a clear opinion on the optimal frequency of consumption, which either reflects a lack of information or some uncertainty regarding the role of these foods in a healthy diet. Respondents provided

varied answers regarding the extent to which plant-based foods replace animal products in their diet. A significant percentage, representing 79% of participants, indicated that they replace only certain types of animal products, highlighting a selective and balanced approach to dietary transition, possibly motivated by health, sustainability, or personal preferences. Only 16% stated that they do not eliminate animal products at all, which may reflect either a strong preference for them or resistance to changes in dietary habits. In contrast, five respondents mentioned following a fully plant-based diet, suggesting a deliberate food choice, possibly driven by ethical factors, ecological concerns, or perceptions regarding health benefits.

Regarding consultation with a nutrition specialist to establish an appropriate diet, over 40% of respondents stated that they have never consulted a nutritionist, while only 26% have sought such an expert, either occasionally or regularly. The rest of the participants expressed openness to potential consultations. These results highlight the need for access to personalized recommendations from specialists, considering that informed nutritional advice, tailored to age, lifestyle, and any medical conditions, is essential for preventing dietary imbalances and forming healthy, sustainable habits, as opposed to general information available online, which may be incomplete or erroneous.

The study highlights that social networks such as Instagram and TikTok represent the primary source of information for respondents regarding plant-based foods, significantly influencing food choices. Although the presence of specialists could combat misinformation, content on these platforms often comes from unauthorized sources. Following these are nutritionists, specialized blogs, friends, and family, while academic materials are rarely consulted. The results underline the need to promote accurate and scientifically grounded information.

Participants indicated that the main obstacle to more frequent adoption of plant-based products is the lack of information about their benefits, which highlights the need for well-targeted educational campaigns. Additionally, consumers believe that a more varied offer and better accessibility of these products on the Romanian market would encourage the transition to a flexitarian diet. Another aspect pursued was identifying respondents opinions on the ability of plant-based products to provide all the essential nutrients the body needs, given the potential nutritional deficiencies generated by the consumption of plant-based products. According to the responses, the majority (59%) of them consider that plant-based products can only partially meet the nutrient requirements, and to complete this deficit, dietary supplements should be used. On the other hand, 18% of respondents believe that an exclusively plant-based diet can provide all the necessary nutrients for health, while 23% disagree with this statement.

About 44% of respondents see similar benefits in plant- and animal-based products, while 21% favor plant-based and 14% favor animal-based for nutritional value; 22% had no clear opinion. Over half would recommend a balanced plant-based diet, especially for health-conscious individuals, though 25% feel it isn't suitable for everyone, 14% are unsure, and 10% would recommend it unconditionally. A major concern is the lack of accessible, reliable information about plant-based diets—70% find it insufficient, only 11% view it as adequate. This information gap may hinder informed choices and industry growth, highlighting the need for better transparency and education from both authorities and producers.

The most widely supported measure to encourage the consumption of plant-based products is the organization of educational and awareness campaigns, mentioned by 61% of respondents, which reflects an acute need for clear and accessible information. Another important direction is the regulation of labeling and certification of these products, supported by 43% of participants, who believe that standardizing these elements would increase trust and reduce confusion regarding the composition and quality of plant-based products. Promoting such products in public institutions, including schools, is another proposed solution, considered relevant by 30% of respondents. This could include thematic campaigns, tastings, or collaborations with nutritionists to encourage acceptance and familiarity with plant-based alternatives. Although financial aspects remain relevant, only 26% of respondents believe that price subsidies should be a priority, which suggests that, in public perception, information and regulation are more effective in supporting consumption.

Regarding food preferences, respondents expressed a desire for a more diverse range of plant-based products, especially in stores and restaurants. Healthy snacks top the list of preferences, followed by plant-based pastries and desserts. There is also growing interest in plant-based dairy products such as milk and yogurt, followed by meat alternatives. A significant portion of participants would like more options for ready-to-eat meals and frozen plant-based products, highlighting an unmet potential in these market segments.

Following the calculation of Pearson correlation coefficients, it was found that two hypotheses were validated, while one was partially validated, as follows:

- **H1** was validated, revealing a strong positive correlation between monthly income level and the frequency of plant-based product consumption (r = 0.9084). Thus, individuals with higher incomes have easier access to these products, which may be more expensive.

- **H2** was partially validated, indicating a positive but moderate correlation (r = 0.7060) between consulting a specialist about the benefits of plant-based products and the consumers' positive perception of their nutritional value. This means that, generally, individuals who consult a specialist have a more favorable perception of the nutritional value of these products, although this may also be influenced by other factors.

- **H3** was validated, showing a moderate positive correlation between the level of education and the frequency of plant-based product consumption (r = 0.7265). Therefore, consumers with a higher level of education tend to regularly consume plant-based products.

Conclusions

The study conducted on the consumption habits of plant-based products provides a detailed overview of consumer behavior and perceptions in Romania. The analysis of the results reveals a significant openness toward plant-based alternatives, particularly in the case of dairy and meat substitutes, which are the most appreciated by participants. Although the majority of respondents are willing to include plant-based products in their diet, not all are convinced of the necessity of daily consumption.

Among the factors that could stimulate increased consumption of plant-based products, educational information and awareness campaigns are considered the most important. Many respondents believe that a plant-based diet should be balanced and diverse to avoid potential nutritional deficiencies. Furthermore, it is evident that a large portion of consumers lack clear and comprehensive information regarding the benefits and risks of such products, highlighting the need for a broader educational effort. Another key point identified in the study is the perception that plant-based products are more expensive than their animal-based counterparts, which represents a major barrier for some consumers. Although price remains a constant concern, there is an opportunity to reduce this gap through product subsidies or by regulating labeling and certification processes to increase consumer trust.

In terms of consumption habits, most participants prefer to replace certain animal-based products with plant-based alternatives, suggesting a balanced approach rather than a radical dietary change. However, in order to encourage wider adoption of plant-based products, they must be accessible, meet taste and texture expectations, and be available in a broader variety of forms (healthy snacks, pastries, etc.).

For plant-based products to gain a significant market share, both price and accessibility barriers must be addressed, along with educational challenges. Authorities and producers must play an active role in promoting these products through awareness campaigns and clearer regulations. The main limitation of the study is the small sample size, consisting of 100 questionnaires, which, although it does not allow for broad generalization of the results, provided a preliminary understanding of the researched topic and helped generate relevant directions for future studies. Another important limitation of the study lies in the homogeneity of the sample, determined by the sampling method used, which favored the participation of young individuals with a high level of education, thus reducing the diversity of perspectives and affecting the representativeness of the results. Possible future research directions include a more in-depth investigation of the cultural, economic, and informational factors that may influence positive perceptions of plant-based foods, as well as the ways in which educational and informational campaigns affect the attitudes and behaviors of Romanian consumers toward such products. Integrating extensive quantitative approaches with qualitative ones could offer a more nuanced perspective on how sustainable eating fits into the construction of individual identity and a responsible lifestyle.

References

Alae-Carew, C., Green, R., Stewart, C., Cook, B., Dangour, A.D., Pauline F.D. and Scheelbeek, P.F.D., 2022. The role of plant-based alternative foods in sustainable and healthy food systems: Consumption

trends in the UK. *Science of The Total Environment,* 807 (3), p.151041, https://doi.org/10.1016/j.scitotenv.2021.151041.

Aschemann-Witzel, J., Gantriis, R.F., Fraga, P. and Perez-Cueto, F.J.A. , 2020. Plant-based food and protein trend from a business perspective: markets, consumers and the challenges and opportunities in the future. *Critical Reviews in Food Science and Nutrition*, 61(18), pp.3119–3128. https://doi.org/10.1080/10408398.2020.1793730.

Bobe, M., Procopie, R. and Bucur, M., 2025. Young Consumers' Perception of Vegan Food: A New Ethic, a Trend or a Risk? *Amfiteatru Economic*, 27(69), pp.414-430. https://doi.org/10.24818/EA/2025/69/414.

Dagevos, H. and Verbeke, W. , 2022. Meat consumption and flexitarianism in the Low Countries. *Meat Science*, 192, p. 108894. https://doi.org/10.1016/j.meatsci.2022.108894.

Eisen, M.B. and Brown, P.O., 2022. Rapid global phaseout of animal agriculture has the potential to stabilize greenhouse gas levels for 30 years and offset 68 percent of CO_2 emissions this century. *PLOS Climate*, 1(2). https://doi.org/10.1371/journal.pclm.0000010.

Euromonitor International, 2024. Plant-Based Diary in Romania [online] Available at: < https://0410v3iuv-y-https-www-portal-euromonitor-com.z.e-nformation.ro/Analysis/Tab > [Accessed 10 March 2025].

Euromonitor, 2025. Statistics, [online] Available at: <https://0410v2pyv-y-https-www-portal-euromonitor-com.z.e-nformation.ro/magazine/homemain> [Accessed 15 April 2025]

Faber, I., Castellanos-Feijoo, N.A., Van de Sompel, L., Davydova, A. and Perez-Cueto, F.J.A., 2020. Attitudes and knowledge towards plant-based diets of young adults across four European countries. Exploratory survey. *Appetite*, 145, p. 104498. https://doi.org/10.1016/j.appet.2019.104498.

GFI Europe, 2023. *Europe plant-based food retail market insights.* [online] Available at: <https://gfieurope.org/market-insights-on-european-plant-based-sales-2020-2022/> [Accessed 3 March 2025].

Hopwood, C.J., Bleidorn, W.,Schwaba, T. and Chen, S., 2020. Health, environmental, and animal rights motives for vegetarian eating. *PLOS One*, 2, https://doi.org/10.1371/journal.pone.0230609.

Mambrini, S.P., Penzavecchia, C., Menichetti, F., Foppiani, A., Leone, A., Pellizzari, M., Sileo, F., Battezzati, A., Bertoli, S. and De Amicis, R., 2025. Plant-based and sustainable diet: A systematic review of its impact on obesity. *Obesity Reviews*. https://doi.org/10.1111/obr.13901.

McEvoy, C.T., Temple, N. and Woodside, J.V., 2012. Vegetarian diets, low-meat diets and health: A review. *Public Health Nutrition*, 15(12), pp.2287–2294. doi:10.1017/S1368980012000936.

Passiou E.K., Agapitou C., Rotsios K. and Folinas D., 2023. Plant-based Protein Food Products: Perceptions from the Greek Food Industry. *Economies of the Balkan and Eastern European Countries, KnE Social Sciences,* pages 119–137. DOI: 10.18502/kss.v8i1.12640.

Rini, L., Bayudan, S., Faber, I., Frøst, M.B., Perez-Cueto, F.J.A., Guadarrama, E., Schouteten, J.J. and De Steur, H., 2025. Diverse dietary lifestyles within households increase purchase intentions for plant-based food. *Food Quality and Preference,* 127, p.105453. https://doi.org/10.1016/j.foodqual.2025.105453.

Statista, 2025. *Value of plant-based food sales in Romania from 2020 to 2022*. [online] Available at: <https://0411g2pyi-y-https-www-statista-com.z.e-nformation.ro/statistics/1410739/romania-plant-based-food-sales-value/> [Accessed 15 April 2025].

Storz, M.A. ,2022. What makes a plant-based diet? A review of current concepts and proposal for a standardized plant-based dietary intervention checklist. *European Journal of Clinical Nutrition*, 76, pp.789–800. https://doi.org/10.1038/s41430-021-01023-z.

Williams, K.A. and Patel, H. , 2017. Healthy plant-based diet: What does it really mean? *Journal of the American College of Cardiology*, 70(4), pp. 423–425.https://doi.org/10.1016/j.jacc.2017.06.006.

Economic Implications of Law no. 77/2016 on the Housing Loans Market

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Abstract

The current paper presents a quantitative assessment of the economic implications of Law no. 77/2016 on the giving in payment of immovable property for the discharge of obligations arising from loans, covering the reference period 13 May 2016 – 28 November 2023. Using official data from the National Agency for Cadastre and Real Estate Publicity, the Superior Council of Magistracy, the National Bank of Romania, and the Alternative Banking Dispute Resolution Centre, the study offers an empirical perspective on the law's actual impact on the mortgage market. The results indicate that *datio in solutum* remained a marginal phenomenon, affecting fewer than 9% of real estate-secured loans during the analysed period. Contrary to initial claims of systemic risk, Law no. 77/2016 functioned as a last-resort mechanism for distressed debtors without destabilizing the contractual lending framework. The study also identifies a post-2020 legislative tightening that significantly reduced access to this legal remedy. A critical weakness observed is the underutilisation of alternative dispute resolution mechanisms, prompting the authors to recommend greater emphasis on financial education and mediation. Overall, the findings support the view that Law no. 77/2016 has served a targeted, corrective function rather than a disruptive one, and its measured application may continue to contribute to a more balanced and socially responsive housing finance system in Romania.

Keywords

Datio in solutum, mortgage discharge, Law no. 77/2016, housing finance, alternative dispute resolution.

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Introduction

In the paper entitled *A Critical Analysis of the Evolution of Datio in Solutum Law in the Context of the National Housing Strategy 2022–2050*, published in 2024, one of the present article's authors, Orjan Mihnea-Tudor, together with co-author Stan Adelina, examined both from a legal and economic perspective the correlation between the provisions of *Law no. 77/2016 on the giving in payment of immovable property for the discharge of obligations arising from loans* (hereinafter referred to as "**Law no. 77/2016**")[1] and the national housing policy, as reflected in the *National Housing Strategy 2022–2050*, an official document drafted by the Ministry of Development, Public Works and Administration.

Briefly, the two authors have concluded that:

- Law no. 77/2016, as revised by Law no. 52/2020, has shifted from borrower protection toward contractual rigidity, limiting its usefulness for those seeking mortgage release;

[1] Entered into force on 13 May 2016 and amended on 16 May 2020 by *Law no. 52/2020 for the Amendment and Completion of Law no. 77/2016* ("**Law no. 77/2016**")

- Romania's National Housing Strategy 2022–2050 highlights persistent issues—overcrowding, weak rental markets, and housing shortages—that force many into long-term debt, particularly young urban families
- by passively deferring housing access to market mechanisms, the Romanian state risks institutionalizing long-term debt and abandoning its role as a social guarantor;
- re-extending *datio in solutum* to "First Home" National Programme loans could partially address this imbalance;
- ultimately, the ethical and social impact of mass mortgage lending must remain central to housing policy debates in Romania.

Building on the intention to expand the previously mentioned study, we, the authors of this paper, have gathered statistical data from official sources reflecting key aspects of the application of Law no. 77/2016 over the reference period 13 May 2016 – 28 November 2023. Our aim is to provide an objective, data-driven assessment of the law's impact on the national housing loans market.

In our view, academic inquiry into Law no. 77/2016 should go beyond theoretical discussions of its evolution and structure. Concrete, quantifiable evidence of the law's long-term effects is of significant practical value, both for the banking sector and for policymakers. Understanding these effects is essential to evaluating the law's actual influence on the housing loans market.

The timeliness and relevance of this topic are also supported by best practices in legislative processes and public policy-making, which require ongoing monitoring of a law's socio-economic impact after its entry into force. As such, this research may serve as a useful reference for Romanian decision-makers in 2025.

Moreover, please note that the findings of the present research may also be interpreted as a *late response* to the renowned group of theorists and practitioners who, in 2016, authored a monograph dedicated to this piece of legislation, entitled *The Datio in Solutum Law: Arguments and Solutions* – in Romanian: *Legea dării în plată: argumente și soluții* (Stoica, V. & others, 2016), even though our reply arrives approximately nine years later. Specifically, the authors of the aforementioned monograph—cited, alongside Ms. Stan A., in our 2024 publication – had drawn attention to the potential economic blockages to which, in their view, Law no. 77/2016 was *ab initio* vulnerable: primarily, the undermining of economic stability and predictability, the weakening of contractual commitments, the declining attractiveness of the Romanian credit market, and, equally, the deterioration of the legal and economic climate in which credit institutions operate in our country. It should be noted that these doctrinal concerns were officially endorsed by numerous representatives of the banking sector, including institutional actors, a point we elaborated upon in the aforementioned research published in 2024.

Now, with access to robust statistical data reflecting nearly a decade of the law's application, we are in a position to assess, objectively, impartially, and with mathematical-level methodological rigour, the extent to which the concerns expressed by the aforementioned authors have materialized into concrete realities of the credit market or whether, on the contrary, they have remained, for the most part, within the bounds of academic debate.

Thus, insofar as the correct interpretation of the statistical data presented in this study reveals that Law no. 77/2016 did not significantly disrupt the balance of the market under analysis—its impact tending rather to be marginal—we note, from this early stage of the paper, that this would allow for the validation of the opposing thesis advanced by another author (Buz, A.D., 2017), according to whom Law no. 77/2016 constituted a necessary regulatory instrument aimed at increasing the level of consumer protection within the credit market. In other words, more plainly stated, it would become possible to argue for the predominantly positive dimension of the law, in relation to the role it has played in shaping the credit market. For greater rigour, it should be noted that this author's viewpoint was not, from the early days of Law no. 77/2016, an isolated one; similar positions were expressed on multiple occasions, including in a scholarly article, by one of the key technical drafters involved in the original version of the law (Piperea, Ghe., 2016). Moreover, this point of view was also shared by the initiator of the legislative proposal that ultimately became Law no. 77/2016, an aspect clearly reflected in the explanatory memorandum accompanying the draft law.

1. Statistical Data on the Impact of Law no. 77/2016 During the Reference Period 13 May 2016 – 28 November 2023 on Housing-Related Borrowing

As a result of our verifications carried out with the support of the National Agency for Cadastre and Real Estate Publicity, we were able to identify the number of private real estate ownership rights registered in the land book on the basis of the provisions of Law no. 77/2016 at national level, during the period 13 May 2016 – 28 November 2023:

Table no. 1. Number of Private Real Estate Ownership Rights Registered Under Law no. 77/2016, by Year (2016–2023)

Year	Private real estate ownership rights registered in the land book on the basis of the provisions of Law no. 77/2016 at national level
2016 (i.e, 13.05.2016 – 31.12.2016)	1.962
2017	3.137
2018	3.686
2019	3.956
2020	4.021
2021	10.020
2022	12.469
2023 (i.e., 01.01.2023 – 28.11.2023)	10.186
Total:	**49.437**

Source: Reply Letter no. 57048/28.11.2023 issued by the National Agency for Cadastre and Real Estate Publicity

However, we draw attention to the potentially misleading nature of this table: the fact that a private real estate ownership right—transferred to the creditor following a *datio in solutum* initiated by the debtor—was registered in the land book in a given year does not necessarily mean that the property was offered in payment during that same year. It is possible that, due to the creditor deeming the debtor's notification non-compliant with legal requirements, a dispute arose between the parties, and the ensuing litigation may have taken a significant amount of time, with the final court ruling being issued in a later year than the one in which the property was initially offered in payment.

In this regard, we also recommend consulting the following judicial statistics, which were made available to us by the Superior Council of Magistracy for the period between 13 May 2016 and 24 November 2023:

Tabel no. 2. Judicial Cases Related to Law no. 77/2016: Creditor Challenges and Debtor Requests for Debt Discharge (2016–2023)

Year	Number of newly registered cases concerning creditor challenges against the debtor's *datio in solutum* notification	Number of newly registered cases concerning the debtor's request for acknowledgment of debt discharge
2016 (i.e, 13.05.2016 – 31.12.2016)	3.396	902
2017	3.329	800
2018	3.365	670
2019	3.281	495
2020	2.709	480
2021	2.287	506
2022	2.062	592
2023 (i.e, 01.01.2023 – 24.11.2023)	1.400	355
Total:	**21.829**	**4.800**

Source: Reply Letter no. 4/22106/24.11.2023 issued by the Superior Council of Magistracy

Given that, during the reference period 13 May 2016 – 24 November 2023, a total of 21,829 creditor challenges to debtor *datio in solutum* notifications were filed, and considering the well-established judicial practice whereby a significant amount of time—often well over a year—typically elapses between the initial filing of such a challenge and the delivery of a final court decision, our earlier conclusion regarding the interpretation of the statistical data provided by the National Agency for Cadastre and Real Estate Publicity becomes even more plausible.

Of particular relevance to the present study is the situation of loans secured by real estate (e.g., mortgages), granted to individual debtors by creditors supervised by the National Bank of Romania, as communicated to us by the latter for the reporting period 1 November 2016 – 30 September 2023.

Tabel no. 3. Number of Real Estate-Secured Loans Granted to Individual Debtors by Creditors Supervised by the National Bank of Romania (2016–2023)

Year	Number of loans secured by real estate granted to individual debtors by creditors supervised by the National Bank of Romania
2016 (i.e., 01.11.2016 – 31.12.2016)	85.639
2017	74.304
2018	68.076
2019	65.357
2020	64.603
2021	83.441
2022	73.284
2023 (i.e., 01.01.2023 – 30.09.2023)	38.032
Total:	**552.736**

Source: Reply Letter no. XIV/5/194/18.01.2024 issued by the National Bank of Romania

In the context of two largely overlapping reference periods—namely, 1 November 2016 to 30 September 2023 and 13 May 2016 to 28 November 2023—creditors subject to reporting obligations to the National Bank of Romania granted a total of 552,736 real estate-secured loans to individual debtors. Over the same period, only 49,437 transfers of real estate ownership were recorded under the application of Law no. 77/2016. This indicates that *datio in solutum*—as applied to immovable property acquired by individual debtors (i.e., typically *consumers*)—was a relatively limited phenomenon, representing approximately 8.95% of all such loans granted.

Consequently, the statistical data contradict the hypothesis advanced in the public space by institutional creditors and by their academic supporters, which suggested that the *datio in solutum* regime would broadly undermine the stability and continuity of contractual relations in the field of mortgage lending.

On the contrary, the figures confirm a different assessment: Law no. 77/2016 functioned as a last-resort mechanism for distressed debtors, not as a systematic erosion of the *pacta sunt servanda* principle. In simple terms, the overwhelming majority of these loans did not terminate through the debtor's recourse to *datio in solutum*, but rather followed their contractual course—supporting the commonsense observation that most individuals who borrow to acquire a home do so with the hope of fully repaying the loan and keeping the property, not with the intention of eventually surrendering it to the creditor.

In addition to the observation regarding the relatively low frequency of *datio in solutum* transactions in relation to the total number of real estate-secured loans, it should be noted that lending activity in this segment was not significantly reduced during the reference period of 1 November 2016 to 30 September 2023. The arithmetic average of the annual values listed in the previous table is 69,092 loans, which compares to a peak of 85,639 loans in 2016 and a low of 38,032 in 2023 (i.e., for the partial period 1 January to 30 September 2023).

Any downward fluctuations in loan volumes over the period—such as the variation between 2021 and 2022—may be attributed to other significant factors unrelated to the *datio in solutum* mechanism, including the Covid-19 pandemic, the armed conflict in Romania's proximity, the energy crisis, deteriorating

macroeconomic conditions (evidenced by rising inflation and policy interest rates), as well as the tightening of fiscal policy in 2023, which impacted the real estate market through multiple channels.

Within this broader context, while it can be argued that Law no. 77/2016 functioned as an economic sanction, in its nature, against undiligent, untimely, unfair or even unlawful practices by various actors on the real estate credit market, this sanctioning effect does not appear to have been particularly severe or systemically disruptive over the period from the law's entry into force through the end of 2023. In other words, the implementation of Law no. 77/2016 did not fundamentally undermine or compromise the process of requesting, approving, and contracting housing loans granted to consumers by financial institutions under the supervision of the National Bank of Romania.

On the contrary, starting in 2020—the year Law no. 77/2016 was amended by Law no. 52/2020—this segment of the lending market, which had been in decline from 2016 to 2020, experienced a visible revival, lasting until 2023. The significant decrease recorded in 2023 is more plausibly attributable to broader economic or geopolitical developments that bear little, if any, connection to Law no. 77/2016, especially considering that the law was not amended in 2023 and that its interpretation has not been modified in that year by either the Constitutional Court or the High Court of Cassation and Justice.

Also of interest is the evolution in the number of *datio in solutum* notifications accepted by creditors supervised by the National Bank of Romania during the reference period 1 December 2016 – 30 November 2023, as shown in the table below:

Tabel no. 4. Annual Number of Datio in Solutum Notifications Accepted by Creditors and Corresponding Loan and Debt Values (1 December 2016 – 30 November 2023)

Year	Number of notifications accepted by creditors	Amount granted under the loan agreement (RON)	Amount owed at the date of *datio in solutum* acceptance (RON)
2016 (i.e., 01.12.2016 – 31.12.2016)	52	10.339.001	8.604.538
2017	223	71.052.074	58.234.360
2018	104	30.192.607	26.649.008
2019	142	47.705.730	41.717.337
2020	303	105.199.221	86.767.360
2021	45	17.497.826	13.128.674
2022	8	3.267.574	2.486.014
2023 (i.e., 01.01.2023 – 30.11.2023)	25	9.697.529	5.618.354
Total:	**902**	**294.951.562**	**243.205.645**

Source: Reply Letter no. XIV/5/194/18.01.2024 issued by the National Bank of Romania

The sharp decline in accepted notifications after 2020 can be logically explained by the entry into force, in that year, of the revised *datio in solutum* mechanism. As detailed in the aforementioned study published in 2024, this new framework is significantly more restrictive and less accessible than the original version. The drop in the number of notifications after 2020 is therefore attributable to this legislative shift.

Apart from these findings, we must also express certain concerns regarding the evident lack of interest shown by both creditors and debtors in resolving disputes arising from *datio in solutum* notifications through alternative dispute resolution mechanisms rather than through the courts. This lack of engagement is clearly reflected when comparing the judicial statistics previously presented—provided by the Superior Council of Magistracy—with the statistical data supplied by the Alternative Banking Dispute Resolution Centre (ABDRC) for the reference period 13 May 2016 – 31 December 2023, which we present below:

Tabel no. 5. Requests and Resolutions Related to Datio in Solutum Submitted to ABDRC Under Law no. 77/2016 (2016–2023)

Year	Number of alternative dispute resolution requests submitted to ABDRC concerning notifications under Law no. 77/2016	Number of disputes (requests) successfully resolved by ABDRC
2016 (13.05.2016 – 31.12.2016)	0	0
2017	1	1
2018	8	2
2019	22	3
2020	20	10
2021	2	2
2022	4	3
2023	4	2
Total:	**61**	**23**

Source: Response communicated by email by the ABDRC on 26.02.2024

From our perspective, both the Romanian State and creditors should place greater emphasis on improving the financial literacy of debtors, encouraging them to make more frequent use of the services provided by ABDRC. This would help reduce the burden on the court system, which — as is widely acknowledged — is already overstretched with cases brought under various laws other than Law no. 77/2016.

At the same time, we assert that the reverse must also be considered: creditors, through their institutional policies, should show greater openness to settling disputes via the Centre's procedures.

This approach would help prevent both debtors and creditors from being penalized by incurring significant litigation costs and, from another perspective, would also protect the Judiciary — a public power not responsible for the circumstances under which debtors are no longer able to meet their loan obligations — from being *penalized* in turn by the influx of additional *datio in solutum* cases to adjudicate.

For the sake of clarity and synthesis, we will graphically illustrate the multitude of aspects highlighted by the data presented in Tables no. 1–5:

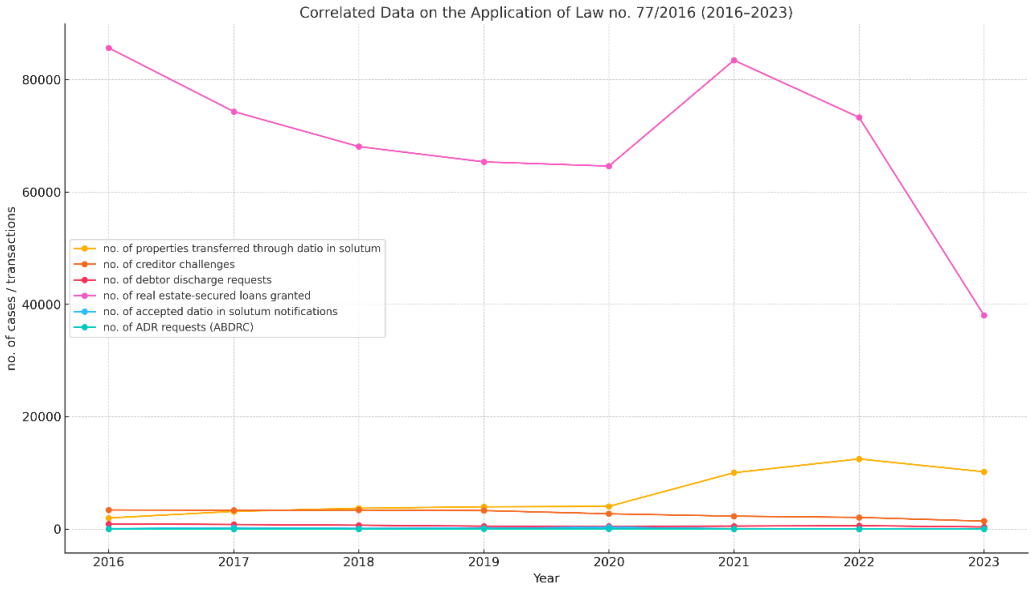

Figure no. 1. Correlated Data on the Application of Law no. 77/2016 (2016-2023)
Source: Tables no. 1-5

Conclusions

This study set out to empirically assess the economic implications of Law no. 77/2016, using statistical data gathered from key national institutions over the period 13 May 2016 – 28 November 2023. The results allow us to draw several grounded conclusions:

a) Limited practical reach

Despite the initial concerns voiced by the financial sector and parts of academia*, datio in solutum* has proven to be a relatively rare phenomenon. With only 49,437 real estate ownership transfers recorded under Law no. 77/2016 out of 552,736 real estate-secured loans granted during the overlapping period, the mechanism was activated in less than 9% of cases.

b) Preservation of contractual stability

The findings challenge the assumption that Law no. 77/2016 would undermine the integrity of contractual lending relationships. On the contrary, the vast majority of housing loans followed their natural course, indicating that debtors generally aim to repay and retain their homes, not to surrender them through legal shortcuts.

c) Moderate impact on lending dynamics

Lending activity in the mortgage segment did not experience a systemic collapse. Variations in loan volumes over the years can be reasonably attributed to external macroeconomic shocks—such as the COVID-19 pandemic, geopolitical instability, and inflationary pressures—rather than to the operation of *datio in solutum*.

d) Post-2020 legislative shift

The steep decline in accepted notifications following 2020 correlates with the entry into force of the revised, more restrictive version of the law. This legislative tightening significantly limited access to the mechanism, especially in the absence of demonstrable hardship.

e) Underutilisation of alternative dispute resolution (ADR)

A notable weakness identified in the implementation of the law concerns the minimal recourse to ADR mechanisms such as the Alternative Banking Dispute Resolution Centre (ABDRC). With only 61 relevant cases submitted and 23 resolved successfully over a span of more than seven years, the ADR channel remains grossly underused by both debtors and creditors.

Thus, we recommend that both public authorities and creditors invest in improving financial education for consumers, while also encouraging ADR mechanisms to reduce litigation pressure on courts. Greater institutional openness to mediation could ease conflicts, lower costs, and support the broader social purpose of the law.

In sum, the evidence suggests that Law no. 77/2016 has not produced destabilizing effects on the housing loans market, but has instead served as a marginal, last-resort remedy for debtors in distress. Its continued refinement and responsible application could contribute meaningfully to a more equitable and balanced housing finance system in Romania.

f) Achievement of the intended purpose of the law

Considering, on the one hand, that the statistical data collected and presented do not reveal a general abuse by consumers of the provisions of Law no. 77/2016, and, on the other hand, that they also do not indicate a blockage in housing-related lending activity, our conclusion is that the law has followed the natural course for which it was conceived by the legislator. In essence, and in the vast majority of cases where its provisions have produced effects, the law has remained an instrument for safeguarding the vital interests of consumers facing economic hardship.

In other words, being generally used with moderation and reserved for exceptional situations of financial difficulty, we are able to argue, with supporting evidence, that Law no. 77/2016 has successfully fulfilled the purpose for which it was designed and adapted – namely, to provide an enhanced level of protection for consumer-debtors confronted with personal circumstances of patrimonial distress. Thus, as a general thesis also valid in case of Law no. 77/2016, as long as a law has produced the effect intended by the legislator at the time of its adoption, without generating adverse consequences detrimental to society, it may be stated,

in our view, that such a law – though possibly open to improvement – did not represent a legislative error, but rather, in essence, a legislative success.

***

Bringing these conclusions together leads to a finding that is far from counterintuitive: the instinct of ownership is deeply embedded in the human mindset, such that relinquishing an already acquired property right is an *ultima ratio* for the vast majority of individuals when faced with delicate circumstances. We consider that this observation should remain a constant reference point in the Romanian legislator's strategy whenever it seeks to regulate matters related to private property rights or to adjacent fields. From a policy implication perspective, this should translate into the absence of fear on the part of the legislator that the majority of the rule's beneficiaries will invoke that rule (i.e., provision) superficially or in bad faith – at least as long as its application could entail negative consequences for their property rights.

Thus, what we strongly believe a wise and prudent legislator cannot overlook when enacting laws that touch upon the economic dimension of society—including in matters related to private property rights—is the psychological dimension inherent to the regulated context. The behaviour of the vast majority of individuals targeted by a new legal norm tends to be, in general, predictable. The law analysed in this research stands as a compelling argument in support of this assertion.

However, please be aware that, while this study provides a data-driven assessment of the economic implications of Law no. 77/2016 on the Romanian housing loans market, several limitations must be acknowledged. First, the analysis relies primarily on quantitative data obtained from national institutions, which, although official and relevant, may not capture the full complexity of the socio-economic dynamics involved, particularly in terms of individual debtor experiences or informal creditor practices (i.e., the statistical data cannot, with absolute certainty, capture all the scenarios that actually materialised during the reference period). Second, the temporal scope of the research (2016–2023) does not allow for prospective assessments of the law's future impact in evolving economic contexts. Third, the absence of a comparative international perspective limits the external validity of the findings, as similar legislative frameworks across EU member states were not systematically analyzed. Finally, the underrepresentation of qualitative insights (e.g., interviews with affected stakeholders or case-level judicial interpretations) constrains the study's ability to explore the normative and behavioural dimensions of the law's implementation.

These limitations suggest that future research would benefit from a mixed-methods approach and a broader comparative framework. Thus, we consider that a future analysis of Law no. 77/2016 through a comparative lens, examining its similarities and differences with analogous legislation in other Member States of the European Union or even in non-EU countries, could prove useful, provided that such a study maintains conceptual and methodological rigor. In particular, it should accord due reverence to the legal, economic, social, and even political differences between Romania and the states whose laws could become subject to comparative review. As a general indication, based on our current knowledge, most EU Member States do not have special laws granting consumers a general right to discharge their debt through the giving in payment of their immovable property, outside the contractual or insolvency framework. Legislation bearing some resemblance to Law no. 77/2016 can be identified in Spain (Royal Decree-Law no. 6/2012, Banking Code of Good Practices), while certain special statutory provisions capable of producing effects relatively similar to the Romanian law are also found in Italy (Law no. 119/2016) and Greece (Law no. 3869/2010). Moreover, particularly in light of the current fragility of the Romanian real estate market, we believe that future research could focus on complementary directions to the present study (for instance, the protection of promissory buyers in the event of the real estate developer's insolvency).

References

Buz, A.D., 2017. *Regăsirea echilibrului pierdut: deziderat comun al reglementărilor din materia clauzelor abuzive în contractele de credit bancar şi a legii dării în plată*. Revista Română de Drept al Afacerilor, no. 2/2017 [online]. Available at: < https://www.rrda.ro > [Accessed 15 March 2025].

Deleanu, I., 2011. 'Accesibilitatea' și 'previzibilitatea' legii în jurisprudența Curții Europene a Drepturilor Omului și a Curții Constituționale Române. *Revista Dreptul*, no. 8/2011, pp.52–53.

Housing in Romania: Improving Quality, Sustainability, and Accessibility, 2022. *Analysis, Diagnosis, and Public Policy and Regulatory Recommendations in the Field*. Romania's Economic and Social Council, November 2022 [online]. >Available at: < https://www.ces.ro/newlib/PDF/2022/CES_Studiu-locuire_digital.pdf >[Accessed 15 March 2025].

Jora, C. and Ciochina-Barbu, I., 2017. *Consideraţii in legătură cu legea dării in plată şi legea conversiei*. Revista Dreptul, no. 7/2017 [online]. Available at: < https://revistadreptul.ro > [Accessed 15 March 2025].

Mangu, F., 2016. *Despre natura juridică a dării în plată a imobilelor în vederea stingerii obligaţiilor asumate prin credite*. Revista Română de Drept al Afacerilor, no. 5/2016 [online]. Available at: < https://www.rrda.ro > [Accessed 15 March 2025].

National Housing Strategy 2022–2050, 2022. Ministry of Development, Public Works and Administration [online]. Available at: < https://sgglegis.gov.ro/legislativ/docs/2022/05/4_cq06fz23gjvw8tmpx5.pdf > [Accessed 15 March 2025].

Orjan, M.-T. and Stan, A., 2024. A Critical Analysis of the Evolution of *Datio in Solutum* Law in the Context of the National Housing Strategy 2022–2050. *European Business Law Journal*, no. 3/2024. Bucharest: ASE Publishing House [online]. Available at: < https://www.ceeol.com/search/article-detail?id=1317780 > [Accessed 15 March 2025].

Panaite, A., 2015. *BCE: Legea dării în plată riscă să lovească în economie și poate induce hazard moral*, 18 December [online]. Available at: < https://www.profit.ro/povesti-cu-profit/financiar/banci/bce-legea-darii-in-platarisca-sa-loveasca-in-economie-si-poate-induce-hazard-moral-14475827 > [Accessed 15 March 2025].

Piperea, Ghe., 2016. *Datio in Solutum Law. Attorney Gheorghe Piperea explained for lumeajuridica.ro the steps that debtors who want to get rid of their debt to the bank through giving the house in payment must follow*, 15 April [online]. Available at: < https://www.piperea.ro/articole/legeadarii-in-plata-av-gheorghe-piperea-a-explicat-pentru-lumeajuridica-ro-caresunt-pasii-pe-care-trebuie-sa-i-urmeze-debitorii-care-vor-sa-scape-de-datoriacatre-banca-prin-darea-casei-in-plata > [Accessed 15 March 2025].

Romanian Banking Association, 2016. *Mesaj ARB privind legea dării în plată*, 5 April [online]. Available at: < https://www.arb.ro/wp-content/uploads/Comunicat-de-presa-ARB-refDarea-in-plata.pdf > [Accessed 15 March 2025].

Șovar, C., 2020. *Datio in Solutum Law, version 2.0. Déjà vu? / Legea dării în plată, varianta 2.0. Déjà vu?*, 14 May [online]. Available at: < https://www.juridice.ro/727172/legea-darii-in-plata-varianta-2-0-dejavu.html#_edn17 > [Accessed 15 March 2025].

Stoica, V. *et al.*, 2016. *The Datio in Solutum Law: Arguments and Solutions / Legea dării în plată: argumente și soluții*. Bucharest: Hamangiu Publishing House, pp.20–25.

Studiu de impact: Efectele legii dării în plată la 4 ani de la adoptare, Institutul pentru Politici Publice (IPP) [online]. Available at: < https://www.anevar.ro/images/documente/efectele_legii_privind_darea_in_plata.pdf > [Accessed 15 March 2025].