Is AI changing the way we are doing business? A study on EU member states

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Abstract

Artificial intelligence (AI) is a key component of contemporary business, fostering innovation, creativity, and competitive success. However, when leveraging AI, organizations should make sure that their values and behaviors are implemented effectively. The research aims to explain how businesses across European Union have been using AI technologies up until now. We have mapped the most common usages of AI found in literature with Eurostat data available for 2023, identifying clusters, and analyzing by company size & by country the ways companies include AI in their operations. There are four main ways in which companies included AI in their work: for marketing or sales operations, in ICT security, production and logistics. The analyzed data panel shows that at EU level machine learning techniques are currently not yet widely used, even if AI has the potential to improve decision-making and business strategies. For companies to fully benefit from AI solutions in terms of increased productivity, flexibility, sustainability, and workforce augmentation, as well as long-term outcomes, they must acknowledge that, in contrast to traditional automation systems, AI solutions carry a unique set of risks that need to be carefully managed. Following the integration process in its early stages helps us identify insights and proactively prepare for properly integrate AI solutions in day-to-day business.

Keywords

Artificial intelligence, ICT security, Logistics, Marketing, Production Processes

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Introduction

Businesses in a variety of sectors are using Artificial Intelligence (AI) services and solutions to succeed in their day-to-day operations. AI has had a big impact on workplace cultures and has the power to change the course of history. AI gives businesses the chance to evaluate performance, examine work patterns, and improve expertise. AI is a key component of contemporary business, fostering innovation, creativity, and competitive success. Organizations can gain from adopting AI standards into practice. The growth of AI will change global society fundamentally and increase the scope of organizations.

AI has tremendous potential to improve company operations by automating tedious operations and optimizing workflows. Businesses can benefit from this by saving time and money, freeing up staff members to work on more strategically important tasks. AI can improve commercial decision-making. Large data sets can be analyzed by AI algorithms, which can then produce insightful analysis and insightful forecasts to aid in decision-making. Better results may result from organizations being able to make more precise and well-informed judgments. Thirdly, AI can enhance the clientele's experience. Chatbots and virtual assistants with AI capabilities can offer real-time, tailored customer service, increasing client happiness and loyalty. AI is also capable of analyzing consumer data to find trends and preferences, which enables companies to better cater their goods and services to the demands of their customers. (Praful Bharadiya, 2023)

Nevertheless, there are important organizational and technical adjustments needed to deploy AI-based innovation management. Technical hurdles that organizations must overcome include data access, data generation and classification, and result interpretation and generalization. They must also address organizational issues such as a lack of internal expertise, limited access to talent, and a skeptical mindset. In order

to effectively execute AI-driven innovation management, enterprises need to change their approaches, allocate resources towards enhancing their capabilities and developing their skills, and cultivate a cooperative and progressive environment. It is crucial to remember that there isn't a single, universal strategy for putting AI-based innovation management into practice. The implementation strategies and preferences of various organizations vary. (Füller et al., 2022)

Companies have started to include AI in their day-to-day operations, but before discovering and leveraging its full potential, they need to prepare the organization, face challenges and overcome resistance to change. We are still far from full adoption of AI technology, but following the integration process in its early stages might reveal insights on how digitalization can change businesses globally and help to proactively prepare solutions for potential problems.

1. Review of the scientific literature

The available research on the topic provides us with a comprehensive outlook on the benefits and barriers imposed by AI usage.

Urooj Nasrullah (2024) listed some advantages of utilizing artificial intelligence: more organizational knowledge; cultural transformation; superior organizational outcomes; a better customer experience, more efficiency and productivity, time and money savings; enhanced manufacturing production methods; improved communication within the workplace; giving opportunities for task performance analysis and monitoring; fostering creativity, innovation, and competitive performance; reducing risks and adding genuine value to the organization, and redefining the workplace culture for upcoming companies.

On the other hand, Füller et al. (2022) indicates some of the technical obstacles to AI-based innovation management could be: creating training data and gaining access to massive databases; organizational issues like reluctance to change and a lack of internal competence; the necessity of significant organizational and technical adjustments in order to properly apply AI-based innovation management; concerns around data security, privacy, and moral ramifications; the possibility of biases and errors in artificial intelligence algorithms and decision-making; the need of continuous investment in the development of skills and capabilities; the importance of coordinating AI-based innovation management objectives with external partners and internal stakeholders.

One of the most debated topics when it comes to AI is the replacement of jobs. Regarding this, literature show us AI will undoubtedly replace jobs requiring repetitive tasks like typing, copying, pasting, and transcribing. AI is outperforming humans in fields including medical diagnosis, speech recognition, and accounting. (Kumar, 2023) AI cannot, however, completely replace human judgment. Some tasks are still reserved for humans, especially those that call for critical thinking or complicated decision-making. Even while AI can help with problem-solving, humans are still ultimately in charge of making the final decisions.

Moreover, according to Kumar (2023), new jobs like data scientists, machine learning engineers, robotics engineers, AI coaches, and specialists in modeling, computational intelligence, machine learning will all be created by AI. The introduction of AI is anticipated to cause a shift rather than a decline in employment opportunities, in spite of rumors about job displacement. People can better position themselves to deal with possible unemployment and maintain their competitiveness in the labor market by developing their competencies and skill sets.

Urooj Nasrullah (2024) has proven AI enhances workplace culture, activities, and atmosphere to maximize employee performance. It has also aided businesses in task performance tracking, worker skill and safety improvement, and work pattern analysis. AI has made it easier for companies to embrace a digital culture and attitude, which has increased their capacity for innovation, creativity, and competitiveness.

Finally, according to Kumar (2023) and Horák and Turková (2023), there are some frontrunner industries which benefit the most of AI.

AI is predicted to have the most positive impact on the healthcare sector, with employment opportunities potentially rising by about one million new open jobs. Artificial intelligence (AI) is being applied in healthcare for tasks like automated patient transportation, surgical operations, health monitoring, and diagnostics. AI has reduced costs and saved time for the logistics and transportation sector. Businesses like Google and Uber are investing in AI-powered buses and cars, which is opening up work prospects for machine learning and artificial intelligence specialists. AI is also utilized in manufacturing to do tasks like process automation, predictive maintenance, and quality control. Artificial Intelligence has disrupted banking and financial industries by substituting intelligent software for human workers. In the banking industry,

technology is employed for tasks including risk assessment, credit card fraud prevention, and fraud detection. Retailers employ AI for a variety of purposes, including targeted marketing, chatbots for customer care, and inventory management. It has enabled businesses in the e-commerce sector to monitor customer preferences and deliver tailored experiences. Intelligent tutoring programs, automated grading, and individualized learning experiences are all made possible by AI in the education sector. AI is also utilized in the entertainment sector for a variety of purposes, including video game facial recognition, personalized advertising, and content suggestion. In the energy sector, it is utilized for projects including renewable energy optimization, predictive maintenance of infrastructure, and energy consumption optimization. AI is utilized in agriculture to help with activities including pest control, precision farming, and crop monitoring. Legal research, contract analysis, and document evaluation are just a few of the tasks that AI is employed for in the legal sector. In customer service it is used for activities such as sentiment analysis, voice recognition, and chatbots. In the data science sector, experts in artificial intelligence and machine learning are highly sought after for jobs involving data analysis, pattern identification, and predictive modeling.

2. Research methodology

The research aims to explain how businesses across European Union have been using AI technologies up until now. In order to do so, we chose document analysis as methodology. We have gathered information from articles, case studies and official data published by EU institutions.

We have mapped the most common usages of AI found in literature with Eurostat data available for 2023, identifying clusters, and analyzing by company size & by country the ways companies include AI in their operations.

To complete the research, publications from reliable scientific sources of Web Of Science and Scopus have been used. The documents are sought after by the keywords "artificial intelligence in business", and they have been narrowed down, selecting only articles from business, economics and finance area, not older than 2018.

Further, available data sets provided by Eurostat have been analyzed, part of Digital Economy and Society Index (DESI). Out of 70 available indicators, 7 track the AI usage by companies across EU member states: Enterprises use AI technologies for marketing or sales; Enterprises use AI technologies for ICT security; Enterprises use AI technologies for production processes; Enterprises use AI technologies for logistics; Enterprises use AI technologies for human resources management or recruiting; Enterprises use AI technologies for organization of business administration processes; Enterprises use AI technologies for management of enterprises.

For the first 4 of them, we identified strong links with examples from literature. Therefore, the following deep-dive focuses on how companies included AI in their work into marketing or sales, ICT security, production, and logistics. The analysis provides an overview by country, and a detailed picture by company size and country. Enterprises are broken down into size classes according to number of employees and self-employed persons: 10-49 (small enterprises), 50-249 (medium enterprises), 250+ (large enterprises), 10+ (total).

3. Results and discussion

3.1 AI technologies for ICT

AI usage for Information and communication technology (ICT) security refers mainly to technologies such as face recognition based on computer vision for authentication of ICT users, detection and prevention of cyber-attacks based on machine learning.

Traditional IT operations can be converted into intelligent, efficient, and time-saving processes thanks to AI's machine learning and deep learning capabilities. Process automation, service management, and quality assurance are the three key domains where AI has shown to be a useful tool. (Thakur, 2021)

As ICT and digital technologies support many areas of business operations, such as supply chains, sales and marketing procedures, product and service delivery, many additional industry verticals will be transformed by AI integration.

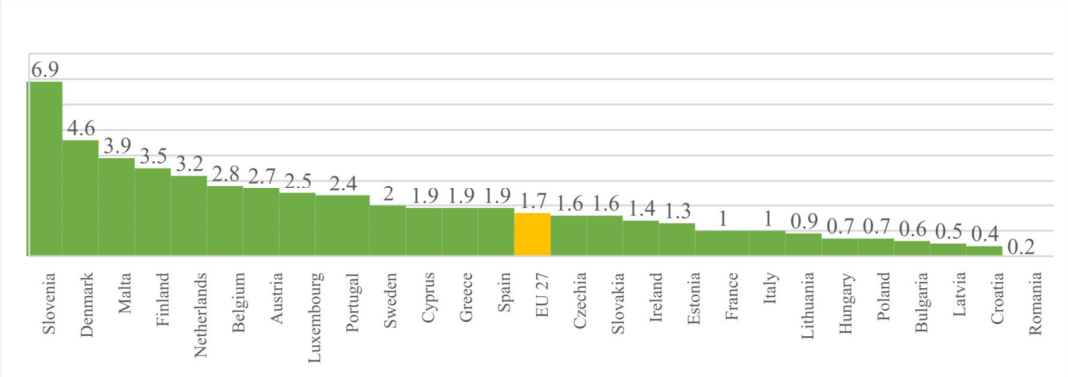

Figure no. 1. Enterprises use AI technologies for ICT security
Data source: Eurostat, 2024, own elaboration

In 2023, only 1.7% of companies in EU have used AI to enhance their ICT security, regardless of the industry they are part of. Higher values are registered in Slovenia (6.3%), Denmark (4.6%), and Malta (3.9%). Large companies are benefiting more from AI implementation in ICT security, since they are more affected by cybersecurity risks and tend to be more cautious and proactive in this regard. For large companies, the EU average is at 15%, compared to 4.2% for medium-sized companies and 1.3% small companies. Businesses in Slovenia and Belgium are the frontrunners, with 39.6% and 31% of them leveraging AI in ICT security.

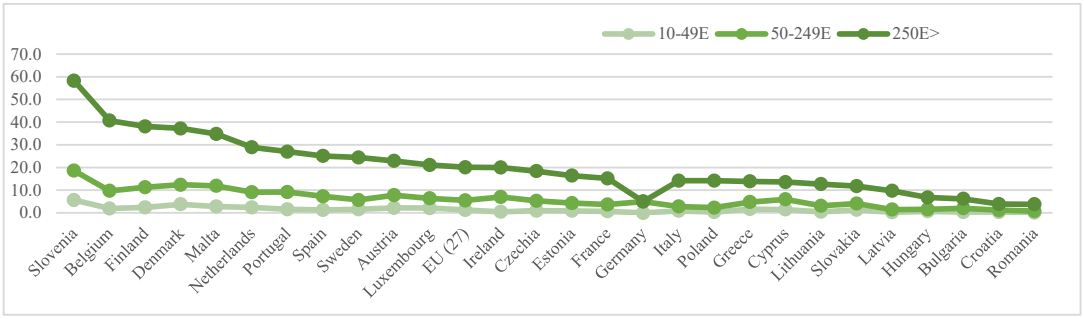

Figure no. 2. Enterprises use AI technologies for ICT security by company size
Data source: Eurostat, 2024, own elaboration

3.2 AI in logistics

Logistics was expected to be one of the most impacted sectors by AI. The technology is used for shipping, tracing, distribution, sorting, route optimization based on machine learning, pick-and-pack solutions in warehouses.

According to Kaushik (2022), businesses may automate operations, increase decision-making procedures, and improve overall supply chain visibility and control by integrating AI into supply chain management systems. AI can assist in locating any hazards or bottlenecks in the supply chain, allowing for the proactive implementation of solutions to guarantee continuous operations. Supply chain management using AI benefits from increased productivity, lower costs, and more customer satisfaction.

Even so, at EU level only below 1% of enterprises implemented AI in their logistic operations in 2023. Companies in Denmark and Netherlands recorded values above 1%, while for most of the member states, AI has been used for logistics only by 0.5% to 0.7% of businesses.

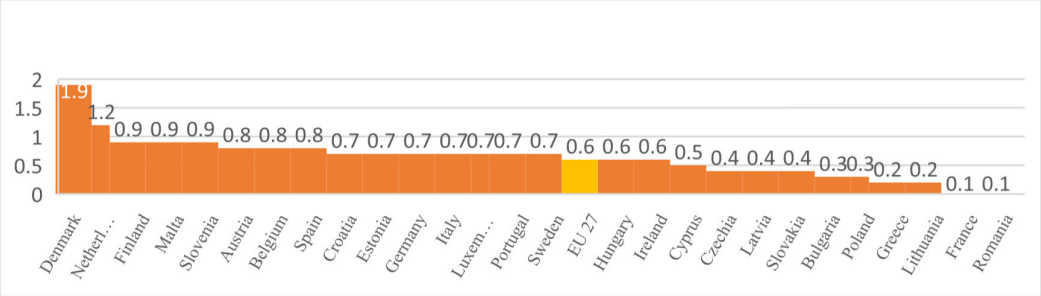

Figure no. 3. Enterprises use AI technologies for logistics
Data source: Eurostat, 2024, own elaboration

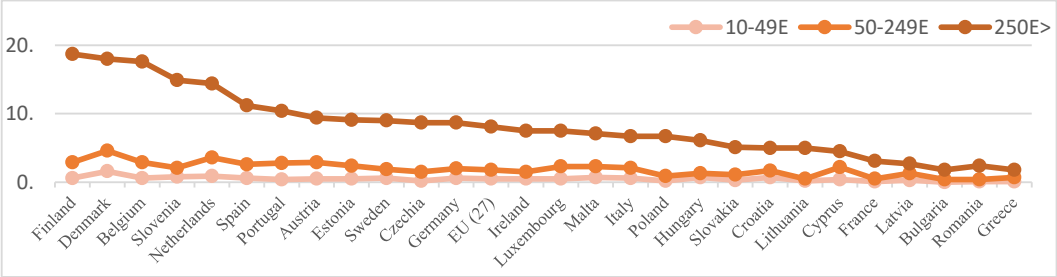

Figure no. 4. Enterprises use AI technologies for logistics by company size
Data source: Eurostat, 2024, own elaboration

We notice larger companies are more willing to include AI in their supply chain management, with top performers such as Finland and Belgium with values ranging around 15%. Even so, the EU average is being pulled down by small and medium businesses, with 0.5%, respectively 1.5% implementation. This can be explained by the fact that AI technologies are not only expensive, but also highly customized. AI operated machines require a complex network of hardware and software components, which are rare and require constant updates and a big amount of energy to operate.

3.3 AI in marketing and sales

AI helps marketing and sales operations through market analysis, price optimization, personalized marketing offers, customer support, order processing.

By applying artificial intelligence algorithms to examine consumer data and behavior, AI enables tailored marketing. This makes it possible for companies to develop customized marketing plans and campaigns that target particular customer segments with appropriate offers and content. AI enables firms to customize their marketing campaigns to each client's unique preferences and demands by analyzing vast amounts of customer data and detecting patterns and trends. AI may also automate the marketing process by creating and implementing real-time targeted marketing campaigns that maximize consumer involvement and raise overall marketing efficacy. (Kaushik, 2022)

The impact of AI on social media marketing is significant and increasing. Kalinova (2022) explains how AI is being used in various ways on social media platforms, such as chatbots, detecting harmful behavior, data analysis, and strategy making. AI has revolutionized social media communication by introducing chatbots that can successfully interact with humans. AI-powered social bots can sense, think, and act on social media platforms in ways like humans. AI can also be used for the early detection of harmful bots that can cause image damage to companies. However, despite the advancements in AI, human involvement is still needed in areas that require emotions, creativity, and personalized customer interactions. Overall, the implementation of AI in marketing on social media is inevitable and continues to evolve.

Additionally, AI gives companies a competitive edge. To spot possibilities and improve go-to-market plans, artificial intelligence tools can examine consumer behavior, competition activity, and market trends. This can assist companies in staying one step ahead of rivals and adjusting to shifting market dynamics. (Praful Bharadiya, 2023)

According to the analyzed data panel, at EU level machine learning techniques are currently not widely used in marketing management, even if artificial intelligence (AI) has the potential to improve decision-making in marketing strategy. On average, 1.7% of companies leverage it for marketing and sales purposes, while in Malta, Netherlands and Finland the values are above 3.5%.

Small and medium sized companies are still within the 0.5%-1.5% range of implementation, while larger companies are performing remarkably better, 8% on average at EU level, and around 20% in Finland and Denmark.

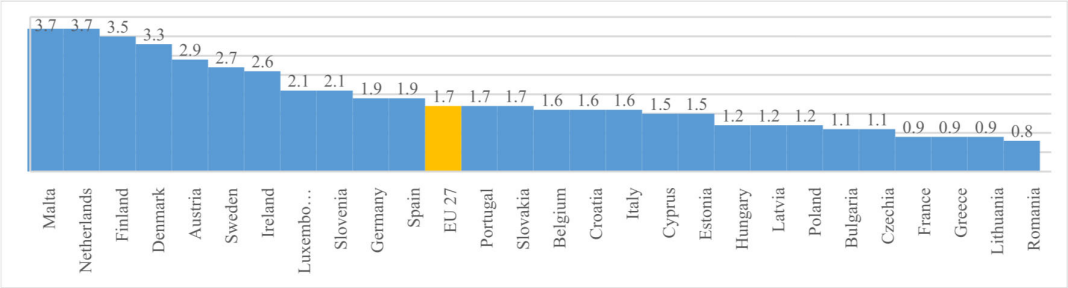

Figure no. 5. Enterprises use AI technologies for marketing or sales
Data source: Eurostat, 2024, own elaboration

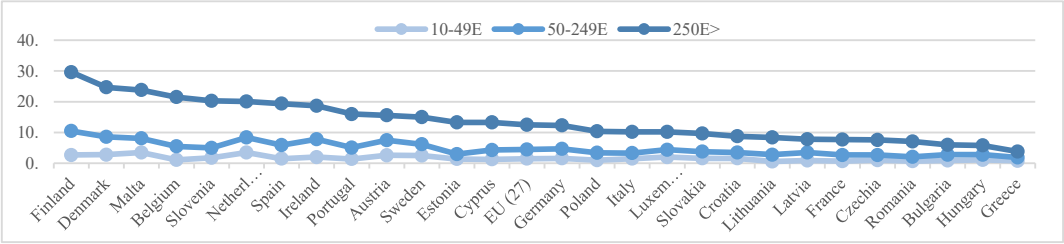

Figure no. 6. Enterprises use AI technologies for marketing or sales by company size
Data source: Eurostat, 2024, own elaboration

3.4 AI and production processes

AI in production processes involves predictive maintenance, process optimization, tools to classify products and spot defects based on computer vision, drones for production surveillance, inspection & security, or even assembly work performed by robots.

A McKinsey report states that businesses have been "digitizing" their factories for decades by using improved process controls, supervisory control systems, and distributed control systems. Although this has significantly enhanced operator visualizations, most large asset businesses have not kept up with the most recent developments in analytics and AI-powered decision support solutions. Operators still rely on human judgment, expertise and intuition. They have indeed downsized their teams to control-room operators who are monitoring signals provided by technologies and adjust the production process if needed. (Charalambous et al., 2019)

For manufacturing to fully benefit from artificial intelligence in terms of increased productivity, flexibility, sustainability, and workforce augmentation, as well as long-term outcomes, enterprises must acknowledge that, in contrast to traditional automation systems, AI solutions carry a unique set of risks that need to be carefully managed. (Triantafyllidis and Hauser, 2024) Complete AI integration promises to create autonomous plants that will free people from labor-intensive jobs so they can focus on projects that best utilize their intelligence and creativity. This will lead to enormous opportunities for innovation and advancement in manufacturing processes. Ensuring ethical AI methods must be a fundamental concept driving such huge growth, given these exciting opportunities.

In EU, just 1.7% of enterprises leverage AI in their production processes. As expected, larger companies with bigger assets and manufacturing operations benefit more from this, with 8% EU average and highest implementation values around 25% in Finland and Slovenia.

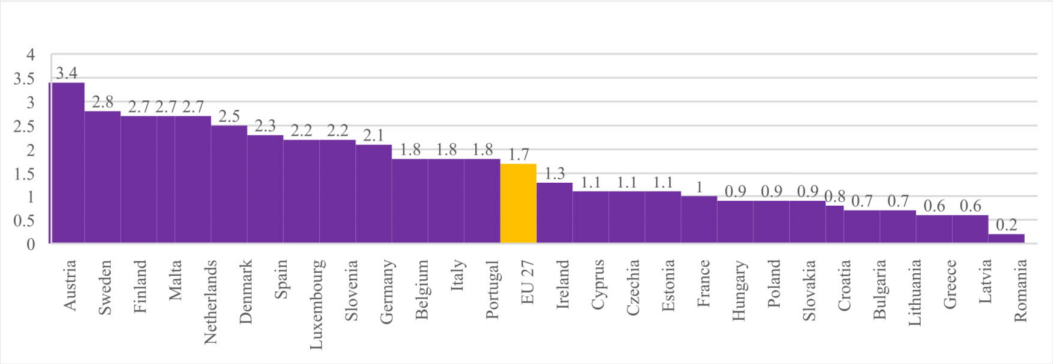

Figure no. 7. Enterprises use AI technologies for production processes
Data source: Eurostat, 2024, own elaboration

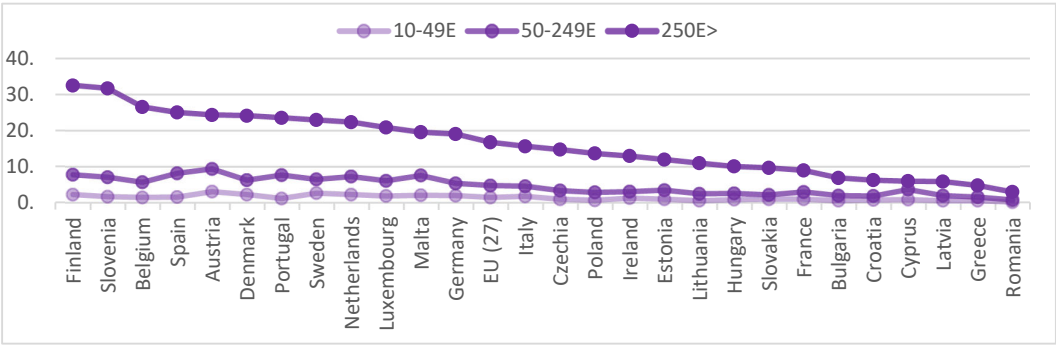

Figure no. 8. Enterprises use AI technologies for production processes by company size
Data source: Eurostat, 2024, own elaboration

Conclusions

Businesses are utilizing AI services and solutions to succeed in a variety of industries. AI has had a big impact on workplace cultures and has the power to change the course of history. AI gives businesses the chance to evaluate performance, examine work patterns, and improve expertise. Artificial intelligence is a key component of contemporary business, fostering innovation, creativity, and competitive success. The growth of AI will change global society fundamentally and increase the reach of organizations. When leveraging AI, organizations should make sure that their values, patterns, and behaviors are all implemented effectively.

According to literature, the top 4 uses of AI in business are for ICT security, logistics, marketing & sales, and production processes. At EU level in 2023, only 2% of companies have implemented AI technology in ICT, marketing, sales & manufacturing, while 0.6% of companies are using AI in their supply chain. Larger companies have more resources, and they are willing to take more risks in experimenting with digitalization, therefore they raise the average when it comes to every analyzed aspect. Small and medium sized companies have yet to discover and leverage the full potential of artificial intelligence in these areas, or maybe they will find other alternative and more suitable uses of AI in their operations.

References

Charalambous, E., Feldmann, R., Richter, G. and Schmitz, C., 2019. *AI in production: A game changer for manufacturers with heavy assets*. [online] Available at: https://www.mckinsey.com/capabilities/quantumblack/our-insights/ai-in-production-a-game-changer-for-manufacturers-with-heavy-assets#/ [Accessed 12 May 2024].

Füller, J., Hutter, K., Wahl, J., Bilgram, V. and Tekic, Z., 2022. How AI revolutionizes innovation management – Perceptions and implementation preferences of AI-based innovators. *Technological Forecasting and Social Change*, [online] 178, p.121598. https://doi.org/10.1016/j.techfore.2022.121598.

Horák, J. and Turková, M., 2023. Using artificial intelligence as business opportunities on the market: An overview. *SHS Web of Conferences*, [online] 160, p.01012. https://doi.org/10.1051/shsconf/202316001012.

Kalinová, E., 2022. USAGE OF ARTIFICIAL INTELLIGENCE ON SOCIAL MEDIA IN EUROPE. *AD ALTA: Journal of Interdisciplinary Research*, [online] 12(2), pp.330–333. https://doi.org/10.33543/1202330333.

Kaushik, Dr.P., 2022. Role and Application of Artificial Intelligence in Business Analytics: A Critical Evaluation. International Journal for Global Academic & Scientific Research, [online] 1(3), pp.01–11. https://doi.org/10.55938/ijgasr.v1i3.15.

Kumar, S. (2023). Usages of AI by Entrepreneur in Business to Boost their Revenue. *International Journal For Multidisciplinary Research*, [online] 5(2), p.2161. https://doi.org/10.36948/ijfmr.2023.v05i02.2161.

Nasrullah, U., 2024. Deciphering Artificial Intelligence's Impact on the Evolution and Transformation of Organizational Culture. *Psychology & Psychological Research International Journal*, [online] 9(1), pp.1–11. https://doi.org/10.23880/pprij-16000385.

Praful Bharadiya, J., 2023. A Comprehensive Survey of Deep Learning Techniques Natural Language Processing. *European Journal of Technology*, [online] 7(1), pp.58–66. https://doi.org/10.47672/ejt.1473.

Thakur, A., 2021. Artificial Intelligence (AI) in Information and Communication Technology (ICT): An Overview. *International Journal of Research and Analysis in Science and Engineering*, 1(3), pp.2582–8118.

Triantafyllidis, K. and Hauser, A., 2024. Mastering AI quality: successful adoption of AI in manufacturing. [online] World Economic Forum. Available at: < https://www.weforum.org/agenda/2024/01/mastering-ai-quality-successful-adoption-ai-manufacturing/ > [Accessed 1 May 2024].