

Regional Innovation for Sustainable Development: The Case of Romania and China

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Please cite this paper as:

Wu, T., 2023. Regional Innovation for Sustainable Development: The Case of Romania and China. In: R. Pamfilie, V. Dinu, C. Vasiliu, D. Pleşea, L. Tăchiciu eds. 2023. *9th BASIQ International Conference on New Trends in Sustainable Business and Consumption*. Constanța, Romania, 8-10 June 2023. Bucharest: ASE, pp. 288-294

DOI: [10.24818/BASIQ/2023/09/058](https://doi.org/10.24818/BASIQ/2023/09/058)

Abstract

In response to the crisis of globalisation since the new crown epidemic, the importance of regionalisation at the national development level has become increasingly evident. Using the Pearl River Delta region in China and the Cluj-Napoca region in Romania as research subjects, this paper presents a comparative and interdisciplinary analysis of the drivers of regional innovation for sustainable development, the approaches and impacts of policy formulation and the dimensions of the impact of regional innovation on sustainable development through a literature analysis and case study approach.

The study shows that the drivers of regional innovation for sustainable development mainly include government support (including financial and platform support) and the industrial capacity of local innovation and entrepreneurship (including academic capacity and industrialisation capacity); government policy formulation mainly has centralised and decentralised approaches, with centralisation requiring large upfront investment and decentralisation facing challenges in the integration of industry and research; the dimensions of regional innovation for sustainable development The main impact dimensions of regional innovation on sustainable development are industry-research synergy, social welfare, low carbon and environmental protection, and talent training. Through case studies, this paper also makes recommendations for stakeholders on the practical application of regional innovation.

The findings and implications of this study are important references for policy makers, practitioners and researchers.

Keywords

Regional innovation; Sustainable development; Pearl River Delta China ; Cluj-Napoca Romania.

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Introduction

1.1 Research Background

With the acceleration of globalisation and the deepening of inter-regional cooperation, exchanges and cooperation between countries have become increasingly close. As two important countries, China and Romania have maintained good relations since their inception and have established extensive cooperation mechanisms and partnerships. Cooperation between the two countries has been outstanding in a number of areas (Popescu and Brinza, 2018). For example, there are many similarities between China's Belt and Road Initiative and Romania's Three Seas Initiative, which provide a broader scope for regional innovation in both countries. At the same time, the continuous improvement of the CEE cooperation mechanism also provides better platforms and opportunities for trade, investment and technology transfer between the two countries (Pencea and Oehler-Şincai, 2015).

The aim of this paper is to examine the regional innovation for sustainable development aspects in China and Romania, two countries with different political, economic and cultural backgrounds but similar challenges and opportunities in terms of regional development (Tse and Gheorghiu, 2022). Regional innovation is a key driver of sustainable development as it contributes to economic growth, environmental protection and social equity in local cities. By comparing and contrasting their experiences, this paper seeks

to identify the factors that facilitate or hinder the adoption and diffusion of regional innovation practices, as well as the outcomes and impacts of these practices on regional sustainability. The focus is on research on regional innovation for sustainable development in China and Romania, the implications of these findings for policymakers and practitioners in China and Romania, and the replicability of these findings for other countries and regions. Finally, the paper summarises the main findings, contributions to the existing literature, and recommendations for future research and policy.

1.2 Research questions

- What are the drivers and barriers of regional innovation for sustainable development in China and Romania, and how do they differ across sectors and regions?
- What are the similarities and differences between regional innovation systems and policies in China and Romania, and how do they affect sustainable development?
- What are the implications of regional innovations for sustainable development and how can they be used to shape policy and practice?

1.3 Structure of the paper

To address these questions, the paper first reviews the relevant literature on regional innovation and sustainable development, focusing on definitions, concepts and empirical evidence of their relationship. It then describes the analytical methodology used to conduct a comparative case study of China and Romania. It concludes by presenting the findings, which include a descriptive analysis of the regional innovation systems in China and Romania, a comparative analysis of their policy frameworks, and an analysis of the challenges and opportunities faced by the two regions.

2. Review of the scientific literature

2.1 Literature review on regional innovation

Regional innovation is the process of creating, disseminating and applying new knowledge and technology in a specific geographical area, usually at the level of a city, region or cluster. Regional innovation involves a variety of actors, such as firms, universities, research institutions, public agencies and civil society organisations, who interact and collaborate in networks and partnerships to generate and exploit innovation opportunities. Regional innovation can take many forms, including product innovation, process innovation, organisational innovation and social innovation, and can have different objectives and impacts, depending on the context and goals of the actors involved.

2.2 Literature review on sustainable development

Regional innovation can play a key role in achieving sustainable development, which has been defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Burton, 1987). The three basic principles are equity, sustainability and commonality. The ultimate aim of sustainable development theory is to achieve common, coordinated, equitable, efficient and multidimensional development.

2.3 Literature review on the role of regional innovation and relevance in sustainable development

Regional innovation can play a key role in achieving sustainable development. Sustainable development requires a balance between the economic, environmental and social dimensions, and regional innovation can contribute to each of these dimensions. At the economic level, regional innovation can create new jobs, increase productivity and promote entrepreneurship and competitiveness, particularly in high-tech and knowledge-intensive sectors. In the environmental dimension, regional innovation can facilitate the transition to a low-carbon and resource-efficient economy through the development and deployment of clean technologies and sustainable practices. On the social dimension, regional innovation can enhance social inclusiveness by addressing local needs and preferences, and by involving different stakeholders in the innovation process (Zhao, Cai and Luo, 2000).

2.4 A literature review on regional innovation for sustainable development research in China and Romania

In China and Romania, there is a growing literature on regional innovation for sustainable development, reflecting their growing importance as emerging economies and regional powers.

In China, regional innovation has been a key element of the country's development strategy since the 1990s, when the government launched a series of policies to promote the clustering of high-tech industries and the upgrading of regional innovation systems. China's regional innovation policy has evolved over time from a top-down approach based on science parks and special economic zones to a bottom-up approach based on innovation clusters and innovation networks (Zhu and Zhang, 2004). Several studies have examined the effectiveness and challenges of regional innovation policies in China, highlighting the role of institutional factors such as governance, finance and intellectual property rights in shaping regional innovation outcomes and impacts.

In Romania, regional innovation is also gaining momentum as the country tries to catch up with its EU counterparts and capitalise on its comparative advantages in high-tech and creative industries. Romania's regional innovation policy has been influenced by the EU Cohesion Policy, which provides funding and guidance for regional development, innovation and entrepreneurship (Dodescu and Chirilă, 2012). However, Romania faces significant challenges in implementing and expanding its regional innovation policy due to a weak innovation culture, a fragmented innovation system, and brain drain of talented graduates and researchers. Several studies have explored the potential of social innovation and smart specialisation as alternatives to regional innovation in Romania, highlighting the need for more participatory and inclusive innovation processes.

3. Research Methodology

3.1 Research design

This study uses a comparative case study approach to examine regional innovation for sustainable development in China and Romania. The case study approach is suitable for exploring complex and context-specific phenomena such as regional innovation, and generates rich and detailed data from multiple sources.

3.2 Case selection

The cases chosen for this study are the Pearl River Delta region in China and the Cluj-Napoca region in Romania. The Pearl River Delta region is a dynamic and innovative urban and industrial cluster in southern China that has undergone significant transformation and upgrading over the past decades, driven by government policies and the private sector (Wu, 2004). The Cluj-Napoca region is a fast-growing and diversified region in north-western Romania with traditional and emerging industries such as information technology, biotechnology and creative industries, and is recognised as an innovation and entrepreneurship hub in the country (Fan, Urs and Hamlin, 2019).

3.3 Data collection

Data collection for this study will rely on a variety of sources and methods, including: i) Document analysis: This will involve a review of relevant policy documents, reports and academic literature to provide a comprehensive overview of regional innovation systems and policies in China and Romania, and to identify key trends, challenges and opportunities. (ii) Survey: This will involve an online survey of selected firms and organisations in the Pearl River Delta and Cluj-Napoca regions to collect quantitative data on their innovation activities, strategies and performance, and to compare and contrast the innovation profiles and trajectories of the two regions.

3.4 Data analysis

The analysis will be guided by research questions and hypotheses, and will aim to identify patterns, relationships and insights that contribute to the understanding of regional innovation for sustainable development in China and Romania.

4. Analysis of the case

4.1 Drivers and barriers to regional innovation for sustainable development

In the Pearl River Delta region, the key drivers of regional innovation for sustainable development include strong government support and coordination that provides resources, incentives and guidance for innovation activities; a vibrant and dynamic private sector that has built up expertise, capital and networks for innovation and entrepreneurship; and a large and diverse talent pool that includes local and foreign professionals and provides a wealth of knowledge and creativity for innovation.

However, in the Pearl River Delta region, there are also significant barriers to regional innovation for sustainable development, such as intense competition and imitation, which can undermine originality and creativity; environmental degradation and resource depletion, which can threaten the long-term sustainability of innovation; and unequal access to resources and opportunities, which can create social and economic disparities.

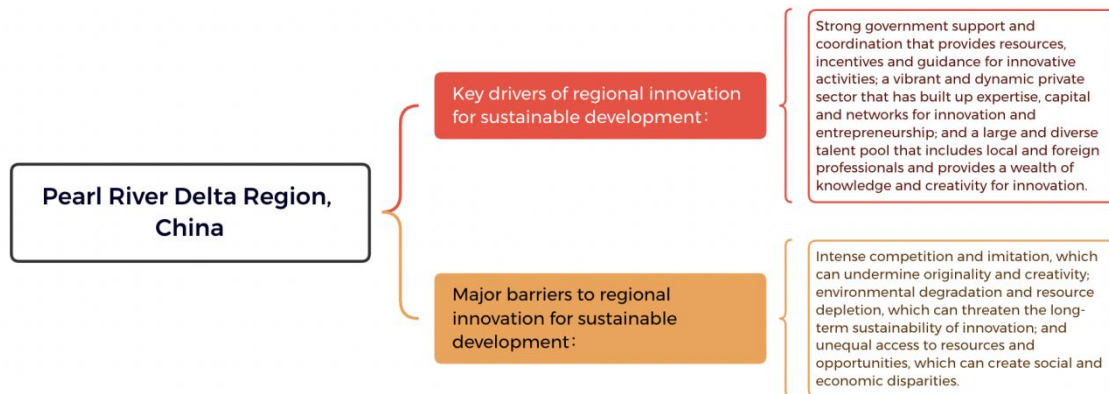


Figure no. 1. Strengths and Obstacles to Development in China's Pearl River Delta Region

Source: Authors' own research

In Cluj-Napoca, the main drivers of regional innovation for sustainable development include: EU funding and support, which provides resources and opportunities for innovation and internationalization; a growing and dynamic IT sector, which has become a major driver of innovation and entrepreneurship; and a supportive and innovative ecosystem, which includes universities, research centers and business incubators.

However, there are also significant barriers to regional innovation for sustainable development in Cluj-Napoca, such as: limited access to finance and markets, which may prevent innovation projects from scaling up; and brain drain and talent retention, which may undermine the sustainability and growth of the regional innovation system.

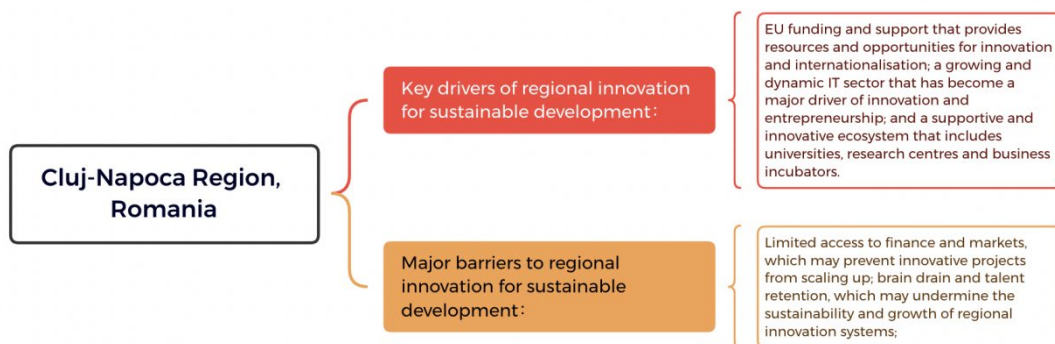


Figure no. 2. Strengths and Obstacles to Development in Romania's Cluj-Napoca

Source: Authors' own research

Weak linkages between academia and industry, which can limit the commercialization and dissemination of research and knowledge.

The differences in these drivers and barriers across sectors and regions are also noteworthy. For example, in the Pearl River Delta region, the manufacturing and technology sectors are more advanced and innovative than the services sector, which faces challenges in terms of upgrading and diversification. In the Cluj-Napoca region, the IT and creative industries are more dynamic and competitive than the traditional sectors, which struggle with low productivity and innovation. There are also differences and inequalities in access to innovation resources and opportunities within each region, reflecting the wider social and economic structures and dynamics.

4.2 Regional innovation systems and policies

The analysis of policy documents and key informant interviews revealed that both China and Romania have comprehensive and ambitious innovation strategies and policies aimed at promoting innovation-led growth,

competitiveness and sustainability. However, there are significant differences in the institutional arrangements, governance structures and cultural contexts that shape the implementation and outcomes of these policies.

In China, the regional innovation system is highly centralised and coordinated by the central government, which has made significant investments in infrastructure, education and research and development to support the development of science and technology parks, innovation clusters and high-tech industries in the Pearl River Delta and other regions. Government policies have also stimulated private sector investment in innovation and entrepreneurship, and fostered collaboration between universities, research institutions and industry.

In contrast, the Romanian innovation system is more fragmented. Innovation policy is largely driven by the EU funding and regulatory framework, which encourages the development of innovation centers, clusters and networks in the Cluj-Napoca region and beyond. However, the implementation and sustainability of these initiatives is challenged by the lack of a coherent innovation strategy, weak linkages between academia and industry, and brain drain of skilled professionals to other countries.

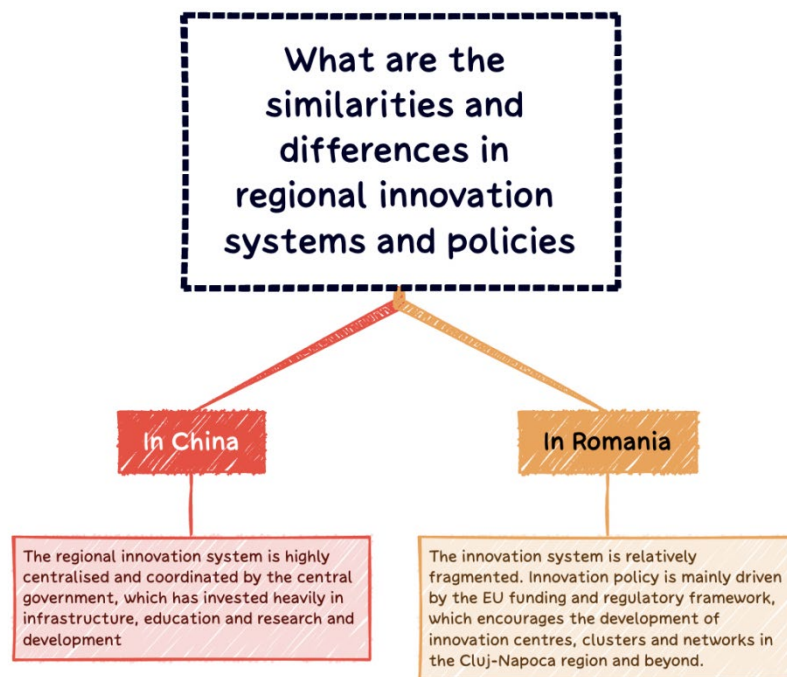


Figure no. 3. What are the similarities and differences in regional innovation systems and policies

Source: Authors' own research

4.3 Dimensions of the impact of regional innovation on sustainable development

Regional innovation can contribute to economic growth, job creation and competitiveness by leveraging the strengths and resources of each region and sector, and by promoting cooperation and synergies between different actors and institutions. However, this requires a coherent and adaptable innovation strategy that is aligned with the broader goals and values of sustainable development and involves a range of stakeholders in its design, implementation and evaluation.

Regional innovation can enhance social inclusion, equity and well-being, provide opportunities and benefits for marginalised and disadvantaged groups, and address social and environmental challenges through innovation and entrepreneurship. However, this requires a participatory and inclusive innovation ecosystem that ensures that diverse voices and perspectives are heard and valued, and that local communities and stakeholders are empowered to shape and benefit from innovation.

Regional innovation can contribute to environmental sustainability and resilience by promoting green technologies, circular economies and low-carbon lifestyles, and by reducing the environmental risks and impacts of economic activities. However, this requires a transformative and systemic innovation agenda that challenges dominant paradigms and practices of unsustainable development and promotes experimentation, learning and adaptation to cope with complex and dynamic ecological and social systems.

Regional innovation can generate knowledge, creativity and culture by enhancing the capacities and talents of individuals and organisations, and by fostering a vibrant and diverse intellectual and artistic community. However, this requires a holistic, people-centred approach to innovation that values the intrinsic and instrumental aspects of innovation and recognises the diversity and plurality of human aspirations and experiences.

Conclusions

Research Conclusion

This study presents a comparative and interdisciplinary analysis of regional innovation for sustainable development, using China and Romania as case studies.

The results show that regional innovation can be a driver of sustainable development, and these drivers include government support (including financial and platform support) and local industrial capacity for innovation and entrepreneurship (including academic and industrialisation capacity), but if these support and capacity are not protected by policies (e.g. lack of patent protection, popular market for copycat products) or if the support/capacity is not strong enough, capital and talent will flow to places with more government support and more capacity for innovative and entrepreneurial industries, becoming a barrier to regional development.

To strengthen regional innovation capabilities, effective local policies and implementation are needed to build effective innovation systems. The case studies of China and Romania show that centralised and decentralised policy management systems have different advantages and challenges, with centralisation facing large up-front investments and decentralisation facing problems in combining industry and research.

Practical application

The practical implications of the research are: to support the development of innovation clusters and networks and to promote cooperation and synergies between different actors and institutions in different sectors and regions. Develop a comprehensive and adaptive innovation strategy, aligned with the goals and values of sustainable development, and involving a range of stakeholders in its design and implementation. Integrate environmental and social sustainability into the innovation agenda by promoting green technologies, circular economies and low-carbon lifestyles, and by reducing the environmental risks and impacts of economic activities. Strengthen the links between academia and industry by facilitating knowledge transfer and commercialisation and supporting the development of scientific and technological talent and skills. Increase the capacity and capability of individuals and organisations by providing training and education programmes, mentoring and coaching, and access to funding and resources. Promote social inclusion and equity in the innovation ecosystem by ensuring diversity and inclusion in the innovation process, and by addressing the needs and aspirations of marginalised and disadvantaged groups.

Innovations and contributions

Contributes to the growing literature on regional innovation and sustainable development through a comparative and interdisciplinary analysis of the drivers, barriers and impacts of regional innovation in China and Romania. It highlights the complex and context-specific nature of regional innovation and its potential contribution to economic, social and environmental sustainability, but also the challenges and trade-offs involved. The findings and implications of this research have important implications for policy and practice and call for a systemic and participatory approach to regional innovation that values diversity, inclusion, experimentation and learning, and integrates the goals and values of sustainable development.

Research limitations and future perspectives

The impacts of regional innovation on sustainable development are complex and specific, requiring a systematic and participatory approach to policy and practice. Further research is needed to explore and test the effectiveness and applicability of these impacts in other regions and countries, and to deepen our understanding of the dynamics and interactions between regional innovation and sustainable development.

Future research in this area could focus on several areas. Firstly, it could extend comparative analysis to other countries and regions to further test and refine the validity and applicability of the drivers, barriers and impacts identified in this study. Secondly, it could examine the dynamics and interactions of regional innovation and sustainable development in different sectors (e.g. agriculture, tourism, healthcare and education) to explore the challenges and opportunities of specific sectors of regional innovation. Finally, it could explore the potential of emerging technologies such as artificial intelligence, blockchain and biotechnology in shaping the future of regional innovation and sustainable development.

Acknowledgment: This paper was funded by the China Scholarship Council.

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