WEP
Warwick
Evans
Publishing

Transactions on Economics, Business and Management Research
ISSN: 2960-1789, eISSN: 2960-2254 | Volume 16
EMFT 2025

A Review of Policy Coordination Mechanisms for Green Transformation of Urban Industrial Structure Under The Dual Carbon Goals

Baojun Liu

School of Earth System Science, Tianjin University, Tianjin, 300072, China

3021207407@tju.edu.cn

Abstract. Under the dual carbon goals, Chinese governments at all levels have introduced a large number of industrial policies in the fields of green manufacturing, clean energy, and circular economy. Their coordination mechanism is of great significance to the green transformation of urban industrial structure. Therefore, the important topic of research on the coordination mechanism of various policies has received widespread attention. Based on a large amount of literature review, this article systematically organizes the relevant content of the research on the policy coordination mechanism of green transformation of urban industrial structure under the dual carbon goals, studies the policy coordination in various key areas, and conducts in-depth analysis of typical city cases. Through research, it is found that through in-depth research and reasonable planning of the policy coordination mechanism, it can more effectively improve the efficiency of green transformation of urban industrial structure, provide a scientific path and a complete green planning framework for urban industrial green transformation, and have great significance for promoting the implementation of the dual carbon plan.

Keywords: urban industrial structure, green transformation, policy coordination, clean energy, technological innovation.

1. Introduction

Under the current dual-carbon strategic goals proposed by the Chinese government, which aim to achieve carbon peaking by 2030 and carbon neutrality by 2060, and the grand narrative of global climate change, cities, as the core carriers of economic activities and carbon emissions, have become the key path for achieving the "dual-carbon" goals through the green and low-carbon transformation of their industrial structure.

To this end, from the central to the local level, Chinese governments at all levels have introduced a large number of industrial policies focusing on green manufacturing, clean energy, circular economy and other fields. However, these policies often belong to different departments with different goals, resulting in problems such as policy goal conflicts, functional overlaps or support gaps [1]. The "fragmented" state of policies may weaken their overall effectiveness and even produce negative effects. Therefore, how to achieve effective coordination of these policies and form a "1+1>2" multiplier effect is a major theoretical and practical issue that needs to be urgently addressed.

This article aims to systematically sort out the policy coordination mechanism, clarify its theoretical basis, operation mode, and evaluation method, in order to make up for the existing research deficiencies and build an integrated analysis framework. Through systematic research on the policy coordination mechanism, it can provide theoretical support and practical paths for the improvement of urban green governance capabilities, and promote the realization of the "dual carbon" goal. The research on the policy coordination mechanism not only involves the synergistic effect of technological innovation policies, the overall government governance model, but also involves multidimensional issues such as regional policy coordination and legal policy coordination, providing theoretical support and practical paths for urban green transformation.

2. Theoretical Basis and Concept Definition

2.1. Green Transformation of Urban Industrial Structure

The green transformation of urban industrial structure refers to the process in which cities promote the transformation of the industrial system from the traditional high-carbon, high-pollution, and high-energy consumption mode to a green, low-carbon, and circular mode through systematic changes under the constraints of resource and environmental carrying capacity, ultimately achieving the coordinated goal of high-quality economic development and high-level ecological environment protection [2]. This transformation process requires the support of a policy coordination mechanism, which integrates policy resources and governance capabilities through institutional arrangements for goal coordination, tool coordination, subject coordination, and process coordination, to achieve a multiplier effect of policy effectiveness and promote urban green transformation [3]. However, resource-based cities face the dilemma of resource dependence and industrial structure transformation, and need to achieve green transformation by extending the industrial chain, developing emerging industries, and adopting circular economy models [2]. The research on policy coordination mechanisms not only involves multidimensional issues such as policy quantification paths, overall government governance models, and regional policy coordination, but also requires a combination of quantitative analysis and mechanism analysis to promote systematic research and practical application of policy coordination mechanisms.

2.2. Policy Coordination

Policy coordination refers to the process in which two or more policy entities integrate policy tools, objectives, processes, and resources through formal or informal institutional arrangements to achieve common or related goals, solve complex problems, and generate synergistic effects. This mechanism emphasizes resource integration and institutional coordination among multiple entities, and achieves a multiplier effect of policy effectiveness through institutional arrangements for goal coordination, tool coordination, entity coordination, and process coordination. In the context of green transformation, the policy coordination mechanism can effectively address complex issues by integrating policy resources and optimizing governance processes. For example, research on the synergistic effects of regional green development shows that policy coordination can significantly enhance regional innovation capabilities and high-quality green development levels [3]. Policy coordination not only involves multidimensional issues such as policy quantification paths, overall government governance models, and regional policy coordination, but also requires a combination of quantitative analysis and mechanism analysis to promote systematic research and practical application of the policy coordination mechanism.

3. Policy Coordination in Key Areas

3.1. Policy Top-Level Design and Collaborative Governance

Systematic governance is achieved through policy coordination and multi-agent collaboration, and top-level design and collaborative governance framework construction are carried out for the policy coordination mechanism of green transformation of urban industrial structure. Studies have shown that at the top-level design level, by strengthening policy coordination and linkage, such as optimizing top-level institutional design to coordinate the coordination of economic, environmental, and carbon emission policies, and promoting the unification of policy objectives and implementation paths; in terms of collaborative governance framework, it draws on collaborative governance theory to build a cross-departmental and cross-regional governance structure, and improves governance efficiency through policy innovation and institutional innovation, which has a guiding and planning role in the green transformation of urban industrial structure [4,5]. Effectively promote the green and low-carbon transformation of urban industrial structure, and achieve high-quality development under the "dual carbon" goal.

3.2. Regional Coordination and Spatial Linkage

Regional collaboration and spatial linkage are technical approaches to the policy coordination mechanism for the green transformation of urban industrial structure. Through policy innovation and top-level design, they promote the optimal allocation of resources and industrial collaboration among cities, such as inter-regional technology spillovers, talent flows, and industrial cooperation, to achieve efficient resource utilization and green transformation. By breaking administrative barriers and promoting the free flow of factors, such as through enclave investment, industrial gradient transfer, and regional cooperation, policy coordination plans regional space for more scientific and rational resource allocation, promoting industrial structure optimization and green upgrading [5]. Ding Xueqian et al. showed in their research that by constructing coupling coordination indicators for the three systems of "land use-high-quality economic development-carbon emissions", and using entropy method and coupling coordination degree model to conduct differentiated scheduling of the comprehensive development level of the three systems, industrial complementarity and technology transfer between the eastern coastal areas and the central and western regions were completed [6]. Formulating differentiated policies according to local conditions to generate regional collaboration and spatial linkage mechanisms have a good promoting effect on low-carbon transformation and are of great significance in pollution reduction and carbon reduction.

3.3. Coordination between Policy Tools and Market Mechanisms

The synergy between policy tools and market mechanisms is a key path for the policy synergy mechanism of green transformation of urban industrial structure. By synergizing policy tools and market mechanisms, implementing a combination of carbon emission trading, taxation, subsidy policies, price signals, and competition incentives, it can effectively promote resource optimization and green technology innovation, and enhance policy efficiency. Through the precise design of policy tools and the improvement of market mechanisms, such as the "dual pilot" policy and innovative financial tool combination in the research of Han Xianfeng et al., it is concluded through hypothesis testing and regression analysis that relying on financial innovation to accelerate the utilization of new energy and clean energy can make green transformation adapt to different regional and industrial needs to achieve the dual goals of economy and environment in green transformation [7]. The rational use of green technology innovation tools to promote collaborative development and promote low-carbon transformation in "dual pilot" cities is at the forefront of the country. He Dexu et al. have shown that by strengthening policy coordination among various departments, such as providing fiscal and tax incentives to key industries, strengthening the rigor of green performance evaluation systems for financial institutions, expanding the scale of green and low-carbon fields, and enabling market entities to more actively participate in green development directions, the green financial incentive and restraint mechanism can be improved [8]. The reasonable synergy between policy tools and market mechanisms has an important role in promoting the green transformation of urban industries.

3.4. Synergy between Technological Innovation and Industrial Transformation

The synergy between technological innovation and industrial transformation is an important support for the policy coordination mechanism of green transformation of urban industrial structure. Technological innovation plays a significant role in promoting industrial transformation and upgrading through breakthroughs in green technology, which can significantly improve green total factor productivity. Technological innovation can correct the impact of rationalization of industrial structure on the economy and promote green transformation [9]. In their research, He Guohua et al. analyzed data from 30 Chinese provinces from 2006 to 2021. Through strengthening policy support for green technological innovation and promoting technological diffusion and industrial synergy under the guidance of policies such as green credit that reduce the cost of technology promotion, various industrial zones have undergone regional industrial green transformation, resulting in significant improvements in green innovation level and industrial structure [10]. In summary, the deep integration of technological innovation and policy coordination is an important support for

achieving urban green transformation and dual carbon goals. Green technology research and development, elimination of backward production capacity, promotion of emerging industries (such as clean energy), and emphasis on the supporting role of technological progress and industrial transformation in carbon emission reduction are all important.

4. Current Status of Policy Coordination in Key Areas of Green Transformation of Urban Industrial Structures

4.1. Typical Operation Mode of Policy Coordination Mechanism

Under the "dual carbon" goal, the typical operating mode of the policy coordination mechanism in the research on the green transformation of urban industrial structure mainly embodies the combination of multi-center governance, policy coordination effect, regional collaborative governance, and top-level design. Multi-center governance emphasizes the collaborative participation of multiple stakeholders (such as government, enterprises, and social organizations), achieving resource optimization and goal coordination through an open system [11]. In terms of policy coordination effect, the dual policy coordination of free trade zones and carbon emission trading pilots can significantly enhance green technology innovation and industrial structure optimization, promoting high-quality green development in the region. Regional collaborative governance emphasizes top-level design and regional linkage, promoting the coordinated advancement of pollution reduction, carbon reduction, economic development, and green transformation through policy innovation and precise implementation. The policy coordination mechanism for the green transformation of urban industrial structure needs to rely on the organic combination of multi-center governance framework, policy coordination effect, regional collaborative governance, and top-level design to achieve systematic progress in the goal of green transformation.

4.2. In-Depth Analysis of Typical Urban Cases

Under the background of dual carbon goals, Shanghai, as a super-large city in China, promotes the green transformation of industrial structure through policy coordination mechanism, becoming a typical research case. Shanghai combines top-level design and policy innovation, such as the "dual carbon" top-level design combined with the positioning of an international metropolis, emphasizing industrial transformation and energy structure adjustment, and promoting green and low-carbon development. The policy coordination mechanism is reflected in multi-dimensional coordination, such as green finance, technological innovation, industrial transformation, and other fields, forming a policy synergy. Shanghai promotes policy implementation through policy experimentation and institutional innovation, such as low-carbon pilot projects, cross-departmental coordination mechanisms, and financial support [12]. At the same time, Shanghai promotes green transformation through industrial structure optimization, such as developing the digital economy, green industries, and optimizing the energy structure. For example, in the research on the green transformation of Shanghai's shipping industry by Wang Zhiqiang et al., they constructed a resource supply system, improved green fuel bunkering services, promoted technological innovation, strengthened upstream and downstream industrial chain collaboration, and established a sound policy and regulation system. By integrating local and external resources, improving bunkering service efficiency, promoting green technology research and development, and facilitating interconnection and interoperability of various links in the industrial chain, they achieved the goal of green transformation [13]. In the research of Zhao Cuiyun et al., Shanghai grasped the key points internally and implemented joint policies through financial support, green incentives, and other policy means to coordinate and regulate, forming a mechanism system for green and low-carbon development. Enterprises were guided and incentivized to independently develop and utilize clean energy. They actively sought to connect Shanghai's local carbon market with the EU carbon market, used reasonable policies to prevent adverse phenomena such as double taxation, and promoted the application of clean energy and the low-carbonization of ship manufacturing through policy support and mechanism innovation, while strengthening the

greening of port infrastructure construction and shipping services [14]. Through the establishment of a carbon market, improving industrial chain collaboration, and technological innovation, the practice of policy coordination mechanism shows that Shanghai has explored a feasible path for green transformation in a super-large city through policy innovation, institutional coordination, and technology drive, providing reference for other cities [15].

However, Shanghai's industrial green transformation currently faces some deficiencies, mainly including insufficient policy coordination, weak support for green credit, lack of industry standards, and insufficient technological innovation capabilities. In addition, the green credit market still shows signs of product homogeneity and insufficient innovation. In the future outlook, Shanghai needs to strengthen policy guidance and top-level design, improve the green financial system, promote the deep integration of finance and industry, and encourage enterprises to increase research and development of green technologies to achieve sustainable development of economy, environment, and society.

5. Shortcomings and Prospects

5.1. Inadequate Research

In this study, although the importance of policy coordination mechanisms in the green transformation of urban industrial structure has been preliminarily established, there are still several shortcomings. Firstly, the research presents a "fragmented" characteristic, with relevant literature being relatively scattered and lacking systematic integration and comprehensive analysis, resulting in an insufficient understanding of the overall policy coordination mechanism. Secondly, existing research is mostly qualitative description-based, lacking sufficient quantitative evaluation, and failing to effectively quantify the actual effects and impacts of policy coordination, which limits the universality and application value of the results. In addition, there is insufficient analysis of the heterogeneity of different cities and regions, and the differential needs of resource-based cities and non-resource-based cities in policy implementation are not fully considered. Finally, although technological innovation is regarded as a key factor, the specific mechanism of how to promote technology transformation and application through policy coordination has not been deeply explored. Therefore, future research needs to strengthen systematic analysis in these areas to more comprehensively understand the role of policy coordination mechanisms in green transformation.

5.2. Research Prospect

In terms of research prospects, future research can focus on the following directions: first, deepening the theoretical model construction of policy coordination mechanism, combining big data and artificial intelligence technology to optimize the design of policy tools; second, exploring regional collaborative governance models, such as the collaborative governance path of Beijing-Tianjin-Hebei, Yangtze River Delta and other urban agglomerations; third, strengthening the linkage between technological innovation and policy coordination, such as the synergistic effect of green technology promotion and industrial policy. Finally, future research should focus on the dynamic evaluation and feedback mechanism of policy coordination to ensure the adaptability and sustainability of policies, so as to more effectively achieve the coordinated promotion of high-quality development and the "dual carbon" goals.

6. Conclusion

This study systematically examines the policy coordination mechanism for the green transformation of urban industrial structure in the context of the dual carbon goals, including four main aspects: top-level policy design and collaborative governance, regional coordination and spatial linkage, coordination between policy tools and market mechanisms, and coordination between technological innovation and industrial transformation. It constructs a relatively complete policy coordination

analysis framework, emphasizing the importance of multi-agent collaboration, regional linkage, coordination between tools and markets, and innovation drive. This provides a more systematic path guidance for urban governors and has a good empirical effect on helping to achieve the coordinated promotion of high-quality development and the dual carbon goals. The impact of the study lies in providing theoretical support and practical cases for regional policy formulation and industrial upgrading paths, promoting the coordinated implementation of green finance, carbon market, and technological innovation policies, and enhancing urban governance capabilities and market expectations.

Of course, this article also has objective limitations, such as limited data coverage and timeliness, unsystematic quantitative evaluation methods, and insufficient research on the heterogeneity of different types of cities (resource-based, non-resource-based, and megacities). Future research can further construct a comprehensive quantitative evaluation framework, combine big data and machine learning methods, deepen regional group comparative research, explore collaborative governance paths for urban agglomerations such as the Beijing-Tianjin-Hebei region and the Yangtze River Delta, and develop operable policy tool combination templates based on this to improve the predictability and reproducibility of policy coordination.

References

[1] Wu J, Zuidema C, Gugerell K, et al. Mind the gap! Barriers and implementation deficiencies of energy policies at the local scale in urban China. Energy Policy, 2017, 106201-211.

[2] Huang H, Huang H, Xiao Y, et al. Industrial structure upgrading, government attention to ecological environment and green innovation efficiency: evidence from 115 resource-based cities in China. Journal of Natural Resources, 2024, 39(01): 104-124.

[3] Yanjun C, Shuai W. Collaborative integration or policy diversification: the influence of policy synergy on regional green development. Frontiers in Environmental Science, 2023, 11.

[4] Di Q, Chen X, Hou Z. Regional differences and key path identification of collaborative governance for pollution reduction and carbon reduction in China's three major urban agglomerations under the "dual carbon" goal. Resources Science, 2022, 44(06): 1155-1167.

[5] Zhang X, Chen Y, Luan X. Spatial reconstruction of the "developing with land" model: a case study of the mountain-sea collaboration project in Zhejiang Province. Journal of Natural Resources, 2023, 38(07): 1730-1742.

[6] Ding X, Wu Q, Liu X, et al. Coupling coordination degree and influencing factors of land use, high-quality economic development and carbon emissions: an empirical study from 282 prefecture-level cities in China. Resources Science, 2022, 44(11): 2233-2246.

[7] Han X, Xiao J, Li B. The synergistic carbon reduction effect of the "innovation-finance" policy tool combination. Resources Science, 2024, 46(07): 1252-1264.

[8] He D, Cheng G. Green finance. Economic Research, 2022, 57(10): 10-17.

[9] She S, Wang Q, Zhang A. Technological innovation, industrial structure and urban green total factor productivity: an examination of the impact channels based on the national low-carbon city pilot program. Economic and Management Research, 2020, 41(08): 44-61.

[10] He G, Zhu P, Wu C. Has green credit promoted industrial green transformation. Economic System Reform, 2024, (03): 184-190.

[11] Of J H P A E. Retracted: Government environmental governance and enterprise coordinated green development under the goal of "Double Carbon". Journal of Environmental and Public Health, 2023, 20239878637-9878637.

[12] Peng Y, Bai X. Experimenting towards a low-carbon city: Policy evolution and nested structure of innovation. Journal of Cleaner Production, 2018, 174201-212.

[13] Wang Z, Cao Z, Zhang C, et al. Research on Shanghai's policies to promote the green transformation of international shipping fuel. Shanghai Energy Conservation, 2025, (01): 8-15.

[14] Zhao C, Zhang J, Zhao N. Research on key elements and mechanism innovation of green transformation of Shanghai shipping industry. Journal of Transportation and Port & Channel, 2025, 12(01):14-19.

[15] Hua S, Hailei Y. Dynamic simulation research on urban green transformation under the target of carbon emission reduction: the example of Shanghai. Humanities and Social Sciences Communications, 2023, 10(1).