

Innovation, Industrial Structure Upgrading, and Environmental Regulation: A Literature Review on Drivers of High-Quality Economic Development in China

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Abstract

Recent literature reveals complex relationships among innovation, industrial structure upgrading (ISU), and environmental regulation in China's high-quality economic development (HQED). This review finds that technological innovation enhances productivity through knowledge spillovers, while green innovation and digital transformation create additional benefits via sustainability and market restructuring. ISU complements these effects by optimizing resource allocation and enhancing regional resilience. Environmental regulation significantly moderates these mechanisms, showing a "U-shaped" relationship between regulation intensity and development outcomes. Regional disparities are evident, with eastern regions exhibiting stronger innovation-upgrading synergies compared to central and western regions. Key challenges include addressing temporal dynamics, regional heterogeneity, and fine-tuning environmental policies to local contexts. Future research should explore variations in institutional quality and the social implications of development transformation.

Keywords: *Innovation, Industrial Structure Upgrading, Environmental Regulation, High-Quality Economic Development, Literature Review.*

Introduction

The transition toward quality-oriented economic development has emerged as a fundamental challenge for economies worldwide, particularly in China. Since 2017, when the Chinese government officially proposed the concept of high-quality economic development (HQED) at the 19th National Congress of the Communist Party of China, the country's development focus has shifted from pursuing high-speed growth to emphasizing quality-driven and sustainable development. This strategic transformation reflects China's response to challenges including environmental degradation, structural imbalances, and innovation capacity constraints that emerged during its rapid growth phase.

This paradigm shift has attracted significant scholarly attention, particularly in recent years (2017-2024). Recent empirical evidence reveals that conventional growth metrics fail to capture crucial aspects of development quality, including sustainability, industrial transformation, and social inclusiveness (Liu, 2019; Xiao et al., 2022). A surge of empirical research, with notable concentration in the past 2-3 years, has examined various mechanisms driving HQED, reflecting both the academic community's recognition of this critical transition and policymakers' need for evidence-based guidance.

Research identifies innovation and ISU as two primary mechanisms driving HQED. While technological innovation enhances productivity through knowledge spillovers (Wei et al., 2020), green innovation creates additional value through environmental sustainability (Li et al., 2021), and digital transformation generates broader spillover effects through market restructuring (Lu & Zhu, 2022). The effectiveness of these innovation pathways varies significantly across regions and development stages, suggesting important

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contextual dependencies that warrant systematic investigation (Yang et al., 2022) .

Industrial structure upgrading demonstrates similar complexity in promoting development quality. Evidence from prefecture-level cities shows that ISU facilitates resource reallocation toward higher productivity sectors (Li et al., 2022) and enhances regional economic resilience through producer services agglomeration (Du et al., 2023). However, these effects exhibit substantial regional heterogeneity. Chen et al. (2023) reveal non-linear relationships between urban land transfer and HQED through ISU in the Yangtze River Economic Belt, while Peng et al. (2024) document stronger effects in more developed urban clusters. These findings suggest that ISU effectiveness depends critically on local economic conditions and institutional capacity.

Environmental regulation has emerged as a crucial moderator in this framework, though its effects show important variations across contexts. Recent evidence from A-share listed companies indicates that environmental regulation enhances the effectiveness of both exploitative and exploratory green innovations (Guo et al., 2024). However, Zhang and Zhou (2023) find that these effects are more pronounced in coastal and non-resource-based cities, suggesting important spatial patterns in regulatory effectiveness. This regional heterogeneity is further confirmed by Kong et al. (2024), who demonstrate that environmental protection tax reform promotes low-carbon productivity primarily in resource-based cities in central and western regions (Mansoor et al., 2022).

The temporal dimension adds further complexity to these relationships. Analysis of prefecture-level cities reveals that digital transformation drives consumption growth through ISU, with stronger effects in rural areas (Wang & Li, 2024). She et al. (2024) document improving coordination between digitalization and green development across cities, while Zhao et al. (2024) show that artificial intelligence reduces carbon intensity through multiple channels including energy structure optimization and industrial upgrading. These findings suggest that the mechanisms linking innovation and ISU to development outcomes evolve as economies transform.

Recent research has expanded understanding of these relationships in several important ways. Innovation's contribution to HQED extends beyond conventional productivity channels, as shown by studies on defense technology innovation (Cai et al., 2023) population aging effects (Gao et al., 2023), and financial market development (Ma, 2023). ISU effectiveness varies with institutional quality and development stage, as evidenced by research on fiscal decentralization (Song et al., 2022), business environment (Zhong & Chen, 2023), and financial openness (Zheng & Wu, 2024). Policy coordination proves crucial, with studies on the "double cycle" strategy (Tan et al., 2023) and pilot free trade zones (Chang & Wang, 2024) highlighting the importance of integrated policy approaches.

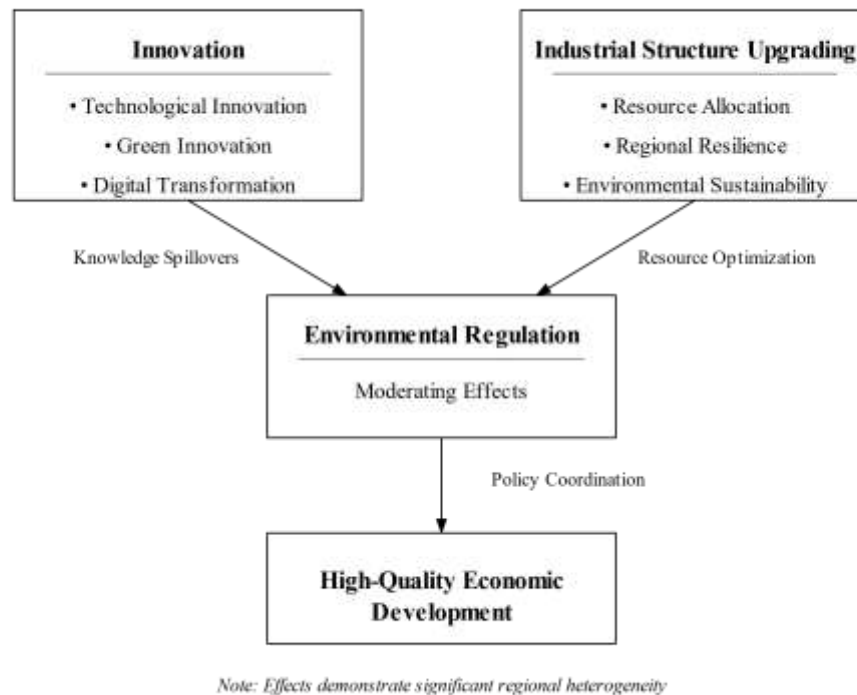


Figure 1. Conceptual Framework of HQED Drivers

Source: Author's elaboration

Methodology

A systematic literature review methodology following the PRISMA guidelines (Moher et al., 2010) was adopted to synthesize existing research on the relationships between innovation, industrial structure upgrading, environmental regulation, and high-quality economic development in China. The systematic approach ensures transparency and replicability in the review process.

Literature Search and Screening

The systematic search covered peer-reviewed articles published between 2017 and 2024 in Web of Science and Scopus databases. This timeframe reflects the emergence and evolution of the HQED concept, which was first proposed in China in 2017. The search strategy combined key terms including:

- “innovation” AND “high-quality economic development” (or “HQED”)
- “industrial structure upgrading” AND “high-quality economic development” (or “HQED”)
- “innovation” AND “industrial structure upgrading” AND “high-quality economic development” (or “HQED”)

The complete search strings are provided in the supplementary materials. This search process initially identified 372 potentially relevant articles.

After removing duplicates, title and abstract screening reduced the sample to 113 articles based on relevance to the research focus. The application of inclusion and exclusion criteria further refined the selection. The complete selection process is illustrated in Figure 2.

The literature sample shows notable concentration in the years 2022-2024, reflecting the evolution of research in this field. The initial years following HQED's introduction in 2017 primarily focused on defining and conceptualizing the term, explaining the relative scarcity of earlier literature. Recent years have witnessed a shift toward exploring various factors influencing HQED, particularly innovation, industrial structure upgrading, and environmental regulation. This shift has generated rich empirical evidence and theoretical insights into the mechanisms and policy implications affecting HQED.

Selection Criteria

The study applied rigorous inclusion and exclusion criteria to ensure the relevance and quality of selected studies. The inclusion criteria were:

- Focus on innovation, ISU, and their combined impact on HQED
- Consideration of environmental regulation as a moderator
- Publication in peer-reviewed journals
- Clear methodological approaches and adequate sample sizes
- Explicit address of ISU or environmental regulation in HQED context

Exclusion criteria encompassed studies focusing solely on traditional economic growth, non-English literature, papers with inadequate methodological descriptions, and those lacking clear definitions of key concepts. For example, studies that only discussed GDP growth without considering sustainability aspects were excluded, as were those that did not provide clear operational definitions of HQED.

Quality Assessment

The quality assessment evaluated five key aspects. First, clear definitions of HQED and related concepts were required. Second, the methodology needed to be robust and well-documented. Third, adequate sample sizes with appropriate representativeness were essential. Fourth, results required systematic and clear presentation. Finally, studies needed thorough discussion of limitations and theoretical implications

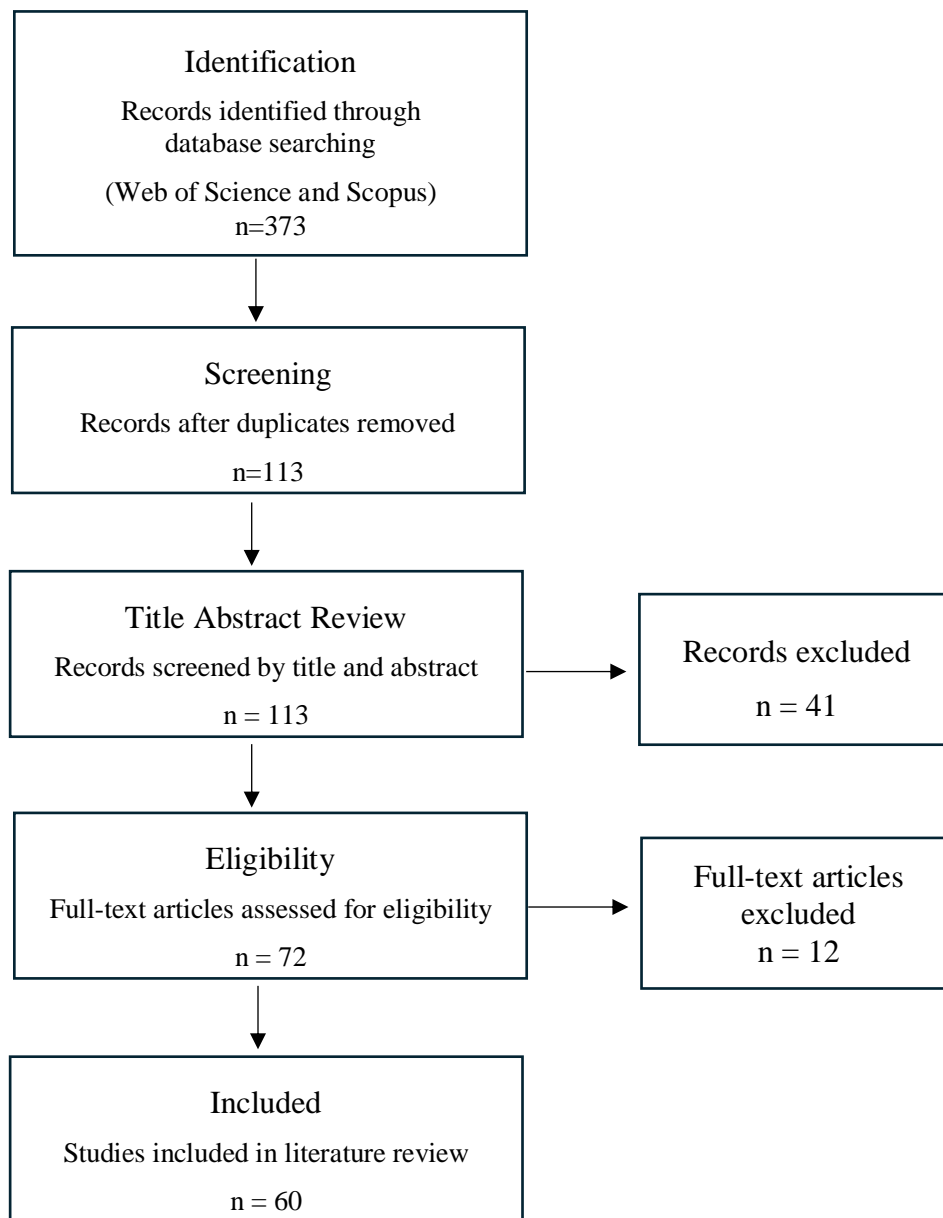


Figure 2. PRISMA Flow Diagram of Literature Selection Process

Source: Author's elaboration

Data Analysis

A structured template facilitated systematic data extraction, recording study characteristics, research context, key variables, main findings, and limitations. The analysis focused on identifying patterns across studies, contradictory findings, and literature gaps. Regular review discussions and external expert consultation helped mitigate potential analytical bias.

Methodological Limitations

Several limitations warrant acknowledgment in this systematic review. The focus on English-language publications potentially excludes relevant research published in other languages. Despite rigorous quality assessment, varying methodologies and contexts across included studies may limit finding comparability.

The predominant focus on Chinese data, while providing rich insights into the world's second-largest economy, constrains the generalizability of findings to other economic contexts.

Innovation Mechanisms Driving HQED

Innovation emerges as a fundamental driver of HQED through multiple distinct but interconnected pathways. These pathways operate through three primary mechanisms: technological innovation, green innovation, and digital innovation. The effectiveness of these mechanisms demonstrates significant variation across regional and institutional contexts.

Conventional Technological Innovation

Technological innovation demonstrates complex but significant effects on HQED through both direct productivity enhancement and institutional development channels. Analysis of provincial-level data reveals that technological innovation enhances productivity through knowledge spillovers and efficiency improvements. Wei et al. (2020) document that financial development and technological innovation jointly improve economic outcomes in Jiangsu Province (2012-2020), though with significant variation across its 13 cities. Han et al. (2022) extend this analysis to 41 prefecture-level cities in the Yangtze River Delta (2009-2018), revealing positive spatial spillover effects particularly pronounced in central cities. This regional innovation pattern gains additional support from Deng et al. (2023), who find that collaborative innovation in the Beijing-Tianjin-Hebei urban agglomeration (2003-2020) generates significant positive spillover effects on neighboring cities, highlighting the importance of regional innovation coordination.

The effectiveness of technological innovation varies systematically across sectors and regions. Defense technology innovation, as examined by Cai et al. (2023) across 27 provincial regions (2010-2019), shows strongest correlation with HQED in the northeast region but weaker effects in the east, suggesting that industrial base and existing technological capabilities significantly moderate innovation effectiveness. This sectoral heterogeneity is further elaborated by Zhao (2024), who studies 30 provincial-level regions (2011-2019) and finds that while innovation factor allocation promotes local HQED, it generates negative spillover effects on neighboring regions, indicating potential regional competition in innovation resources.

Financial-innovation linkages demonstrate particular significance in shaping development outcomes. Z. Liu et al. (2023) analyze 30 provinces (2012-2021) and find that financial development promotes HQED through scientific and technological innovation, with financial development efficiency showing the strongest impact. Ma (2023) extends this analysis to regional financial institutions (2012-2020), documenting how financial innovation enhances HQED by shortening innovation cycles and improving regional efficiency, though with persistent east-west disparities.

Green Innovation and Sustainability

Green innovation has emerged as a crucial mechanism for promoting both environmental sustainability and economic development quality. Through multiple channels including improved resource efficiency, reduced environmental impacts, and market restructuring, green innovation contributes significantly to HQED while addressing environmental challenges. The effectiveness of these contributions demonstrates important variations across regions and institutional contexts.

Regional patterns in green innovation effectiveness show systematic variation with important policy implications. Yang et al. (2022) examine 30 Chinese provincial regions (2010-2019) and find that green technology innovation's impact strengthens where industrial structure, urbanization, and economic development create favorable conditions, though energy consumption acts as an inhibiting factor. Xu et al. (2023) examine 30 provinces (2010-2019) and find that green technology innovation significantly promotes HQED in eastern regions with strong spillover effects, while observing weaker and sometimes negative effects in central and western regions.

Policy coordination significantly influences green innovation's effectiveness in promoting development

quality. Evidence from Kong et al. (2024) shows that environmental protection tax reform promotes low-carbon productivity through green technology innovation, particularly benefiting resource-based cities. R. Zhang et al. (2022) demonstrate that green credit enhances HQED through multiple channels, though noting negative spatial spillover effects. These findings underscore the importance of coordinated policy approaches in maximizing green innovation's contribution to development quality.

Digital Transformation Effects

Digital transformation creates distinctive pathways for HQED through technological advancement and market restructuring. Ding et al. (2021) provide evidence of the transformative potential of digital innovation, analyzing 30 Chinese provinces (2011-2019) and find that the digital economy significantly promotes HQED, with technological innovation acting as a key mediating factor. These findings gain further support from Lu and Zhu (2022), who examine 31 provinces (2013-2020) and document that the digital economy enhances HQED both directly and through spillover effects, with scientific innovation serving as a crucial mediator. These findings highlight important complementarities between digital and technological innovation in driving development outcomes.

The spatial distribution of digital innovation effects reveals clear patterns with important policy implications. Wang and Li (2024) analyze 253 prefecture-level cities (2011-2020) and find that digital transformation drives consumption growth through industrial structure upgrading, with particularly strong effects in rural areas and western regions. She et al. (2024) document improving coordination between digitalization and green development across cities, suggesting evolving synergies between digital and environmental innovations.

Integration effects prove particularly significant in enhancing development quality through digital innovation. Analysis of pilot free trade zones by Chang and Wang (2024) reveals that digital-real economy integration significantly enhances HQED, with technological innovation positively moderating this effect. Zhao et al. (2024) provide additional evidence by showing how artificial intelligence reduces carbon intensity through multiple channels, including energy structure optimization and industrial upgrading. These findings underscore the transformative potential of digital innovation when effectively integrated with other development initiatives.

Industrial Structure Upgrading and HQED

Industrial structure upgrading (ISU) constitutes a fundamental mechanism driving HQED through multiple interconnected channels. The effectiveness of ISU in promoting development quality operates through three primary dimensions: resource allocation optimization, regional resilience enhancement, and environmental sustainability improvement. These dimensions demonstrate significant variations across regions and development stages, suggesting the need for context-sensitive approaches to industrial transformation.

Resource Allocation Optimization

ISU contributes to HQED primarily through optimizing resource allocation across sectors and regions. Li et al. (2022) analyze 283 prefecture-level cities (2010-2019) and find that ISU generates positive spatial spillover effects in resource allocation efficiency. This finding gains further support from Zhou et al. (2024), who document that industrial structure optimization enhances green total factor productivity, though with varying importance across regions. Gong et al. (2022) provide additional evidence that green finance enhances resource allocation efficiency through industrial upgrading and green technology innovation, creating a dynamic feedback loop that promotes sustainable development.

Environmental factors significantly influence resource allocation patterns through ISU. F. Zhang et al. (2022) provide quantitative evidence that environmental quality affects industrial upgrading trajectories, documenting a 2% decrease in structural height for each 1% increase in PM2.5 concentration. Guo et al. (2023) extend this analysis by showing how energy-consuming right trading policy improves resource

allocation efficiency through ISU, with stronger effects observed in eastern and non-resource-based cities. Xu et al. (2024) further illustrate this mechanism through a detailed case study of Jiangsu Province (2010-2021), where green finance effectively catalyzes industrial transformation by compelling high-energy consumption industries to upgrade their production processes.

Financial resource allocation plays a crucial role in supporting industrial upgrading processes. Xu and Dong (2023) analyze 30 provinces (2009-2019) and demonstrate that green finance promotes HQED through ISU, with environmental regulation enhancing this relationship. This financial-industrial nexus is further elaborated by Zhang (2023), who reveals that green finance has stronger impacts on ISU in central and western regions, suggesting important regional variations in financial resource effectiveness.

Regional Resilience Enhancement

Regional resilience emerges as a critical channel through which ISU promotes development quality, operating through both structural diversification and adaptive capacity building. Du et al. (2023) examine 264 prefecture-level cities (2009-2015) and find that diversified producer services agglomeration enhances economic resilience through ISU. The importance of structural diversity is further emphasized by Chen et al. (2023), who reveal significant non-linear relationships in the Yangtze River Economic Belt, showing that while urban land transfer positively impacts HQED, its effect through ISU follows an inverted “U” pattern.

Development stage differences significantly moderate ISU’s contribution to regional resilience. Dou and Guan (2023) find stronger effects in both eastern and western China but through different mechanisms, suggesting that regional development stages shape the pathways through which ISU enhances resilience. This finding is extended by Peng et al. (2024), who document that ISU effectiveness peaks in major urban clusters like the Yangtze River and Beijing-Tianjin-Hebei regions.

The effectiveness of ISU in promoting regional resilience varies systematically with policy implementation quality. Li and Liu (2023) show that both formal and informal environmental regulations positively affect HQED through ISU, with significant spatial spillover effects. This understanding is further developed by Yu (2024), who analyzes 53 cities in the Yellow River Basin (2006-2019) and finds that environmental regulation enhances FDI’s positive impact on ISU, though excessive regulation may become counterproductive.

Environmental Sustainability Promotion

Industrial structure upgrading demonstrates significant potential in promoting environmental sustainability through multiple reinforcing mechanisms. Xu and Dong (2023) show that ISU contributes to environmental improvement through enhanced resource efficiency and reduced pollution intensity. This environmental dimension gains particular significance in the context of regional development strategies, as evidenced by Tan et al. (2023), who examine how the double cycle strategy promotes HQED with ISU playing a crucial mediating role.

The environmental effects of ISU show distinct regional patterns that warrant careful consideration in policy design. Zhang and Zhou (2023) examine prefecture-level cities (2009-2020) and find that pilot free trade zones significantly improve Green Total Factor Energy Efficiency through ISU, with stronger effects in coastal and non-resource-based cities. These regional differences are further documented by Zeng and Liu (2023), who find that environmental regulation generates positive spillover effects on ISU in surrounding regions. Zhu and Lin (2022) reveal that excessive economic growth pressure can inhibit energy efficiency improvements by approximately 3.3%, primarily through its negative impact on industrial structure upgrading. This finding is extended by Ul-Haq et al. (2024), who provide further evidence that while traditional growth-oriented development may increase energy insecurity, HQED approaches can significantly reduce such risks through optimized industrial structure upgrading.

Interactive Effects between Innovation and ISU

The interaction between innovation and industrial structure upgrading represents a complex, mutually reinforcing system that shapes HQED outcomes. These interactions operate through complementary enhancement mechanisms, sustainability-oriented integration, and distinct regional-temporal evolution patterns, creating a dynamic framework for understanding development processes.

Mutual Reinforcement Mechanisms

Innovation drives industrial structure transformation through several distinct but interconnected channels. Li et al. (2022) demonstrate that science and technology innovation promotes HQED through ISU with significant spatial spillover effects, particularly evident in the Yangtze River Delta region. This relationship is further elaborated by R. Zhang et al. (2022), who show how technological innovation enhances green credit's effectiveness in promoting ISU, especially in optimizing energy consumption structures across provinces. He et al. (2024) extend this understanding through their analysis of the Technological Finance Cooperation Pilot policy, revealing that the integration of technological and financial resources significantly promotes HQED through both ISU and technological innovation, with notable spatial spillover effects across prefecture-level cities.

Financial innovation emerges as a crucial catalyst in this transformation process. Z. Liu et al. (2023) find that financial development promotes HQED through scientific and technological innovation, with development efficiency showing the strongest impact. This finding gains additional support from Ma (2023), who studies regional financial institutions (2012-2020) and documents how financial innovation enhances HQED through shortened innovation cycles and improved regional efficiency, despite persistent east-central-west disparities.

The urban development context significantly shapes these mutual reinforcement effects. Zhong and Chen (2023) find that business environment optimization promotes HQED with technological innovation playing a crucial mediating role. This institutional dimension is further explored by Lu Liu et al. (2023), who study 258 cities (2004-2019) and demonstrate how improved regional talent allocation enhances HQED through innovation, particularly in regions with upgraded industrial structures.

Sustainability-Oriented Integration

Green innovation creates powerful synergies with industrial upgrading in promoting sustainable development. Liu and Li (2024) show how green finance simultaneously promotes green innovation and ISU in the Beijing-Tianjin-Hebei region, while Xu and Dong (2023) reveal that environmental regulation enhances these relationships across provinces. Li et al. (2024) extend this understanding by revealing significant synergistic effects between green finance and new infrastructure construction in improving urban carbon emission performance, particularly through the joint promotion of green technology innovation and ISU. Quan and Quan (2023) analyze 30 Chinese provinces (2003-2019) and find that financial agglomeration promotes green low-carbon development through economies of scale, industrial upgrading, and technology spillover.

Digital transformation emerges as a transformative force in reshaping industrial structures. Wang and Li (2024) document that digital transformation drives consumption growth through ISU, with stronger effects in rural areas and western regions. She et al. (2024) provide evidence of improving coordination between digitalization and green development, with ISU serving as a key mechanism. These findings are reinforced by Chang and Wang (2024), who demonstrate that digital-real economy integration significantly enhances HQED through coordinated innovation and structural change.

Regional and Temporal Evolution

The effectiveness of innovation-ISU interactions demonstrates significant regional variation. Eastern regions generally show stronger innovation-upgrading synergies, as evidenced by Yang et al. (2022), who

find that green technology innovation proves most effective where industrial structure, urbanization, and economic development create favorable conditions. Central regions show increasing innovation potential, documented by Lulu Liu et al. (2023), who demonstrate significant improvements in urban carbon efficiency through coordinated green technology innovation and ISU. Yang and Gu (2023) further characterize this evolutionary pattern by revealing that HQED exhibits distinct spatial-temporal characteristics primarily driven by economic scale, urbanization, and green technological innovation, with the eastern coastal regions showing more advanced development stages compared to inland areas.

The temporal dimension reveals important evolution patterns in these interactions. Zhang et al. (2023) demonstrate that new urbanization promotes HQED through innovation, consumption, and investment, with public services, ecological environment, and ISU serving as key moderators. Song et al. (2022) reveal that while fiscal decentralization can increase industrial structure distortions, regional innovation helps mitigate this effect, highlighting the importance of policy stability and adaptation in maintaining effective innovation-ISU interactions over time.

Environmental Regulation as Moderating Factor

Environmental regulation emerges as a critical moderating factor that shapes the effectiveness of both innovation and industrial structure upgrading in promoting HQED. This moderation operates through complex channels and demonstrates significant variation across contexts, development stages, and policy implementation frameworks.

Moderation of Innovation Activities

Environmental regulation significantly influences innovation activities through multiple interconnected channels. Li and Hu (2021) examine 34 industries in China (2007-2015) and show that environmental regulation positively influences green total factor productivity both directly and through technological innovation, though with substantial industrial heterogeneity. This finding is further supported by Liu et al. (2021), who reveal that environmental regulation enhances the effectiveness of green finance in promoting industrial structure upgrading through non-linear effects, with the impact varying based on the initial development stage of different regions. Recent evidence from Guo et al. (2024) extends these insights by examining A-share listed companies (2010-2022), finding that environmental regulation enhances the effectiveness of both exploitative and exploratory green innovations in promoting HQED.

The relationship between environmental regulation and innovation effectiveness demonstrates important non-linear patterns. Lin et al. (2022) reveal a “U-shaped” relationship between regulation intensity and HQED, mediated by green technology innovation. Kong et al. (2024) provide additional evidence by showing that environmental protection tax reform promotes low-carbon productivity through green technology innovation and ISU, with particularly strong effects in resource-based cities in central and western regions.

Moderation of Industrial Upgrading

Environmental regulation shapes industrial structure upgrading through multiple mechanisms. Li and Liu (2023) examine 30 provinces (2002-2020) and demonstrate that both formal and informal environmental regulations positively affect HQED through ISU, generating significant spatial spillover effects. Yu (2024) analyzes 53 cities in the Yellow River Basin (2006-2019) and finds that environmental regulation enhances FDI's positive impact on ISU, though excessive regulation may become counterproductive.

The effectiveness of environmental regulation varies systematically across regions and development stages. Zhang and Zhou (2023) find stronger regulatory effects in coastal and non-resource-based cities. The spatial dimension gains additional insight from Zeng and Liu (2023), who document positive spillover effects of environmental regulation on ISU in surrounding regions. Zhou et al. (2024) show that while both energy structure and industrial structure optimization positively influence green total factor productivity, central and western regions benefit more from industrial upgrading while eastern regions gain from energy

structure optimization.

Policy Effectiveness and Coordination

The effectiveness of environmental regulation depends critically on implementation quality and policy coordination. Huang and Cheng (2023) show that environmental regulation improves rural migrant workers' job quality through ISU and digital transformation, though with heterogeneous effects across demographic groups. The importance of institutional capacity is further emphasized by Chai et al. (2023), who demonstrate that green credit enhances energy transformation and environmental quality through ISU, with effectiveness depending on local institutional strength.

Strategic policy alignment emerges as crucial for regulatory effectiveness in promoting development quality. Wang et al. (2022) find that the dual cycle strategy's success depends significantly on its coordination with environmental regulations and industrial policies in the Yangtze River Economic Belt. She et al. (2024) document improving coordination between digitalization and green development across cities, with environmental regulation facilitating this transformation through multiple channels.

Policy Implications and Research Directions

Recent evidence on the relationships among innovation, industrial structure upgrading, and environmental regulation suggests important implications for both policy development and future research. These findings indicate the need for carefully designed interventions that account for regional conditions while maintaining coordination across policy domains.

Policy Development

The effectiveness of development policies demonstrates significant regional heterogeneity, necessitating carefully calibrated approaches across different contexts. Evidence from Yang et al. (2022) reveals that innovation policies require careful adaptation to local conditions, with eastern regions showing stronger innovation-development linkages than central and western regions. This regional variation suggests the need for differentiated policy frameworks that account for local industrial bases, institutional capacity, and development stages. The effectiveness of regional innovation poles documented by Zheng et al. (2024), who examine 284 prefecture-level and above cities (2005-2018) and indicate that concentrated support in strategically selected locations can generate significant spillover benefits within a 150 km radius, helping cities cross the "middle-income trap".

Environmental regulations require careful coordination with broader development policies to maximize their effectiveness. Evidence from Xu and Dong (2023) shows how environmental regulation can enhance green finance's effectiveness in promoting HQED through ISU. This finding gains additional support from Tan et al. (2023), who show that the success of development strategies depends critically on their integration with environmental and industrial policies. The temporal dynamics revealed by Cao and Peng (2023) underscore the importance of policy stability while allowing for necessary adaptations to changing conditions.

The integration of digital transformation initiatives with traditional development policies emerges as particularly crucial. Wang and Li (2024) analyze 253 prefecture-level cities (2011-2020) and find that digital economy policies show stronger effects in rural areas and western regions, suggesting important opportunities for reducing regional disparities. The coordination between digitalization and environmental policies, as examined by She et al. (2024), reveals improving synergies that warrant careful policy support.

Future Research Priorities

The evolution of research on high-quality economic development reveals several promising directions for future investigation. The temporal dynamics of development mechanisms require more systematic examination, particularly regarding the stability of innovation-upgrading relationships across different

development stages. While existing research provides valuable insights into short-term effects, as shown by Wang and Li (2024) and Zhao et al. (2024), understanding long-term evolutionary patterns remains crucial for policy design.

Institutional quality emerges as a critical factor warranting deeper investigation, particularly in its role of moderating development relationships. Current research by Huang and Cheng (2023) and Zhong and Chen (2023) highlights how institutional factors shape policy effectiveness, but the specific mechanisms through which institutional variation affects development outcomes need more detailed examination. This understanding proves especially important for designing institutional reform initiatives that can enhance policy implementation effectiveness.

The social dimensions of economic transformation deserve increased scholarly attention. While current research focuses primarily on economic and environmental outcomes, the social implications of development policies, including employment effects documented by Huang and Cheng (2023) and distributional impacts noted by Li and Liu (2023), represent crucial aspects of development quality requiring systematic investigation. Understanding these social effects becomes particularly important for ensuring inclusive growth and social stability during economic transformation.

Regional coordination mechanisms in policy implementation warrant more detailed examination. Evidence from Zhang and Zhou (2023) and Kong et al. (2024) reveals significant spatial spillover effects in policy effectiveness, suggesting the importance of regional policy coordination. However, the specific mechanisms through which successful policy practices diffuse across regions, particularly between more and less developed areas, require further investigation.

Achieving HQED requires integrating technological progress, sustainable industrial practices, and effective environmental governance. Success depends on carefully calibrated policies that account for regional conditions, development stages, and institutional capacities while maintaining careful attention to social impacts. Future research advancing understanding of temporal dynamics, institutional effects, and social implications will further enhance capacity to promote sustainable and inclusive development across diverse contexts.

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