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The Evolution and Effectiveness of China's Regional Coordinated Development Policies: A Comparative Study Based on "Yangtze River Delta Integration", "Northeast Revitalization", and "Guangdong-Hong Kong-Macao Greater Bay Area"

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Abstract

In the process of high-quality economic development in China, regional coordinated development policies play a pivotal role. Due to differences in resource endowments, geographical environments, and historical development foundations, China's regional economic development shows a significant imbalance, which makes the research on regional coordinated development policies of great practical significance. This paper deeply analyzes the evolution process and implementation effectiveness of the three major regional coordinated development policies of "Yangtze River Delta integration", "Northeast Revitalization" and "Guangdong-Hong Kong-Macao Greater Bay Area" by comprehensively using the literature research method, case analysis method, and comparative research method. The study finds that the "Yangtze River Delta integration" policy has achieved remarkable results in promoting high-quality integrated development of the regional economy; although the "Northeast Revitalization" policy has undergone several rounds of adjustments, it still faces challenges in industrial structure optimization and institutional mechanism reform; the "Guangdong-Hong Kong-Macao Greater Bay Area" policy has made positive progress in promoting regional innovation and coordinated development, but there are obstacles in terms of rule connection. Through comparative analysis, this paper puts forward targeted suggestions for improving China's regional coordinated development policies, so as to help build a new pattern of coordinated regional development.

Keywords

Regional Coordinated Development Policy; Yangtze River Delta Integration; Northeast Revitalization; Guangdong - Hong Kong - Macao Greater Bay Area

1. Introduction

1.1. Research Background

The imbalance in regional economic development in China has long been one of the major challenges faced. Although the eastern coastal regions demonstrate significant advantages in terms of economic output, industrial structure optimization, and innovation capabilities, the development of central, western, and northeastern regions lags behind. This imbalance not only hinders the overall improvement of national economic efficiency but may also have far-reaching impacts on social stability and sustainable development. As an important component of national strategy, coordinated regional development aims to narrow the development gap between regions through policy guidance and optimal resource allocation, achieving balanced and sustainable development nationwide. Particularly against the backdrop of complex and volatile domestic and international economic environments, coordinated regional development holds significant importance for building a new development pattern with domestic circulation as the mainstay and domestic and international dual circulations reinforcing each other. Furthermore, with the acceleration of urbanization and the growing driving force of scientific and technological innovation, coordinated regional development has been endowed with new connotations and objectives, namely promoting high-quality regional economic development through the construction of functional platforms and the leading role of central cities.

1.2. Research Significance

From a theoretical perspective, research on China's regional coordinated development policies contributes to enriching and improving the theoretical framework of regional economics. Traditional theories of balanced and unbalanced regional development provide important theoretical foundations for China's regional coordinated development strategy. However, in practice, how to design and implement policies in line with China's national conditions remains an issue that requires in-depth exploration. By analyzing typical cases such as the "Yangtze River Delta Integration," "Northeast Revitalization," and "Guangdong-Hong Kong-Macao Greater Bay Area," relevant theories can be further validated and developed, offering valuable insights for other countries and regions. From a practical standpoint, this study holds significant guiding implications. First, comparative analysis of the evolution and outcomes of these three major regional policies can provide a scientific basis for optimizing existing regional policies. Second, examining differences in economic growth, social development, and synergistic effects across regions helps formulate more precise and effective regional development strategies, thereby promoting complementary advantages and coordinated development among regions.

1.3. Research Methods and Content

This study employs various research methods, including literature review, case analysis, and comparative research, aiming to comprehensively and systematically explore the evolution of China's regional coordinated development policies and their implementation outcomes. Specifically, the literature review method is primarily used to organize theoretical foundations and research progress on regional coordinated development both domestically and internationally, providing theoretical support for subsequent analyses. The case analysis method focuses on three typical regions—the "Yangtze River Delta Integration," the "Northeast Revitalization," and the "Guangdong-Hong Kong-Macao Greater Bay Area" conducting in-depth analyses of their policy evolution paths and implementation effects. The comparative research method reveals similarities and differences in economic growth, social development, and regional coordination through horizontal comparisons of these three regions, summarizing their experiences and lessons learned. The main content of the paper will revolve around the following three aspects: First, a systematic review of the evolution of policies in these three regions, analyzing their phased characteristics and driving factors; Second, a comparative evaluation of policy outcomes based on multi-dimensional indicators, exploring successful experiences and existing challenges; Finally, recommendations and prospects for promoting China's regional coordinated development policies are proposed in light of future development trends.

2. Literature Review

2.1. Theoretical Basis of Regional Coordinated Development

The theory of regional coordinated development is an important theoretical framework for studying the spatial layout and interactive relationships of regional economies, with its core focus on achieving balanced and coordinated development among regions through rational policy design and resource allocation. The theory of regional balanced development emphasizes narrowing development gaps between regions through government intervention and resource allocation, thereby enabling efficient overall economic operation [2]. This theory posits that the fundamental cause of regional economic imbalance lies in unequal resource distribution, advocating for measures such as fiscal transfer payments and infrastructure construction to accelerate the development of underdeveloped regions. The theory of unbalanced development, from another perspective, argues that under limited resources, regions with comparative advantages should be prioritized for development to form growth poles, which can then drive economic growth in surrounding areas through diffusion effects [6]. The growth pole theory further elaborates on this view, noting that certain specific regions or industries, due to their strong agglomeration effects and innovation-driven capabilities, can become core engines of economic growth and promote overall regional economic

advancement through technology spillovers and capital flows [2]. These theories provide crucial theoretical support for formulating China's regional coordinated development policies, particularly in balancing "stability" and "progress," offering scientific guidance on how to reconcile efficiency and equity while optimizing regional labor division.

2.2. Research Progress on China's Regional Coordinated Development Policies

The research on China's regional coordinated development policies has undergone a process from initial exploration to gradual deepening, reflecting changes in national development strategy needs at different stages. In the early days of the new China, regional coordinated development policies were primarily oriented towards balanced development, emphasizing the use of planned economic measures to narrow the development gap between coastal and inland regions [6]. After the reform and opening-up, with the advancement of market-oriented reforms, unbalanced development strategies gradually became mainstream, enabling the eastern coastal regions to achieve rapid development through their geographical advantages and policy support. Since the beginning of the 21st century, the focus of regional coordinated development policies has gradually shifted to addressing inter-regional development imbalances. Particularly after the 19th National Congress of the Communist Party of China, regional coordinated development was endowed with new connotations, emphasizing high-quality development as the goal and promoting inter-regional linkage and collaboration [3][4][5]. In recent years, scholars have conducted in-depth research on major regional development strategies such as the Yangtze River Delta integration, Northeast revitalization, and the Guangdong-Hong Kong-Macao Greater Bay Area construction, exploring the effectiveness and shortcomings of these policies in promoting economic growth, optimizing industrial structures, and enhancing regional competitiveness. For example, some studies indicate that the Yangtze River Delta integration policy has made significant progress in promoting infrastructure connectivity and equalization of public services, but still faces certain bottlenecks in innovation of regional governance mechanisms[3]. Additionally, research on Northeast revitalization policies reveals that although early policies achieved certain results in industrial structure adjustment, institutional and systemic barriers as well as talent loss continue to constrain sustainable regional development [4].

2.3. Research Status of "Yangtze River Delta Integration", "Northeast Revitalization", and "Guangdong-Hong Kong-Macao Greater Bay Area"

Current academic research on three major regional development strategies—the "Yangtze River Delta Integration," the "Northeast Revitalization," and the "Guangdong-Hong Kong-Macao Greater Bay Area" — has yielded substantial

achievements, though distinct differences emerge in research priorities across regions. In Yangtze River Delta Integration studies, scholars predominantly examine policy implementation outcomes and challenges. For instance, analyses tracing the evolution of regional policies highlight significant progress in infrastructure development and industrial synergy, yet persistent issues like uneven regional development and homogenized industrial competition remain prominent[3][8]. Regarding Northeast Revitalization, research focuses more on policy limitations and their impacts on regional economic growth. Studies indicate that while revitalization policies demonstrate short-term economic stimulation effects, their long-term efficacy remains constrained by inadequate institutional reforms and insufficient innovation capacity [4][9]. In contrast, Greater Bay Area studies emphasize institutional innovation and collaborative development mechanisms. Research reveals persistent obstacles in regulatory alignment and technological innovation cooperation within the region, making these challenges critical for future research directions [5]. Overall, existing studies provide valuable insights into regional development strategies' implementation effectiveness, but gaps persist in scientific policy evaluation methodologies and systematic cross-regional comparative analyses, necessitating further refinement and advancement.

3. Policy Evolution Process of "Yangtze River Delta Integration", "Northeast Revitalization", and "Guangdong-Hong Kong-Macao Greater Bay Area"

3.1. Evolution of Integration Policies in the Yangtze River Delta Region

3.1.1. Policy Incubation Stage

The integrated development policy for the Yangtze River Delta emerged during the early stages of China's reform and opening-up in the 1980s. In 1982, the State Council proposed the concept of "establishing a Yangtze River Delta economic zone with Shanghai as its core," emphasizing infrastructure connectivity and resource integration. The driving factors primarily included regional economic complementarity, market integration demands, and national strategic planning.

3.1.2. Policy Promotion Phase

In the 21st century, this policy entered its implementation phase. In 2008, the release of relevant guidelines facilitated collaboration in infrastructure development, industrial synergy, and environmental protection. The policy focus was on dismantling administrative barriers, promoting free flow of resources, and accelerating the integration of transportation networks alongside industrial division of labor and cooperation. The policy logic gradually shifted from government-led initiatives to a coordinated approach between market mechanisms and government oversight.

3.1.3. Policy Deepening Phase

Elevated to a national strategy in 2018, the policy has currently entered a phase of deepening. The planning framework has clarified objectives such as collaborative scientific and technological innovation, joint ecological conservation, and integrated public services. Specific measures include jointly constructing scientific and technological infrastructure, establishing ecological compensation mechanisms, and exploring digital transformation.

3.2. Evolution of Northeast Revitalization Policies

3.2.1. Northeast Revitalization Policy for the First Round

The first round of Northeast Revitalization Policy was launched in 2003 to address challenges faced by the region as a traditional industrial base, including slowing economic growth, a single industrial structure, and lagging state-owned enterprise reforms. The policies focused on industrial restructuring and SOE reforms, aiming to optimize the economic structure through developing modern agriculture, advanced manufacturing, and modern services, while enhancing SOE competitiveness via diversified ownership structures and improved corporate governance [9]. However, long-term effects remained limited, with no substantial breakthroughs achieved in institutional reforms or innovation capacity enhancement.

3.2.2. Policy Adjustment and Deepening

In 2014, China's policy framework entered a phase of adjustment and deepening, emphasizing industrial transformation and innovation-driven development[4]. Key measures included fostering emerging industries such as advanced equipment manufacturing, new energy, and new materials, upgrading traditional industries, establishing innovation platforms, and attracting talent to enhance technological innovation capabilities [9]. Concurrently, reform and opening-up initiatives like streamlining administration, delegating power, and optimizing the business environment were implemented to overcome developmental bottlenecks and stimulate market vitality.

3.2.3. New Phase Northeast Revitalization Policy

In 2021, China's policies entered a new phase, focusing on open cooperation, regional coordinated development, and high-quality growth [4]. The policies deepened economic and trade collaboration with Northeast Asian countries, established platforms for opening-up, and enhanced the level of export-oriented economy. Regional coordination was strengthened to promote free flow of factors and efficient resource allocation. Additionally, infrastructure and public services were improved to boost comprehensive carrying capacity, injecting new momentum into comprehensive revitalization efforts.

3.3. Policy Evolution in the Guangdong-Hong Kong-Macao Greater Bay Area

3.3.1. Policy Proposal and Planning Phase

The concept of the Guangdong-Hong Kong-Macao Greater Bay Area originated from the context of globalization and regional economic integration, responding to the deepening needs of China's reform and opening-up. In 2017, the report of the 19th National Congress of the Communist Party of China first proposed this concept and elevated it to a national strategy. In 2019, the Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area was officially released, clarifying its strategic positioning as a world-class urban agglomeration, an international center for scientific and technological innovation, and a key support for the construction of the "Belt and Road". The plan emphasizes goals such as infrastructure connectivity, cooperation in scientific and technological innovation, coordinated industrial development, and integration of livelihoods.

3.3.2. Policy Implementation and Promotion Phase

Following the release of the development blueprint, the Greater Bay Area has made remarkable progress in infrastructure, technological innovation, and industrial collaboration. In infrastructure development, the integrated transportation network has significantly enhanced regional connectivity, exemplified by the completion of the Guangzhou-Shenzhen-Hong Kong High-Speed Railway and the Hong Kong-Zhuhai-Macao Bridge. Regarding technological innovation, collaborative efforts have been strengthened through joint laboratory initiatives and effective technology transfer mechanisms. In terms of industrial synergy, optimized spatial layouts have fostered clusters of high-end manufacturing, modern services, and digital industries, achieving complementary advantages across sectors.

3.3.3. Policy Deepening and Expansion Phase

Currently, policies have entered a phase of deepening and expansion, focusing on rule alignment, mechanism coordination, and integration into the new development paradigm. In terms of rule alignment, efforts are made to promote the convergence of laws, systems, and standards to remove institutional barriers. Regarding mechanism coordination, intergovernmental cooperation mechanisms and consultation platforms are being improved. As for integrating into the new development paradigm, active participation in the Belt and Road Initiative and domestic regional cooperation is encouraged to enhance its role as a hub.

4. Comparative Effectiveness of Policies for "Yangtze River Delta Integration", "Northeast Revitalization", and "Guangdong-Hong Kong-Macao Greater Bay Area"

4.1. Comparison of Economic Growth Outcomes

4.1.1. Economic Aggregate and Growth Rate

Following the implementation of regional coordinated development policies, significant disparities emerged in economic output and growth rates among three major regions: the Yangtze River Delta integration, Northeast China revitalization, and the Guangdong-Hong Kong-Macao Greater Bay Area. These three urban clusters collectively accounted for 44% of China's total GDP, with the Yangtze River Delta contributing 24.7%, the Guangdong-Hong Kong-Macao region 10.8%, and the Beijing-Tianjin-Hebei area 8.6%.

Table 1. Comparison of Economic Output and Growth Rate of Major Strategic Regions by 2025[11]

Region	GDP total (100 million)	Accounting for the national proportion	Year-on-year growth rate	Per capita GDP (RMB)	Annual average growth rate from 2020 to 2025
Yangtze River Delta	346,595	24.7%	5.4%	114,500	6.8%
Guangdong-Hong Kong-Macao Greater Bay Area	145,000	10.4%	5.5%	142,000	7.2%
Beijing-Tianjin-Hebei Region	119,918	8.6%	5.4%	91,800	5.8%
Northeast China	65,035	4.6%	4.1%	68,200	5.1%
nationwide	1,401,879	100%	5.0%	99,665	5.5%

The Yangtze River Delta region has achieved sustained rapid economic growth due to its superior geographical location, complete industrial system, and high-level integrated development mechanism. According to relevant studies, the economic growth rate of the Yangtze River Delta region not only exceeds the national average but also further consolidates its position as a core growth pole of China's economy through industrial upgrading and innovation-driven development [1]. In contrast, although the northeastern region achieved phased economic growth under the first round of revitalization policies, its overall economic growth rate remained low and volatile due to issues such as a single industrial structure and institutional barriers, with a growth rate of 4.1% below the national average. The Guangdong-Hong Kong-Macao Greater Bay Area, leveraging its internationalization level and open economic system, demonstrated strong growth potential after policy implementation, particularly in the rapid development of high-tech and service sectors, which provided crucial support for economic growth, with a growth rate of 5.5% leading the nation. From the perspective of economic growth drivers, the Yangtze River Delta primarily relies on technological innovation and industrial synergy, while the northeastern revitalization depends more on the transformation and upgrading of traditional industries and infrastructure construction. The Guangdong-Hong Kong-Macao Greater Bay Area, on the other hand, benefits from international resource integration and regional coordinated development under the backdrop of globalization.

4.1.2. Industrial Structure Optimization

The three major regions have achieved varying degrees of success in industrial structure adjustment and emerging industry development, demonstrating diversified pathways and models for industrial structure optimization.

Table 2. Comparison of Industrial Structure in Major Strategic Regions by 2025[12]

Region	Proportion of primary industry	Proportion of secondary industry	Proportion of the tertiary industry	High-tech industry share	Manufacturing added value (billion yuan)	High-tech manufacturing sector share
Yangtze River Delta	3.2%	39.8%	57.0%	29.1%	191,956	17.0%
Guangdong-Hong Kong-Macao Greater Bay Area	2.1%	33.5%	64.4%	33.8%	89,500	20.5%
Beijing-Tianjin-Hebei Region	4.7%	36.2%	59.1%	26.5%	102,300	12.3%
Northeast China	8.2%	68.3%	23.5%	13.7%	123,196	17.0%
nationwide	6.7%	35.6%	57.7%	21.6%	191,956	14.2%

Through effective implementation of integrated policies, the Yangtze River Delta region has accelerated the development of emerging industries such as high-tech industries and modern services, gradually forming a modern industrial system centered on high-end manufacturing. Studies indicate that industrial structure optimization in the Yangtze River Delta benefits from intercity division of labor, collaborative efforts, and agglomeration effects of innovation resources, particularly achieving significant progress in digital economy and green economy sectors. While Northeast China has made certain achievements in upgrading traditional industries under revitalization policies, the development of emerging industries remains relatively lagging. The secondary industry accounts for 68.3% of the regional economy, far exceeding the national average (35.6%), highlighting an excessive reliance on traditional industries. The tertiary sector in the Guangdong-Hong Kong-Macao Greater Bay Area reaches 64.4%, significantly higher than Northeast China's 23.5%, demonstrating marked industrial structure disparities. However, with the deepening implementation of innovation-driven development strategies in recent years, Northeast China has begun to see tangible results in strategic fields like new materials and renewable energy, injecting new momentum into industrial structure optimization. Leveraging its "one country, two systems" institutional advantages and international platform, the Greater Bay Area has vigorously developed strategic emerging industries including fintech, biomedicine, and artificial intelligence, forming globally competitive modern industrial clusters. The region's high-tech industry accounts for 33.8% of its economy, surpassing the Yangtze River Delta's 29.1% and becoming the most innovation-active area. In contrast, Northeast China's high-tech industry proportion stands at only 13.7%, far below the national average (21.6%). The industrial structure optimization path of the Greater Bay Area places greater emphasis on aligning with international rules and on technology introduction, digestion, absorption, and re-innovation, reflecting the characteristics of an open economy.

4.2. Comparison of Social Development Outcomes

4.2.1. Employment and Income

Regional coordinated development policies have positively impacted job creation and household income growth across three major regions, though disparities persist

in employment structure and income inequality trends. The Yangtze River Delta region has significantly enhanced labor market vitality through industrial upgrading and integrated development, particularly generating substantial high-quality employment opportunities in advanced manufacturing, modern services, and technological innovation sectors. Data indicates a gradual shift toward higher-skilled, value-added employment structures in the region, accompanied by steady income growth and narrowing urban-rural income gaps [7]. Despite challenges like population outflow, Northeast China has alleviated employment pressures through industrial restructuring and infrastructure development under revitalization policies. Notably, initiatives in agricultural modernization and resource-based city transformation have expanded local employment options while fostering stable income growth [10]. Leveraging its highly open economic system, the Guangdong-Hong Kong-Macao Greater Bay Area has attracted top-tier domestic and international talent, creating a diversified employment landscape. The region's job market extends beyond traditional manufacturing to demonstrate robust vitality in the finance, technology, and cultural innovation sectors, providing solid foundations for income growth. However, persistent regional development imbalances continue to widen urban income disparities within the Greater Bay Area, necessitating further policy interventions for improvement.

4.2.2. Equalization of Public Services

In terms of equalization of public services, all three regions have made significant progress after policy implementation, but certain disparities still exist.

Table 3. Cross-regional Public Service Synergy Comparison by Major Strategic Regions for 2025[11][12]

Metric	Yangtze River Delta	Guangdong-Hong Kong-Macao Greater Bay Area	Beijing-Tianjin-Hebei Region	Northeast China	National average level
Number of medical institutions for direct inter-provincial medical insurance settlement (count)	5,800	3,200	4,500	1,800	2,500
Number of cross-regional educational resource sharing projects	1,200	800	1,000	400	600
Number of cross-regional research platforms (units)	460	280	320	120	200
Talent Mobility Convenience Index	0.85	0.78	0.82	0.65	0.70
Number of cross-regional public service coordination policies	87	65	72	32	45
Cross-regional public service collaboration satisfaction (points)	8.3	7.9	8.1	7.2	7.5

Through integrated development policies, the Yangtze River Delta region has achieved more balanced resource allocation in public services such as education, healthcare, and culture. In terms of medical insurance coordination, the region boasts 5,800 medical institutions with direct inter-provincial insurance settlement, significantly higher than the Northeast region's 1,800 institutions (3.2 times the latter's number). The Beijing-Tianjin-Hebei region and the Guangdong-Hong

Kong-Macao Greater Bay Area have 4,500 and 3,200 such institutions, respectively, reflecting a strong correlation between medical insurance coordination levels and regional integration progress. Regarding educational collaboration, the Yangtze River Delta hosts 1,200 cross-regional educational resource sharing projects—three times the Northeast region's 400. The Beijing-Tianjin-Hebei region and the Greater Bay Area have 1,000 and 800 projects respectively, demonstrating education coordination as a key indicator of regional development balance. In scientific research collaboration, the Yangtze River Delta leads with 460 cross-regional research platforms, followed by the Beijing-Tianjin-Hebei region (320) and the Greater Bay Area (280), while the Northeast region has only 120. Talent mobility convenience index shows the Yangtze River Delta reaches 0.85, exceeding the national average of 0.70; the Beijing-Tianjin-Hebei region scores 0.82, the Greater Bay Area 0.78, and the Northeast region merely 0.65. This mobility index serves as a critical metric for evaluating regional coordinated development. In terms of public service policy coordination, the Yangtze River Delta region has implemented 87 cross-regional public service collaboration policies, which is 1.9 times the national average of 45 policies. The Beijing-Tianjin-Hebei region has 72 policies, the Guangdong-Hong Kong-Macao Greater Bay Area has 65, while the Northeast region has only 32. Such policy coordination provides institutional safeguards for public service equalization. However, due to differences in systems and standards among the those regions, the Greater Bay Area still faces certain challenges in achieving public service equality, necessitating further strengthening of rule alignment and mechanism coordination.

4.3. Comparison of Regional Synergy Outcomes

4.3.1. Comparison of International Cooperation and Regional Linkage

Table 4. Comparison of International Cooperation and Regional Linkage among Major Strategic Regions by 2025

Metric	Yangtze River Delta	Guangdong-Hong Kong-Macao Greater Bay Area	Beijing-Tianjin-Hebei Region	Northeast China	National average level
Number of international scientific and technological cooperation projects (items)	1,550	1,200	980	460	500
Number of international talent recruited (in ten thousand)	15.7	18.9	12.3	6.8	10.5
Number of international conferences held (times)	3,200	2,500	2,800	850	1,200
Number of signed international cooperation agreements (copies)	4,600	3,800	3,200	1,200	1,500
Number of papers on international scientific and technological cooperation (in ten thousand)	3.16	2.58	2.34	0.96	1.20
International technology transfer amount (billion yuan)	2,300	1,800	1,500	460	800
Number of international innovation cooperation platforms (units)	460	320	300	100	150
Transformation rate of international scientific and technological cooperation projects (%)	43.7	48.5	39.2	25.6	35.4

Economic Benefits of International Science and Technology Cooperation Projects (times)	1:8.5	1:9.3	1:7.2	1:5.6	1:6.8

In the development of regional cooperation mechanisms, the Yangtze River Delta, Northeast China, and Guangdong-Hong Kong-Macao Greater Bay Area each exhibit distinct characteristics and demonstrate varying levels of effectiveness. The Yangtze River Delta region leads the nation with 1,550 international science and technology cooperation projects and 157,000 international talent recruits. The economic benefit ratio of international sci-tech cooperation projects in the Greater Bay Area stands at 1:9.3, surpassing the national average (1:6.8), while the Yangtze River Delta registers 1:8.5, the Beijing-Tianjin-Hebei region 1:7.2, and Northeast China only 1:5.6—highlighting significant disparities in regional innovation collaboration quality. The Yangtze River Delta produces 31,600 international sci-tech papers, 3.3 times the Northeast region's 9,600 publications. As a key indicator of regional innovation cooperation, the Greater Bay Area achieves 180 billion yuan in international technology transfer, exceeding the national average. The Yangtze River Delta handles 230 billion yuan, the Beijing-Tianjin-Hebei region 150 billion, and Northeast China merely 46 billion—demonstrating the critical role of technology transfer efficiency in regional innovation. The Yangtze River Delta hosts 460 international innovation cooperation platforms, 4.6 times the Northeast region's 100 platforms, providing robust infrastructure for regional innovation collaboration.

4.3.2. Element Flow

Regional coordinated development policies exert distinct impacts on talent, capital, and technology flows across three major regions, highlighting their crucial role in overcoming factor mobility barriers. The Yangtze River Delta region has significantly enhanced intra-regional factor mobility through integrated policies. For instance, progressive relaxation of talent mobility regulations and continuous improvement of cross-regional talent recruitment mechanisms have provided robust talent support for regional innovation. Capital and technology flows have also become more efficient, particularly through the Yangtze River Delta Science and Technology Innovation Corridor, where deep collaboration between universities, research institutions, and enterprises facilitates technology transfer and commercialization. While Northeast China has improved factor mobility environments under revitalization policies, challenges such as underdeveloped economies and market vitality remain constraints on overall mobility levels. Recent efforts to optimize business environments and strengthen infrastructure have attracted external capital and technology, though systemic barriers still require further resolution. The Guangdong-Hong Kong-Macao Greater Bay Area leverages its international platform advantages to demonstrate unique appeal in factor mobility. Talent policies between mainland cities and Hong Kong/Macao regions have been progressively relaxed, with specialized talent exchange mechanisms established in sectors like technology and finance. Additionally, interconnected capital markets and shared technological

innovation resources within the Greater Bay Area provide critical support for regional collaboration. However, due to differences in systems and standards among the three regions, the Greater Bay Area still faces certain challenges in factor mobility, necessitating further strengthening of rule alignment and mechanism coordination.

5. Key Experiences in Regional Coordinated Development Policies

5.1. Practical Pathways for Innovation-Driven Regional Coordinated Development

5.1.1. Yangtze River Delta Model

This model has established a comprehensive innovation ecosystem spanning demand identification, technological breakthroughs, pilot-scale maturation, and industrial application through initiatives like the G60 Sci-Tech Innovation Corridor. By 2025, its seventh Science and Technology Achievement Auction achieved a transaction volume of 20.2 billion yuan, with cumulative sales exceeding 30 billion yuan and total technology contract transactions surpassing 300 billion yuan, setting a benchmark for regional innovation collaboration.

5.1.2. Guangdong-Hong Kong-Macao Model

This model operates with the core mechanism of rule alignment under the "One Country, Two Systems" framework. For instance, the "List of Overseas Professional Qualifications for Facilitated Practice Recognition" issued by the Hengqin Cooperation Zone covers 10 professional fields and 87 occupational qualifications, with a cumulative total of 658 filings completed involving 103 enterprises and 555 professionals. This initiative has effectively facilitated cross-border practice for Hong Kong and Macao professionals.

5.2. Innovative Practices of Regional Coordination Mechanisms

5.2.1. Cross-regional Cooperation Mechanism

The Yangtze River Delta region established the "G60 Sci-Tech Innovation Corridor Technology Transfer Platform Consortium", the Beijing-Tianjin-Hebei region set up the "Coordinated Development Statistical Monitoring Office", and the Guangdong-Hong Kong-Macao Greater Bay Area formed the "Greater Bay Area Development Leading Group", thereby establishing a multi-level, institutionalized regional coordination mechanism.

5.2.2. Benefit Sharing Mechanism

The Yangtze River Delta region has pioneered a 'cross-regional tax revenue-sharing mechanism,' while the Beijing-Tianjin-Hebei area implemented a 'cross-regional infrastructure co-construction and sharing mechanism.' The Guangdong-Hong Kong-Macao Greater Bay Area further developed a 'cross-border financial

cooperation mechanism.' These mechanisms aim to achieve shared benefits in regional coordinated development.

5.2.3. Element Flow Mechanism

The Yangtze River Delta region has implemented a "Cross-regional Mutual Recognition Mechanism for Science and Technology Innovation Vouchers." As of the latest statistics, 2,966 enterprises across nine cities have utilized these vouchers, totaling 581 million yuan, with over 5,400 service institutions participating. Meanwhile, the Guangdong-Hong Kong-Macao Greater Bay Area has piloted a "Negative List Mechanism for Cross-border Data Flow" to facilitate efficient cross-border movement of key digital economy elements.

5.3. Differentiated Strategies for Functional Area Optimization

5.3.1. Yangtze River Delta Strategy

Its functional positioning includes "a source of technological innovation, an advanced manufacturing base, a pilot zone for reform and opening-up, and a demonstration area for Yangtze River Delta integration." The industrial division of labor follows a pattern of "Shanghai R&D, Jiangsu manufacturing, Zhejiang application, and Anhui transformation."

5.3.2. Guangdong-Hong Kong-Macao Strategy

Its functional positioning is defined as "an international center for scientific and technological innovation, a new engine for high-quality development, a gateway for high-level opening-up, and a hub for rule alignment mechanisms," forming a differentiated functional layout characterized by "Hong Kong's finance, Guangzhou's technology, Shenzhen's innovation, and Macao's distinctive features."

5.3.3. Northeast Strategy

Its functional focus centers on "safeguarding five critical security domains: national defense security, food security, ecological security, energy security, and industrial security." The industrial layout exhibits distinct characteristics: Liaoning specializes in advanced manufacturing, Jilin in fine chemical industries, and Heilongjiang in modern agriculture.

6. Outstanding Challenges in Regional Coordinated Development

6.1. Challenges in Industrial Structure Optimization and Transformation and Upgrading

6.1.1. Northeast China Region

The secondary industry accounts for a staggering 68.3% of regional GDP, with traditional industries dominating the economic structure. By 2025, high-tech industry share only reach 13.7%, falling below the national average of 21.6%.

Balancing the transformation of traditional industries with the cultivation of strategic emerging industries remains the core challenge for Northeast China's revitalization.

6.1.2. Yangtze River Delta Region

Although high-tech industries account for 29.1% of the total, traditional manufacturing sectors face multiple pressures during transformation and upgrading, including rising costs and a shortage of skilled personnel. For instance, while Shanghai's manufacturing investment grew by 10.3%—exceeding the national average—the proportion of traditional manufacturing industries still reached 42.3%.

6.1.3. Guangdong-Hong Kong-Macao Greater Bay Area

Although high-tech industries account for as high as 33.8% of the total, there remains dependence on external sources for high-end talents, core technologies, and critical equipment. For instance, the localization rate of high-end chip manufacturing equipment in Shenzhen is less than 30%, which constrains the autonomy and security of industrial and supply chains.

6.2. Challenges in Innovation Drive and Technology Transfer

6.2.1. Northeast China

The R&D investment intensity was 2.08%, lower than the national average (2.68%). The technology commercialization rate of universities and research institutes was less than 35%, significantly lower than the 43.1% in the Yangtze River Delta region, reflecting poor alignment between technological innovation supply and actual industrial demand.

6.2.2. Yangtze River Delta Region

Despite substantial innovation investment and high output, there remains room for improvement in the efficiency of technology commercialization. For instance, the technology commercialization rate in the G60 Innovation Corridor is 43.7%, lower than the 48.5% in the Guangdong-Hong Kong-Macao Greater Bay Area, indicating that the collaborative innovation mechanism with deep integration of industry, academia, and research requires further refinement.

6.2.3. Guangdong-Hong Kong-Macao Greater Bay Area

Demonstrates robust innovation vitality but exhibits relatively weak basic research capabilities and insufficient supply of original technologies. For instance, the Hong Kong Special Administrative Region allocates 45% of its R&D expenditure to basic research, yet demonstrates relatively weak industrialization capacity; Shenzhen possesses strong industrialization capabilities, but its basic research investment accounts for less than 30% of total expenditure.

6.3. Challenges of Regional Coordination and Institutional Innovation

6.3.1. Yangtze River Delta Region

Significant achievements have been made in regional coordinated development, but challenges such as inter-provincial administrative barriers, imperfect regional benefit distribution mechanisms, and data sharing obstacles persist. For instance, the sharing rate of large-scale scientific research instruments among the nine cities is less than 40%, which constrains the efficient allocation of innovation resources.

6.3.2. Guangdong-Hong Kong-Macao Greater Bay Area

Significant breakthroughs have been achieved in rule alignment. However, under the "one country, two systems" framework, disparities in legal systems, administrative management systems, and market operation rules among the three regions remain deep-seated bottlenecks that constrain the efficient and convenient flow of production factors. For instance, the mutual recognition coverage rate of professional qualifications in livelihood sectors such as healthcare and education is less than 60%.

6.3.3. Northeast China

Regional cooperation mechanisms have been gradually established, but the depth of interprovincial collaboration needs to be enhanced. For instance, the transaction volume of technology contracts among the three northeastern provinces accounts for only 12.3% of the total regional technology contract transactions, significantly lower than the 25.7% in the Yangtze River Delta region, indicating an urgent need to improve regional collaborative innovation capabilities.

6.4. Challenges of Open Collaboration and International Competition

6.4.1. Northeast China

Despite the annual freight volume of the China-Europe Railway East Corridor reaching 6 million tons, its foreign trade dependence rate stands at only 28.6%, lower than the national average of 30.2%, indicating the need for further improvement in the development level of an open economy.

6.4.2. Yangtze River Delta Region

The total volume of goods trade reached 17.1 trillion yuan, accounting for 37.8% of the national total. However, service trade accounted for less than 20% of the total trade volume, lower than the 25.3% in the Guangdong-Hong Kong-Macao Greater Bay Area, indicating the need to enhance openness and competitiveness in the service trade sector.

6.4.3. Guangdong-Hong Kong-Macao Greater Bay Area

Demonstrates active innovation in institutional openness, with 280 enterprises participating in the pilot program for negative lists on cross-border data flows.

However, its influence in participating in and leading international rule-making remains limited. For instance, its involvement in international standard-setting accounts for only 65% of the global average, hindering further enhancement of international competitiveness.

7. Summary and Outlook

7.1. Summary

This study employs literature review, case analysis, and comparative research methods to analyze the evolution process and implementation outcomes of three major regional coordinated development policies: "Yangtze River Delta Integration," "Northeast Revitalization," and "Guangdong-Hong Kong-Macao Greater Bay Area." It identifies differences among regions in economic, social, and collaborative development aspects, and proposes policy recommendations accordingly. The findings reveal that "Yangtze River Delta Integration" has achieved remarkable results in promoting high-quality integrated regional economic development; while "Northeast Revitalization" has faced challenges in industrial structure optimization and institutional reform despite multiple adjustments; "Guangdong-Hong Kong-Macao Greater Bay Area" has made positive progress in fostering regional innovation and coordinated development, though obstacles persist in rule alignment. These insights are significant for refining China's regional coordinated development policy framework, formulating differentiated regional strategies, and advancing balanced and sustainable regional development, providing practical references and theoretical support for building a new pattern of regional coordinated development.

7.2. Future Outlook

7.2.1. New Trends in Regional Coordinated Development

Digitalization and greenification have become the core trends of China's regional coordinated development. Digital technologies enhance regional governance and industrial chain collaboration, while greenification promotes industrial layout and energy optimization. Population mobility exhibits a multi-center pattern, and new urbanization requires optimizing regional functional layouts to strengthen the carrying capacity of small and medium-sized cities.

7.2.2. Policy Adjustment Direction

Policies must adapt to emerging trends. The digital economy should enhance collaboration, establish data markets, and dismantle barriers; green industries require targeted support, development of specialized sectors, and the establishment of ecological compensation mechanisms. Simultaneously, by integrating innovation and openness, technological reforms should be deepened, openness expanded, and regional competitiveness elevated.

7.2.3. Impact on Regional Economic Patterns

Policy adjustments will narrow regional disparities, while digitalization and green initiatives will address imbalances and boost development in remote areas. Green industries will create new growth drivers. By fostering distinctive economies and leveraging comparative advantages, we can cultivate leading industries. This will establish a balanced and diversified economic landscape, enhance the radiating influence of urban clusters, unleash the vitality of small and medium-sized cities, and support shared prosperity and modernization.

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