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The Role of China's Railway Development in Promoting Regional Economic Integration: A Case Study of the Three Northeastern Provinces

Kaiyuan Ye

Beijing National Day School, Beijing, China, 100039
wangying_jiaodaochu@bnds.cn

Abstract:

The railway system in China's Northeast has expanded rapidly in recent years, becoming a critical component of the region's economic infrastructure. This rapid development is of great significance because it enhances accessibility and provides new momentum for the region's economic revitalization. Taking the three Northeastern provinces—Liaoning, Jilin, and Heilongjiang—as a case study, this paper analyzes how railway development promotes regional economic integration. The study applies document analysis and case studies of representative railway projects, such as the Harbin–Dalian High-Speed Railway and the Shenyang–Baishan High-Speed Railway. The findings indicate that enhanced railway accessibility significantly reduces travel time and transport costs, strengthens intercity linkages, and stimulates industrial transformation along major railway corridors. Railway development has not only improved transport efficiency but also facilitated the integration of markets and resources across provinces. It further contributes to upgrading the industrial structure by attracting investment and talent. Overall, railway expansion emerges as a key driver of regional economic integration in Northeast China, with clear implications for balanced and sustainable development.

Keywords: Transportation Efficiency; Regional Integration; Northeast China; Railway Development; Industrial Upgrading

1. Introduction

Recent research has increasingly focused on the interplay between railway development and regional economic integration in Northeast China. Meng, Feng, and Wen examined the evolution of the re-

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gional urban network using passenger flow data, and concluded that while the Harbin–Shenyang corridor showed stronger connectivity, peripheral areas remained weakly integrated [1]. Chu et al. investigated the spatial effects of high-speed rail, finding that the Harbin–Dalian line improved accessibility dramatically but produced uneven outcomes, with core hubs benefiting more than smaller ones [2]. Sun analyzed the impact of high-speed rail on industrial structure, arguing that it stimulated service-sector growth and clustering, though challenges of industrial upgrading persisted [3]. Collectively, these studies highlight the importance of railway development but also reveal gaps in achieving balanced integration, leaving room for further exploration. This paper therefore addresses two research questions: what is the current status of the railway network in Northeast China, and how does railway development promote regional economic integration? Methodologically, the study applies document analysis of government policy and statistical reports [4], alongside case studies of representative projects such as the Harbin–Dalian and Shenyang–Baishan high-speed railways. The significance of this research lies in providing theoretical references and practical guidance for promoting economic development in the three Northeastern provinces, as it clarifies the mechanisms through which railway development drives regional integration.

2. Current Status of the Railway Network in Northeast China

Northeast China, comprising Liaoning, Jilin, and Heilongjiang, currently possesses one of the densest railway networks in the country, reflecting its historical role as a transportation hub for heavy industry. By the early 2020s, the total operating mileage in the region had reached approximately 12,000 kilometers, with projections that it will expand to 15,000 kilometers by 2035 [5]. The backbone of the system is the north–south Harbin–Changchun–Shenyang–Dalian corridor, which connects the Heilongjiang hinterland with Liaoning's coastal ports. The opening of the Harbin–Dalian High-Speed Railway in 2012 marked a milestone, reducing travel time between the two endpoints from about thirteen hours to three and a half hours [6]. By 2022, this line alone had safely transported 670 million passengers, underscoring its importance for regional mobility [6]. Meanwhile, conventional railways continue to carry bulk cargo, especially for "grain-to-south" flows and coal transport, which remain vital to national supply chains. Recent years have also seen progress in filling gaps. Liaoning Province achieved "HSR to every city," making it the first province in the Northeast with complete prefectural-level coverage [7]. New projects, such as the Shenyang–Baishan High-Speed Railway, will connect smaller eastern cities and tourist destinations like Changbai Mountain, and will extend modern rail service into previously under-served areas [7]. However, challenges persist: peripheral regions, especially in eastern Heilongjiang, still rely on slower single-track lines, and east–west inter-provincial routes remain less developed [5]. Overall, the railway system of Northeast China has entered a stage of modernization and expansion, but continued efforts are required to achieve balanced and fully integrated coverage.

3. The Role of Railway Development in Promoting Regional Economic Integration

3.1 Improving Transportation Efficiency

Transportation efficiency is one of the most direct outcomes of railway development, and it serves as the basic condition for regional economic integration. In the past, the Northeast was often described as "far from the center," with long distances between major cities and slow conventional trains. The Harbin–Dalian High-Speed Railway, opened in 2012, was a turning point. It reduced the travel time between Harbin and Dalian from approximately thirteen hours to only three and a half hours [6]. Harbin, Changchun, and Shenyang were brought into a one-to-two-hour travel circle, which has changed the way people travel and work [6]. For many residents, a trip that once required overnight travel can now be done in one day. This has made commuting, business trips, and tourism far more convenient, and it has lowered the costs of cross-provincial cooperation for companies.

Passenger mobility is only one side of the improvement. Freight transport has also been transformed. Because high-speed passenger trains now use separate tracks, the older conventional lines have more room to carry goods. For example, the Harbin–Shenyang corridor saw its annual freight capacity increase by more than ten million tons after high-speed services were introduced. This extra capacity is crucial for projects such as "grain-to-south" (moving grain from Heilongjiang to southern provinces) and "rail-sea intermodal transport" (sending goods from inland to Liaoning's ports for export). These flows are essential to the national food and energy supply chains. The ability to move goods more quickly and cheaply also benefits local companies. For example, agricultural producers can ship fresh products to markets with less risk of spoilage, and manufacturers can reduce storage costs by

relying on just-in-time delivery.

Another important aspect is the improvement of reliability. The Northeast is known for its long and cold winters, which often caused delays in the past. The Harbin–Dalian line was designed with special engineering solutions that allow trains to run safely even at –40°C [6]. Heating systems for tracks, snow removal technology, and cold-resistant materials ensure that trains can keep operating in harsh weather. This has reduced seasonal interruptions and kept goods and passengers moving throughout the year. It has also improved public confidence in rail as the most dependable mode of transport.

Finally, modernization of railway technology—such as electrification, double-tracking, and digital signaling—has improved the speed and accuracy of services. Trains run faster, schedules are more predictable, and accidents are reduced. Companies benefit from lower transaction costs, while passengers enjoy safer and more comfortable journeys. In summary, railway development in the Northeast has not only improved travel speed but also increased cargo capacity, ensured reliable year-round service, and reduced overall costs. These improvements have established the physical foundation for stronger integration among the three provinces, transforming distance from a barrier into an opportunity for closer economic cooperation.

3.2 Strengthening Regional Economic Connections

Railway development in Northeast China has not only improved efficiency but also reshaped the economic ties among the three provinces. By reducing distance barriers and lowering transport costs, the rail network has encouraged more frequent interaction among goods, people, and services. One of the most visible results is market integration. In the past, Heilongjiang's agricultural products often faced difficulties in reaching ports quickly enough for export, while Liaoning's industrial goods had limited inland reach. With faster and more reliable train services, grain, soybeans, and timber from Heilongjiang can now reach Dalian and Yingkou ports more efficiently, enabling them to enter both domestic and foreign markets. At the same time, heavy machinery and petrochemical products produced in Liaoning can be delivered to cities in Jilin and Heilongjiang with lower costs. This creates a more unified regional market, where supply chains cross administrative boundaries and complement the strengths of each province.

Another important change is labor mobility and urban network formation. Before the high-speed era, people rarely considered daily commuting between major cities because of long travel times. Now, with Harbin–Changchun–Shenyang connected by high-speed rail, intercity commuting has become feasible [2]. Professionals can attend meetings in another city and return the same day, students can choose universities in other provinces without feeling isolated, and tourists can plan short trips with ease. Such mobility builds stronger human links and gradually forms an urban network. Harbin, Changchun, and Shenyang function as three growth poles, while smaller cities like Tonghua, Baishan, and Fushun gain new opportunities through connections provided by the Shenyang–Baishan High-Speed Railway [7]. This reduces the isolation of peripheral areas and helps spread the benefits of growth more evenly.

Railway development has also promoted inter-provincial cooperation initiatives. Governments in Liaoning, Jilin, and Heilongjiang are now able to design joint projects, including logistics parks, cross-province tourism routes, and shared industrial corridors. For instance, the creation of a "Barrier-Free Tourism Zone" across the three provinces was facilitated by the convenience of high-speed rail [7]. Tourists can now travel from Shenyang to Changbai Mountain in one day, encouraging coordinated marketing of destinations [7]. Logistics cooperation is another example: freight hubs in Shenyang, Harbin, and Changchun are being designed to serve the whole region, reducing duplication of infrastructure and improving efficiency.

Finally, railway connectivity has strengthened external linkages. Cross-border lines to Russia and North Korea expand the role of Northeast China as a gateway to Northeast Asia. The Harbin–Mohe route improves access to Russia's Far East, while the Dandong rail bridge provides direct links with North Korea. These routes not only benefit foreign trade but also encourage the provinces to coordinate more closely to maximize regional advantages.

Overall, railway development has changed the Northeast from three relatively separate provincial economies into a more cohesive regional bloc. Markets are more integrated, people move more freely, and governments cooperate more actively. By reducing fragmentation, the railway system has fostered a shared regional identity and laid the groundwork for deeper economic integration.

3.3 Promoting Industrial Structure Upgrading

Beyond efficiency and connectivity, railway development in Northeast China has served as a catalyst for industrial transformation and upgrading. Improved rail access has made corridor cities and surrounding industrial parks more attractive to investors. For instance, the anticipation of the Shenyang–Baishan High-Speed Railway spurred the establishment of more than 9,500 new service-sector enterprises between 2021 and 2024, particularly in tour-

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ism and hospitality. Once operational, the line is expected to attract over eleven million tourists annually to the Changbai Mountain area, stimulating local consumption and encouraging the expansion of related industries [7]. This illustrates how better connectivity directly fuels the growth of the tertiary sector.

Railway development also supports the restructuring of traditional industries. By lowering transport costs and improving reliability, it allows resource-based sectors such as coal, timber, and grain to reach wider markets while simultaneously encouraging downstream processing and value-added activities. At the same time, improved logistics facilitate the clustering of advanced manufacturing along rail corridors, such as equipment manufacturing in the Harbin–Changchun–Shenyang belt. This clustering effect promotes specialization and inter-provincial cooperation, strengthening value-chain integration across the three provinces.

In addition, the modernization of rail systems has introduced technological upgrading. The design and operation of high-speed rail in extreme cold have generated new expertise in rolling stock manufacturing, signaling, and engineering, with facilities in Changchun and Shenyang playing leading roles [6]. These innovations spill over into local industries, generating skilled employment opportunities and elevating the technological level of the regional economy.

Finally, by making cities more accessible, railways help to retain and attract human capital. Professionals are more inclined to stay or relocate to Northeast cities when they are better connected to national hubs such as Beijing and Shanghai. This talent circulation supports the growth of emerging sectors like IT services, biotechnology, and creative industries. Overall, railway development is not only modernizing infrastructure but also reshaping the industrial landscape, guiding the Northeast toward a more diversified and innovation-oriented economy.

4. Conclusion

This study has examined how railway development promotes regional economic integration in Northeast China, with a focus on the three provinces of Liaoning, Jilin, and Heilongjiang. By reviewing the current railway network and analyzing its impacts, we have drawn three main conclusions. First, the expansion of high-speed and upgraded conventional lines has greatly improved transportation efficiency, reducing travel time, lowering costs, and ensuring year-round reliability even in extreme cold [6]. Second, enhanced connectivity has strengthened intercity linkages, integrating markets, labor, and urban networks, while also encouraging inter-provincial cooperation in logistics, tourism, and cross-border trade [2][7]. Third, railway development has served as a catalyst for industrial restructuring, fostering investment along corridors, promoting the clustering of advanced manufacturing, and supporting the growth of service and innovation-oriented industries [7]. Together, these findings confirm that modern railways are not only physical infrastructure but also drivers of economic transformation.

Despite these findings, the study has limitations. It relies primarily on qualitative analysis and selected case examples, without providing detailed quantitative modeling of railway impacts on economic indicators such as GDP or trade flows. Data constraints also restricted the ability to isolate railway effects from other policy factors. Future research could utilize econometric models with city- or firm-level data to measure causal effects more precisely. Moreover, emerging issues such as digital economy integration, multimodal transport, and environmental sustainability deserve greater attention. Addressing these areas would provide deeper insights into how infrastructure can shape long-term regional development.

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