

The Automotive Industry in the Beijing-Tianjin-Hebei (BTH) Region: A Study of Synergistic Development and the Supply Chain Ecosystem

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Abstract

Against the backdrop of the Beijing-Tianjin-Hebei (BTH) Coordinated Development Strategy, this paper examines the region's automotive supply chain ecosystem. The study begins by systematically reviewing the industrial layout of Original Equipment Manufacturers (OEMs) and core component suppliers. It then analyzes the policy-driven synergistic locational advantages formed by a network of industrial parks, integrated transportation, and S&T innovation resources. Furthermore, the critical role of industry organizations (e.g., the BTH Automotive Supply Chain Alliance) and third-party institutions (e.g., CATARC) in resource integration, standard establishment, and innovation empowerment is investigated. The paper concludes by summarizing the ecosystem's development model, discussing its challenges and future trends, and proposing theoretical and practical pathways for establishing a world-class automotive industry cluster.

Keywords

Beijing-Tianjin-Hebei Coordinated Development, Automotive Supply Chain, Industrial Ecosystem, Locational Advantage, Industrial Park.

1. Introduction

Driven by the dual forces of a profound realignment in the global economic landscape and a new wave of technological revolution, the automotive industry is undergoing a deep and disruptive transformation. The trend characterized by electrification, intelligence, connectivity, and shared mobility (often termed the "Four New Modernizations") [1], is not only reshaping the product morphology of automobiles but also driving a profound restructuring of industrial and supply chain systems. Against this backdrop, the "Beijing-Tianjin-Hebei (BTH) Coordinated Development" has been established as a major national regional development strategy [2]. It aims to create a world-class city cluster capable of leading the nation's high-quality development by optimizing regional functional layouts and promoting industrial specialization and collaboration. Therefore, for the BTH region, as the core economic engine of Northern China, how its automotive industry can adapt to this industrial transformation and leverage the regional synergistic strategy to achieve its upgrading and transformation has become a critical issue of both theoretical value and practical significance.

Leveraging its robust automotive industrial base, the Beijing-Tianjin-Hebei (BTH) region has formed a nascent industrial ecosystem characterized by complementary functions. The region hosts numerous mainstream vehicle manufacturers and a complete component supply system, constituting a key pillar in China's automotive industrial landscape. The three localities each possess comparative advantages in distinct areas—such as R&D and innovation, high-end manufacturing, large-scale production, and logistics hubs—exhibiting significant differentiation and immense synergistic potential. The deepening advancement of the BTH Coordinated Development Strategy offers a strategic opportunity to dismantle administrative

boundaries, integrate regional industrial resources, and construct an efficient, interconnected supply chain system. Guided by policy initiatives, a multi-layered, networked framework for synergistic development is rapidly taking shape, featuring specialized industrial parks as carriers for industrial transfer and innovation commercialization, cross-regional industry alliances and associations as connective links, and authoritative third-party technical service platforms as crucial support. Consequently, a systematic study of the synergistic mechanisms[3], locational advantages, and ecosystem evolution of the BTH automotive supply chain is of great practical significance for enhancing the region's industrial competitiveness and building a world-class industry cluster. Furthermore, it provides a valuable theoretical case study and practical experience for exploring synergistic industrial development models within megacity clusters.

Domestically, following the implementation of the Beijing-Tianjin-Hebei (BTH) Coordinated Development Strategy, a substantial body of research has emerged, focusing on areas such as transportation integration, joint environmental governance, and macro-level industrial structural adjustment[4]. Some scholars have directed their attention to the issue of industrial synergy within the BTH region, conducting preliminary explorations of models like the "Beijing R&D, Tianjin-Hebei Manufacturing" paradigm. However, the existing literature still exhibits certain limitations. Firstly, a majority of studies tend to focus on macro-level qualitative descriptions, lacking a systematic, multi-dimensional investigation of the BTH automotive industry as a complete and dynamic "supply chain ecosystem." Secondly, the coordinating and facilitating role played by diverse actors—such as industrial parks, industry associations, and third-party testing institutions—in promoting regional supply chain synergy has not been fully and deeply explored. Finally, scant research has organically integrated the region's locational advantages, cooperation platforms, and the evolutionary path of the industrial ecosystem to systematically reveal the underlying mechanisms of its synergistic development.

In summary, this study aims to address the aforementioned research gaps. Taking the Beijing-Tianjin-Hebei (BTH) automotive industry as a specific case, it will systematically review the industrial layout of its vehicle manufacturers and component suppliers. The research will conduct an in-depth analysis of the composite locational advantages formed under the coordinated development strategy, which integrate industrial parks, transportation networks, and S&T innovation resources. Furthermore, it will focus on examining the critical role of various cooperation platforms and organizations in resource integration and innovation empowerment. Ultimately, the study seeks to delineate a comprehensive panorama of the BTH automotive supply chain ecosystem, with the intention of providing decision-making references and theoretical support for the region's efforts to build a secure, efficient, and intelligent modern automotive industry cluster.

2. Status and Layout of the BTH Automotive Industry

As one of the key engines of China's economic growth, the automotive industry in the Beijing-Tianjin-Hebei (BTH) region has, over several decades of development, evolved into a large-scale and relatively complete industrial cluster. This cluster serves not only as a key pillar of the regional economy but also holds a pivotal position within the automotive industrial landscape of China and, indeed, the world. Guided by the BTH Coordinated Development Strategy, the three localities have gradually transcended their original administrative boundaries. Under the dual impetus of market forces and policy promotion, the region's automotive industry has exhibited the characteristics of a "Golden Triangle" layout, marked by a clear division of labor and complementary functions. This has established a solid foundation for the construction of an efficient supply chain ecosystem.

2.1. OEM Positioning and the "Golden Triangle" Layout

The vehicle manufacturing industry in the Beijing-Tianjin-Hebei (BTH) region has formed a structured functional division of labor in its spatial layout. This is specifically manifested in a synergistic "Golden Triangle" configuration, wherein Beijing serves as the center for R&D and high-end manufacturing, Tianjin functions as the hub for comprehensive, large-scale production and logistics, and Hebei acts as the base for mass manufacturing and industrial support.

Firstly, Beijing, as the nation's capital, primarily concentrates its functional positioning on R&D and design, corporate headquarters, and high-value-added manufacturing. The region is home to the headquarters of BAIC Group and hosts joint venture brands such as Beijing Benz and Beijing Hyundai. In the realm of indigenous brands, BAIC Group focuses on the development of its high-end intelligent electric vehicle brand, ARCFOX. In the commercial vehicle sector, Beiqi Foton maintains significant production and R&D bases in the region, with an early strategic presence in hydrogen fuel cell vehicles[5]. Furthermore, Beijing's robust S&T innovation ecosystem and its advantage in high-end talent have also attracted Xiaomi Auto to establish a manufacturing base with full-stack, in-house R&D capabilities, while Li Auto has located its global flagship R&D headquarters in Beijing's Shunyi District, creating an innovative landscape where traditional giants and "new forces" coexist and thrive.

Secondly, Tianjin, leveraging its superior port facilities and robust industrial base, undertakes large-scale, multi-category vehicle manufacturing and provides international logistics services for the entire region. The area hosts multiple vehicle and core component plants for FAW-Volkswagen North China Base and FAW-Toyota, which are integral parts of their respective global strategies. Concurrently, Great Wall Motor (GWM), a leader among China's indigenous brands, has also established a world-class smart factory in Tianjin, serving as a primary base for its high-end model production and vehicle exports. Furthermore, the presence of companies like National Electric Vehicle Sweden (NEVS) reflects Tianjin's strategic positioning in the new energy vehicle manufacturing sector. By capitalizing on the logistics infrastructure of the Port of Tianjin, the city provides critical support for the global supply chain integration of the BTH automotive industry, establishing its function as the region's core production and manufacturing center and supply chain hub.

Finally, Hebei province leverages its advantages in ample land resources and lower costs to serve as the region's largest manufacturing base and a hinterland for component supply. The province is the core base for Great Wall Motor (GWM), and in its headquarters city of Baoding, a complete industrial ecosystem has been established around the company, hosting the primary plants for its multiple brands, including Haval, WEY, ORA, and TANK. As a representative project of the BTH Coordinated Development, the Beijing Hyundai plant in Cangzhou is a direct manifestation of the outward relocation of vehicle production capacity from Beijing. It is also noteworthy that Hebei has established an advantage in specific new energy technology pathways; for instance, the Zhangjiakou area has developed into an industrialization and demonstration zone for hydrogen fuel cell vehicles, attracting a cluster of industrial chain enterprises such as Yihuatong. Consequently, Hebei province provides the regional supply chain with foundational manufacturing capabilities and cost advantages.

2.2. The Tiered Layout and Synergy of Core Component Suppliers

Corresponding to the "Golden Triangle" layout of vehicle manufacturing, the automotive component industry in the Beijing-Tianjin-Hebei (BTH) region also exhibits a clear tiered distribution. This has formed a complete chain ranging from high-value-added core components to traditional basic parts, with significant synergistic effects observed among the three localities.

The structure of Beijing's component industry aligns with its functional positioning in R&D and innovation, focusing primarily on the core technology segments of intelligent & connected vehicles and new energy vehicles. In the domain of autonomous driving, representative firms include Baidu Apollo [6] and Haomo.AI, a company incubated by Great Wall Motor. In the field of automotive-grade AI chips, which are critical to the future of in-vehicle computing power, Horizon Robotics stands as one of the few companies globally to have achieved mass production for pre-installation. In the areas of intelligent cockpits and software-defined vehicles, ThunderSoft and NavInfo are key players in the operating system and high-definition map sectors, respectively. In the domain of NEV "three-electric" systems (battery, motor, and electric control), Beijing hosts R&D firms for solid-state batteries, such as WeLion New Energy, as well as Jing-Jin Electric, a company possessing leading technology in electric drive systems. Tianjin's component industry is characterized by its maturity and high degree of internationalization, and it has formed a deeply intertwined, symbiotic relationship with the local large-scale vehicle manufacturers. As a major production base for both Japanese and German automakers, Tianjin has attracted a host of leading international Tier 1 suppliers. To serve Japanese firms like FAW-Toyota, a cluster of core Japanese suppliers, including Denso, Aisin, and Toyota Boshoku, has congregated in the area. Similarly, supporting FAW-Volkswagen and other automakers, a group of international Tier 1 suppliers such as ZF, BorgWarner, Magna, and Lear have also established a presence. In the power battery sector, both the domestic enterprise Lishen Battery and the foreign-invested enterprise Samsung SDI operate production bases in Tianjin, creating a diversified supply structure.

Hebei's component industry is primarily characterized by large-scale production and cost control, while also extending into high-value-added sectors. A vast cluster of supporting enterprises has formed around Great Wall Motor within the province, exemplified by system integrators like NOBO Automotive System, which provides products such as seating and interior/exterior trim. To support its new energy strategy, SVOLT Energy Technology, a company incubated by Great Wall Motor, has developed into a major supplier in the power battery sector and has established multiple production bases in Hebei. Furthermore, Hebei possesses significant scale and cost advantages in traditional component areas, including body stampings, chassis systems, and automotive glass (with companies like Xinyi Glass operating production bases there). This constitutes the foundational support for the entire BTH automotive supply chain system.

3. Synergistic Locational Advantages of the BTH Automotive Supply Chain: An Analysis

The formation and development of the Beijing-Tianjin-Hebei (BTH) automotive industry cluster is the product of a synergistic coupling of multiple locational factors, guided by national top-level design and a regional coordinated strategy, rather than being solely a result of spontaneous market evolution. This synergy provides the BTH region with distinctive locational advantages over other domestic clusters, particularly in the dimensions of policy drive, industrial carriers, transportation & logistics, and science and technology innovation resources. Together, these factors establish the foundation for the efficient operation and continuous upgrading of the region's automotive supply chain.

3.1. Policy-Driven Industrial Functional Synergy and Orderly Transfer

The Beijing-Tianjin-Hebei (BTH) Coordinated Development, a major national regional strategy, is the primary driver shaping the structure of the region's automotive industry. This strategy transcends traditional local administrative frameworks, providing top-level design and policy guarantees for the optimal allocation of industrial resources and functional synergy among the

three regions. This process is primarily characterized by the orderly interaction of 'relocation' and 'reception' of industrial functions.

First, the 'Relocation of Non-Capital Functions' policy in Beijing has served as a catalyst for optimizing the regional industrial structure by systematically transferring out general manufacturing activities. This applies particularly to those with high resource consumption deemed incompatible with the capital's core functions. A direct result of this policy was the establishment of landmark projects, most notably the Beijing Hyundai Cangzhou plant, which extended Beijing's vehicle manufacturing capacity into Hebei. This relocation allowed Beijing to reallocate its resources to focus on high-value-added activities such as R&D, corporate headquarters, financial services, and high-end manufacturing. Consequently, this dual approach of 'relocating out and guiding in' has effectively reinforced Beijing's role as the region's primary hub for industrial R&D and innovation.

Secondly, acting as the primary receiving areas, Tianjin and Hebei have supported industrial transfer by enacting a range of supportive policies. These include offering preferential treatment in land supply, tax, and talent acquisition, and establishing high-quality industrial parks as platforms. This policy coordination facilitates a smooth and efficient transition for industries, mitigating risks such as project stagnation and efficiency loss due to administrative barriers. A key example is how Tianjin's targeted policies for the New Energy Vehicle and Intelligent Connected Vehicle sectors synergize with Beijing's technological strengths. This has solidified and deepened the 'R&D in Beijing, Manufacturing in Tianjin-Hebei' division of labor, fostering a regional development model based on functional complementarity and shared benefits.

3.2. Industrial Parks as Spatial Platforms for Industrial Transfer and Innovation

Functioning as physical spatial carriers, specialized industrial parks are essential for accommodating industrial transfers, fostering enterprise agglomeration, and accelerating innovation incubation. They act as critical nodes within the synergistic framework of the Beijing-Tianjin-Hebei (BTH) automotive supply chain. A network of these parks, each with a distinct functional focus, has emerged across the region, creating a system of functional complementarity.

Functioning as frontier zones for industrial transfer and coordinated development, parks such as the Beijing-Tianjin Industrial New City in Wuqing and the Zhongguancun Science and Technology City in Baodi have leveraged their proximity to Beijing to become primary destinations for its automotive industry resource spillover. Their location, approximately a one-hour drive from downtown Beijing and connected by infrastructure like the Beijing-Tianjin Intercity Railway, fosters a 'city integration' effect. While they accommodate some component manufacturers from Beijing, their more critical role is emerging as a frontier for the industrialization of Beijing's automotive R&D achievements, encompassing pilot production and small-scale mass production. By simultaneously benefiting from the policy incentives of both Beijing and Tianjin, these parks offer a highly attractive business environment that significantly lowers the institutional costs associated with cross-regional collaboration.

The Beijing Economic-Technological Development Area (E-Town) serves as a core functional area and a primary source of innovation, exerting a significant demonstrative and leading influence. As the 'National High-Level Automated Driving Demonstration Zone', it has become a magnet not only for OEMs like Xiaomi Auto and BAIC BluePark but also for numerous innovative firms specializing in autonomous driving, automotive-grade chips, and intelligent cockpits. The ecosystem it provides—comprising open-road testing, data-sharing platforms, and diverse application scenarios—offers an invaluable validation and iteration environment

for the ICV technologies of the entire BTH region. Consequently, innovations developed in E-Town can be swiftly commercialized via the industrialization bases located in Tianjin and Hebei. Positioned as strategic bases for large-scale manufacturing, Hebei's specialized automotive industrial parks, including those in Baoding and Cangzhou, leverage lower local costs of land and labor. Centered around major OEMs like Great Wall Motor and Beijing Hyundai, these parks have cultivated extensive industrial clusters. Their capacity to support high-volume vehicle production and a massive supply of components establishes a complementary gradient with Beijing and Tianjin based on production cost and manufacturing efficiency. This structure underpins the economies of scale and overall cost competitiveness for the entire regional supply chain.

3.3. Integrated Transportation and Logistics Network Advantages

The efficiency and low cost of logistics are prerequisites for achieving lean production and agile response in modern automotive supply chains. The BTH region capitalizes on Northern China's most developed integrated transportation network to convert geographical proximity into strong industrial synergy, thereby providing a solid foundation for the integrated operations of the entire automotive value chain. This advantage is particularly evident in its two main arteries: maritime and land transport.

The maritime advantage is primarily manifested through the Port of Tianjin, the largest port in Northern China and the central hub for the region's global market connectivity[7]. The port is crucial not only for large-scale vehicle exports by companies such as Great Wall Motor but also as the main conduit for importing critical components like chips and high-end equipment, and exporting bulk parts. Its advanced facilities, including Roll-on/Roll-off and container terminals, combined with a comprehensive service system, markedly lower international logistics costs and lead times for regional enterprises.

Regarding land transport, the BTH region features a 'one-hour transportation circle' underpinned by a comprehensive skeleton of expressways and railways. This network, which includes major routes like the Beijing-Tianjin-Tanggu and Beijing-Shanghai expressways, as well as high-frequency services such as the Beijing-Tianjin Intercity Railway, facilitates the swift circulation of components between key industrial nodes like Beijing, Tianjin, Baoding, and Cangzhou. The resulting high-efficiency logistics enable Original Equipment Manufacturers (OEMs) to significantly compress inventory and implement lean production management, which in turn enhances the capital turnover rate and operational efficiency across the entire supply chain.

3.4. Complementary Innovation and Talent Resources

The long-term competitiveness of a regional industry depends on its technological innovation capabilities. The Beijing-Tianjin-Hebei (BTH) region has formed a structural complementarity in science and technology innovation and talent resources, providing critical human capital and technological support for the automotive industry's transformation toward electrification and intelligence.

Beijing possesses significant advantages in basic research and high-level talent. The area is home to top-tier domestic universities such as Tsinghua University (including its School of Vehicle and Mobility) and Beihang University, as well as multiple relevant research institutes affiliated with the Chinese Academy of Sciences. These institutions offer vital research support and original innovation capabilities for addressing fundamental scientific problems and developing frontier technologies in the automotive industry, such as new materials, artificial intelligence algorithms, and advanced powertrain systems. Concurrently, as a national hub for S&T talent, Beijing attracts a large number of high-caliber engineers and R&D personnel,

servicing as the core talent supply for the R&D activities of companies like Li Auto and Xiaomi Auto.

In turn, Tianjin and Hebei provide essential support in engineering technology application and skilled labor. A cohort of key universities, represented by Tianjin University, Nankai University, and Hebei University of Technology, cultivates a large-scale workforce of engineering talent, who are the main force in transforming Beijing's R&D achievements into engineered products. Furthermore, Tianjin and Hebei have well-established vocational and technical education systems that continuously supply the front-line positions of automotive manufacturing with skilled technical workers proficient in advanced processes and equipment operation. This stable supply of skilled labor is fundamental to ensuring product manufacturing quality, enhancing production line efficiency, and achieving precision manufacturing.

4. The Integrative and Empowering Functions of Multi-Level Cooperative Platforms and Organizations

4.1. The Network-Building and Horizontal Resource Integration Functions of Industry Alliances and Associations

Industry alliances and associations, which function as non-governmental cooperative bodies for enterprises, primarily serve to break down administrative and market barriers. Their core purpose is to build a regional industrial cooperation network and facilitate the horizontal integration of resources.

Firstly, cross-regional industry alliances are a direct force in promoting synergy among the three regions. Represented by organizations such as the BTH Automotive Supply Chain Industry Alliance and the BTH Intelligent Manufacturing Equipment Industry Alliance, their membership comprises vehicle manufacturers (OEMs), component suppliers, universities, and research institutes from all three regions. By regularly holding events like industry forums, technical exchange meetings, and supply chain matchmaking events, these alliances provide efficient platforms for information exchange and business negotiations for enterprises within the region, effectively mitigating the cooperative barriers caused by geographical separation and information asymmetry. They play a critical role as organizers and coordinators in promoting precise supply-demand matching, coordinating the resolution of common technical challenges, and facilitating the establishment of stable cooperative relationships between upstream and downstream enterprises in the industrial chain.

Secondly, foundational support for regional synergy is provided by local industry associations. Bodies like the Beijing Automotive Industry Association (BAIA), the Tianjin Automotive Parts Association, and the Hebei Automobile Industry Association are deeply embedded within their respective local clusters, giving them a profound understanding of the technical capacities, operational status, and development needs of local firms. Beyond providing tailored services to these firms, they function as key interfaces, organizing collective participation in wider BTH regional cooperation initiatives. This 'regional alliance-local association' two-tier network structure effectively balances scope and depth, ensuring that regional synergistic measures are efficiently communicated and implemented down to the enterprise level.

4.2. Third-Party Technical Service Institutions: Empowerment through Technology and Standards

Technical service platforms, represented by third-party testing and certification institutions, constitute the core technical support for ensuring regional product quality, accelerating technological innovation, and enhancing the overall credibility of the industry. By providing neutral and authoritative technical services, they offer the regional supply chain a quality benchmark and a public good for innovation validation.

The China Automotive Technology and Research Center Co., Ltd. (CATARC), based in Tianjin, is a key national-level technical administration body for the automotive industry within the region. CATARC offers a comprehensive suite of services, including the formulation of automotive product standards, research on technical regulations, product testing and certification (such as for crash safety[8], emissions, and NEV safety), publication of industry data, and policy consultation. Its location in Tianjin offers enterprises across the BTH region advantageous access to convenient and authoritative testing and certification. This facilitates a shorter R&D and validation cycle for new products and technologies, ultimately lowering innovation costs and mitigating market entry risks.

Meanwhile, Beijing has also formed an agglomeration of national-level specialized technical institutions, creating a functional complementarity with the comprehensive institutions in Tianjin. This cluster includes: the China Machine-Building International Corporation (CMVT), which has professional advantages in the testing and evaluation of commercial vehicles, construction machinery, and intelligent connected vehicles (ICVs); the China Certification Centre for Automotive Products (CCAP), which focuses on market access management such as the China Compulsory Certification (CCC); and the National Automobile Quality Supervision and Test Center (Beijing) (NAST-B), which possesses outstanding technical capabilities in the testing and evaluation of new energy vehicles (NEVs) and ICVs. Furthermore, this cluster has attracted other national-level research forces. For instance, the China Automotive Engineering Research Institute Co., Ltd. (CAERI), headquartered in Chongqing, has established a branch in Beijing, extending its professional technical capabilities in fields like intelligent connectivity and software testing to the BTH region. A common characteristic of these institutions is their high degree of focus on emerging and frontier technology fields, making Beijing a significant hub for the testing and validation of intelligent connectivity technologies within the region.

In addition, the region's technical service system also exhibits characteristics of diversification and internationalization. On the one hand, internationally renowned third-party testing and certification institutions such as TÜV Rheinland and SGS have all established laboratories in the BTH region, providing market access certification services for regional enterprises targeting international markets. On the other hand, the testing capabilities of leading enterprises themselves are also continuously strengthening. For example, Great Wall Motor has built a leading large-scale comprehensive proving ground in Baoding, Hebei, which represents the enhancement of in-house testing and validation capabilities.

5. Conclusion

This systematic study of the automotive supply chain industry in the BTH region leads to the following conclusions:

First, guided by the coordinated development strategy, the Beijing-Tianjin-Hebei (BTH) automotive industry has formed a regional industrial cluster with a clear structure and functional complementarity. At the vehicle manufacturing level, it presents a 'golden triangle' pattern with Beijing focusing on R&D, innovation, and high-end manufacturing; Tianjin on comprehensive manufacturing and logistics hubs; and Hebei on large-scale production and supporting facilities. At the component supply level, it exhibits a gradient distribution characteristic, with Beijing specializing in high-value-added core technologies; Tianjin in internationalized system integration and supply; and Hebei in large-scale basic manufacturing. This intrinsic industrial division of labor lays a solid physical foundation for the efficient synergy of the regional supply chain.

Second, the coordinated development of the BTH automotive supply chain benefits from the coupling of multi-dimensional locational advantages. These include: policy drive, centered on the 'Relocation of Non-Capital Functions', which provides the top-level design for orderly

industrial transfer and functional reshaping; spatial layout, with specialized industrial parks as carriers, which offer physical nodes for industrial agglomeration and innovation transformation; a logistics network, supported by an integrated comprehensive transportation system, which provides the physical guarantee for the efficient operation of the supply chain; and an science and technology innovation system, composed of a gradient-structured talent pool from the three regions, which serves as the intellectual engine for continuous industrial innovation. The interplay of these elements collectively forms the region's unique synergistic and advantages.

Third, multi-level cooperative platforms and organizations constitute the 'soft' infrastructure for promoting the integration and empowerment of the regional supply chain. Cooperative networks, represented by industry alliances and associations, reduce cooperation costs and information asymmetry among enterprises by horizontally integrating resources. In contrast, technical service platforms, represented by third-party testing and certification institutions, achieve vertical empowerment for the industry and accelerate the transformation of innovation outcomes by providing authoritative technical standards and validation services. The synergistic interaction between these two forms the key mechanism for the efficient operation of the Beijing-Tianjin-Hebei (BTH) automotive supply chain ecosystem.

Based on the research and analysis of this paper, the coordinated development of the Beijing-Tianjin-Hebei (BTH) automotive industry has demonstrated strong endogenous momentum and broad future prospects. Looking forward, the region should further consolidate and amplify its synergistic advantages, continuously advancing toward the goal of building a world-class automotive industry cluster. Its development path lies in deepening the 'R&D and Innovation in Beijing + Intelligent Manufacturing in Tianjin-Hebei' synergistic model. While solidifying its advantages in intelligent connected vehicles and new energy vehicles, the region should also proactively seize the new track of hydrogen fuel cell vehicles to form diversified industrial growth poles. This process requires the construction of a more secure and autonomous regional supply chain, focusing on joint R&D efforts to achieve breakthroughs in key segments such as automotive-grade chips, thereby enhancing industrial resilience. Concurrently, by strengthening the role of industry alliances and promoting the construction of digital platforms, the operational efficiency and synergy level of the supply chain can be comprehensively improved. Through these pathways, the BTH automotive industry is poised to develop into a technologically leading, secure, and efficient world-class industry cluster, providing robust support for the transformation and upgrading of China's automotive industry and the implementation of the regional coordinated development strategy.

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