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Development Mechanisms of Nansha Economic and Technological Development Zone Within the Guangdong-Hong Kong-Macau Greater Bay Area

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Abstract: Nansha Economic and Technological Development Zone, as a key strategic platform within the Guangdong-Hong Kong-Macau Greater Bay Area (GBA), serves as a vital engine for regional economic growth and industrial upgrading. This paper delves into the integration pathway of "port logistics—port-proximate industry—technological innovation" in Nansha and the pivotal role of policy instruments in spurring regional economic transformation and upgrading. It unveils the rationale underpinning Nansha's evolution from a conventional industrial base to a hub for new productive forces. The analysis reveals that Nansha must refine policy execution, bolster cross-regional collaboration, and enhance industrial chain coordination. The paper provides recommendations such as streamlining policy procedures and upgrading education and healthcare infrastructure, offering insights into institutional innovation and industrial integration within regional development zones. Furthermore, Nansha's strategic significance lies not only in its role as a driver for regional economic growth, but also in its potential to serve as a model for innovation and cooperation in the global economic landscape. Additionally, it underscores the significance of Nansha's strategic advantages in the context of China's "dual circulation" development strategy, providing a reference for other regional development zones striving for high-quality development through policy and industrial integration.

Keywords: Five-Port Synergy, industrial synergy, Greater Bay Area

1. Introduction

In recent years, with the acceleration of global economic integration, regional economic development zones have become increasingly important in promoting local economic growth and industrial upgrading. As a key window of China's reform and opening-up, economic development zones have attracted significant attention from both academics and policymakers.

Existing research on Nansha Economic and Technological Development Zone has focused on several aspects. Some scholars have highlighted that Nansha's port logistics reduces transportation costs and improves supply chain efficiency, thereby driving the agglomeration of manufacturing in the Pearl River Delta (PRD) [1, 2]. Based on Nansha's internal and external development environment and current industrial status, it is essential for Nansha to follow a sustainable development strategy, transform its development model, leverage its port-proximate advantages, and prioritize high-tech industries to build a sustainable new Nansha coordinated with the PRD [3, 4].

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Nansha's logistics hub should capitalize on its deep-water port conditions and significant government investment to develop ocean transportation, using scale benefits to mitigate competitive pressures and avoid the pitfalls of homogenized and malicious competition prevalent among enterprises in the PRD [5-7]. Against the backdrop of the Belt and Road Initiative (BRI), free trade zone construction, and the elevation of the Greater Bay Area (GBA) to a national strategy, it is necessary to gradually establish a high-standard network of free trade zones that focuses on neighboring regions, radiates to the BRI and faces the globe, further advancing China's reform and opening-up [8-10]. The government, by analyzing transportation issues in the GBA and Nansha's urban characteristics, should anticipate future transportation trends, clarify Nansha's goal of becoming a transportation hub in the GBA, and implement three development strategies, namely, building a regional radiating rail network, intensifying cross-river channels in the PRD, and forming an integrated modern transportation system of air, sea, rail, and road to lead the coordinated development of transportation integration in the GBA [11-13]. However, existing research has three main shortcomings. First, it overlooks the pressure of weak industrial foundations and structural transformation; second, it fails to recognize the insufficient attractiveness of the high-level talent market; third, there is a lack of systematic analysis of Nansha's recent policy innovations.

Therefore, the marginal contributions of this paper lie in combining the latest policies to break away from a single perspective. From the view of industrial chain integration of "port logistics—port-proximate industry—technological innovation," this paper reveals the cross-industry synergy path of Nansha. It also explores Nansha's transition logic from a traditional industrial base to a hub for new productive forces, combining "Five-Port Synergy" and digital economy layout. Studying the role of Nansha Economic and Technological Development Zone provides references for other regional development zones, especially in exploring how to achieve high-quality development through institutional innovation and industrial integration under the "dual circulation" development pattern.

2. Overview of economic development status of Nansha

Nansha Economic and Technological Development Zone, located in southern Guangzhou, Guangdong Province, has evolved into a vital engine for economic growth in the PRD and the GBA since its establishment as a national-level economic and technological development zone in 1993. As the geometric center of the PRD, Nansha connects Guangdong, Hong Kong, and Macau, leveraging its "Five-Port Synergy" advantages (sea, air, digital, financial, and talent) and a layout of large ports, large industries, and large logistics to drive regional economic transformation and upgrading. In recent years, the "port + technology" policy synergy has yielded significant results.

In Nansha's economic structure, advanced manufacturing and modern services are the core drivers. In 2023, advanced manufacturing accounted for 35% of its Gross Domestic Product (GDP), while modern services accounted for 41%, together contributing 76% of the regional GDP. Despite a slowdown in GDP growth to 4.3% in 2023 due to external environmental factors, the growth rate rebounded to 5% in 2024 through policy support and industrial upgrading. In terms of industrial structure and layout, Nansha has attracted major projects through policy support, such as key automotive manufacturing projects involving BYD and XPeng, becoming the world's first city for "Robotaxi." Additionally, Nansha focuses on port economy and marine engineering equipment, such as the launch of China's first deep-sea drilling ship, "Dream," with a maximum drilling depth of 11,000 meters, marking a breakthrough in deep-sea exploration technology. Nansha has also achieved breakthroughs in new energy, artificial intelligence, and biomedicine, with over 100 high-tech enterprises in the district, benefiting from tax exemptions of 720 million yuan under policy support. In terms of policy support and innovation, in 2023, Nansha introduced policies such as the "Support Measures for Promoting Advanced Manufacturing and Construction Industry," attracting foreign investment and increasing the number of high-tech enterprises to over 100. In 2024, the "port +

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technology" policy synergy significantly promoted the deep integration of port economy and emerging industries.

Looking ahead, Nansha plans to drive the coordinated development of advanced manufacturing and modern services through policy support and technological innovation. In 2024, Nansha aims to attract foreign investment through Guangdong-Hong Kong-Macau technology innovation cooperation, further integrating port economy with emerging industries. Additionally, Nansha plans to complete the construction of a 200,000-ton cannel to enhance the competitiveness of its port-proximate industries.

3. Challenges facing the economic development of Nansha

Despite its progress, Nansha Economic and Technological Development Zone faces several challenges. First, in terms of policy mechanisms, Nansha's policies lack precision and timeliness, particularly in attracting high-tech and innovative enterprises. For example, in 2024, Nansha aimed to attract foreign investment through policy support, but existing policies suffered from complex application processes and long funding turnover periods, increasing the burden on enterprises and affecting long-term investment decisions. These issues may undermine Nansha's ability to attract and retain high-tech enterprises.

Second, Nansha faces pressures from weak industrial foundations and structural transformation. Although progress has been made in advanced manufacturing and modern services, compared to mature regions like Shenzhen and Guangzhou, Nansha's industrial chains remain underdeveloped, and industrial cluster effects are yet to be fully realized. For instance, Nansha is still in the early stages of emerging industries like new energy and artificial intelligence, lacking core technological breakthroughs. With a research and development (R&D) investment ratio of only 2.5%, significantly lower than Shenzhen's 5.4%, Nansha's innovation capacity remains insufficient. This weak industrial foundation and structural transformation pressure may place Nansha at a disadvantage in regional competition, making it difficult to attract and retain high-tech enterprises.

Third, Nansha struggles to attract and retain high-end talent. Despite policies such as the "dual 15% tax reduction," Nansha's appeal remains limited compared to cities like Shenzhen. In 2024, Nansha plans to attract talent through improved education and medical infrastructure, but shortcomings in these areas persist. For example, Nansha's education resources are relatively weak, and high-end medical resources are insufficient to meet the needs of high-end talents and their families. This lack of talent competitiveness may hinder Nansha's innovation capacity and development potential. Moreover, comparing Nansha's infrastructure and innovation capabilities with those of nearby, such as Shenzhen, there is a noticeable gap. This situation makes it harder for Nansha to attract multiple enterprises and innovative resources. Some areas' public transport is not efficient enough and public services like schools and hospitals are struggling to keep up with the increasing population and enterprise needs.

Compared to Shenzhen, which attracts numerous high-tech enterprises through a complete industrial chain and strong innovation capacity, Nansha lacks top-tier research institutions and high-end innovation platforms, making it difficult to attract and retain top scientific talent. Furthermore, Nansha's influence in regional cooperation is relatively weak, limiting its ability to play a leading role in the overall development of the GBA. These factors may affect Nansha's economic development speed, quality, and innovation capacity.

4. Policy evaluation and recommendations

Nansha's existing policies have achieved some success in attracting investment and talent. Tax incentives such as the "dual 15% tax reduction" provide motivation for enterprises and individuals.

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This policy typically means a preferential corporate income tax rate of 15% for eligible enterprises in certain industries, compared to the standard rate of 25%, and a personal income tax reduction where the actual tax burden on eligible individuals is capped at 15%. These measures aim to attract high-quality enterprises and talent to Nansha, while industrial support policies promote the development of emerging industries like biomedicine and integrated circuits through special funds. Talent policies attract high-end talents through subsidies and housing guarantees.

However, existing policies have shortcomings, such as insufficient precision in attracting high-tech and innovative enterprises, limited stability causing uncertainty for long-term enterprise decisions, and complex implementation processes that increase the burden on enterprises and reduce policy attractiveness. Nansha can draw inspiration from successful experiences of other economic development zones. For example, Pudong New Area attracts high-tech enterprises through complete industrial chains and policy stability; Shenzhen Qianhai enhances competitiveness through optimized business environments and regional cooperation; and Suzhou Industrial Park forms an effective innovation ecosystem through infrastructure development and technological innovation investment.

Based on Nansha's real situation, the government can optimize policy implementation mechanisms by simplifying processes and improving efficiency to ensure policy precision and timeliness. It should also strengthen cross-regional cooperation, coordinate industries and resources with surrounding cities, and jointly build industrial clusters. Land use reforms should clarify functional boundaries and provide rent reductions or other incentives to enterprises. Collaboration among the government, enterprises, and social organizations should be enhanced to create a multi-stakeholder participation framework. Additionally, innovation capacity should be improved through increased R&D investment, attracting top talent, and enhancing technology transfer efficiency. Through these measures, Nansha can overcome existing challenges and achieve higher-quality development.

Learning from the Yangtze River Delta region's economic radiation and satellite city development experiences, Nansha can strategically position itself as a key player in the GBA. Similar to how Shanghai has integrated surrounding areas through strategic positioning and infrastructure development, Nansha can leverage its geographical advantages and industrial synergies to become a vital logistics hub, innovation center, or manufacturing base. By investing in high-speed rail and integrated transportation networks, Nansha can enhance connectivity with core cities, akin to Shanghai's emphasis on rapid transit systems. Moreover, fostering collaboration between traditional industries and emerging sectors promotes the development of clusters like biological medicine and new energy, which in turn align with regional development goals. Nansha should also focus on improving education, healthcare, and housing to attract and retain talent, mirroring Shanghai's balanced urban development approach. This integrated strategy not only strengthens Nansha's role within the GBA, but also positions it as a model for sustainable and high-quality development, effectively leveraging its strategic advantages for long-term economic growth and regional cooperation.

5. Conclusion

As a pivotal strategic platform within the GBA, Nansha Economic and Technological Development Zone has demonstrated significant potential for driving regional economic growth and industrial upgrading. This paper has thoroughly examined the synergistic mechanisms of Nansha's "Five-Port Synergy" strategy, focusing on how port logistics, port-proximate industries, and technological innovation can collectively propel economic transformation. The analysis has highlighted the critical role of policy tools in optimizing industrial structures and fostering high-quality development. One key finding is that Nansha must streamline policy implementation, enhance cross-regional cooperation, and strengthen industrial chain coordination. Recommendations such as improving

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educational and medical infrastructure, accelerating land policy reforms, and boosting R&D investment have been proposed to address existing challenges and leverage Nansha's strategic advantages. These insights aim to provide actionable guidance for institutional innovation and industrial integration in regional development zones, particularly in the context of China's "dual circulation" development strategy.

While this study offers valuable perspectives on Nansha's economic development, it is not without limitations. The analysis primarily relies on secondary data and policy documents, which may limit the depth in fully representing the actual complexities in the development of Nansha. Additionally, the dynamic nature of regional economic policies and global market conditions introduces uncertainties that are challenging to be fully captured in a static analytical framework. Future research could benefit from longitudinal studies to track the long-term impacts of policy interventions and industrial synergy initiatives. Furthermore, incorporating primary data through surveys and interviews with local enterprises and policymakers would enrich the analysis by providing firsthand insights into implementation challenges and success factors. As Nansha continues to evolve as a hub for new productive forces, ongoing research and adaptive policy frameworks will be essential to sustain its competitive edge and fulfill its role as a model for high-quality development in the GBA and beyond.

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