

# ***The Economic Impact of High-Speed Rail Development in the Pearl River Delta: A Case Study of Guangzhou-Shenzhen-Hong Kong Express Rail Link***

Songyuan Zhang<sup>1,a,\*</sup>

<sup>1</sup>*Faculty of Business & Economics (HKU Business School), The University of Hong Kong, Hong Kong, China*

*a. steven7@connect.hku.hk*

*\*corresponding author*

**Abstract:** The rapid expansion of high-speed rail (HSR) has become a crucial element of infrastructure, markedly improving regional connectivity and economic integration. This study centers on the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL), a pivotal project that connects major cities within the Pearl River Delta (PRD) and links Hong Kong to mainland China. The analysis demonstrates that while the XRL has stimulated economic growth by facilitating inter-regional exchanges, it has also presented challenges to local vulnerable sectors, particularly small and medium-sized enterprises (SMEs). These challenges stem from heightened competition due to industrial agglomeration. To mitigate these effects, the study proposes enhancing regional economic cooperation by establishing specialized economic zones and developing cross-border trade networks. These strategies aim to capitalize on the benefits of the XRL while enabling SMEs to access new markets and boost their competitiveness. The research underscores the importance of strategically leveraging infrastructure projects like the XRL to promote sustainable economic growth, offering a framework for addressing potential drawbacks.

**Keywords:** High-speed Rail, Economic Integration, Regional Cooperation, SMEs, Guangzhou-Shenzhen-Hong Kong Express Rail Link.

## **1. Introduction**

### **1.1. Research Background**

With the rapid development of high-speed rail (HSR), its cost-effectiveness and efficiency have made it a popular choice for passengers within countries and even continents. The operation of high-speed railways can not only enhance connectivity between regions but also make resource redistribution more reasonable during exchanges. Served as a critical infrastructure connecting the Pearl River Delta region in China, the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) facilitates convenient transportation and fosters economic growth along the line.

Since 1964, when the first commercial high-speed rail system, the Tokaido Shinkansen, began operating in Honshu, Japan, high-speed rail has transformed inter-city travel. Compared with automobiles and air, high-speed rail has swiftly become a significant transportation infrastructure due

to its balance of accessibility and speed. As of 2020, over 55,000 kilometres of high-speed rail lines were operational worldwide, underscoring the growing preference for this mode of transport [1]. China, which only completed its first high-speed rail line (Beijing-Shanghai High-Speed Railway) in 2008, has become the country with the largest high-speed rail mileage as a latecomer. As of 2019, China has over 35,000 km of high-speed rail, connecting major cities and vast underdeveloped regions [2].

The Pearl River Delta (PRD) is one of China's major economic zones and manufacturing centres at the Pearl River's mouth. The Pearl River Delta is one of the most prosperous economic zones in China, with an average substantive growth of 6.9% in gross regional product in 2018, accounting for 80.2% of the gross regional product of Guangdong Province, equivalent to 9.0% of the national GDP [3]. The Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) operation, which served as a major infrastructure project linking the Pearl River Delta and Hong Kong, has contributed to economic growth and enhanced regional connectivity. In the first half of 2024 alone, the Guangzhou-Shenzhen-Hong Kong Express Rail Link has sent a total of 7.587 million cross-boundary passengers [4]. Meanwhile, the Hong Kong Legislative Council approved an investment of US\$8.6 billion for the construction of a high-speed rail link between Hong Kong and mainland China, and a cost-benefit analysis showed a high net present value of US\$2,068.49 million, suggesting that the project has the potential to be financially viable and have a high economic return [5].

## 1.2. Literature Review

The development of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) has been extensively studied, with a number of papers emphasizing its economic impact on the Pearl River Delta (PRD) and even other regions. Ding & Zhang studied the role of XRL in promoting the development of PRD city clusters [6]. They emphasized the "urban corridor effect", whereby HSR shortens travel time and enhances connectivity between cities, thereby promoting economic integration and regional development. The study highlighted the need to coordinate transportation and land use policies to maximize the benefits of HSR infrastructure. Focusing on the Yangtze River Delta and comparing it to the Pearl River Delta, Sun et al. explored how HSR affects regional economic sustainability [7]. Their findings suggest that HSR greatly improves the accessibility of cities, fosters closer economic ties, and improves the functional role of central cities. However, the uneven distribution of benefits from HSR has exacerbated economic disparities within the region. Bao and Mok analyzed the impact of the XRL on real estate prices and found that real estate values along the railroad line increased significantly [8]. Their study of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) showed that real estate prices in West Kowloon, the terminus of the Hong Kong section, rose significantly after the project was announced and completed. The rise in real estate values was attributed to the fact that the XRL brought easier access and more economic opportunities, making the area more attractive for investment and development.

Together, these studies suggest that the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) is crucial in enhancing regional connectivity, promoting economic integration and stimulating development. However, the distribution of these benefits varies, and there is a need to formulate targeted policies to address the resulting inequities and maximize the overall regional development.

However, the vast majority of studies have focused on the economic impacts generated by the XRL, but very few have mentioned cross-border economic integration. The opening of the XRL is not only Hong Kong's unilateral support to the PRD region but also provides possibilities and facilitations for Hong Kong's industrial restructuring as well as northbound investment. As such, XRL facilitates the redistribution of resources between the PRD region and Hong Kong, as well as a more rational overall layout of the regional economy. Hong Kong and the PRD industries have realized integration and become an inseparable economic whole, thus achieving cross-border

economic integration. In addition, the socio-economic impacts of integration are rarely mentioned. Population mobility, lifestyle changes, and the transformation of regional industries are all subtle effects of the opening of XRL.

### 1.3. Research Framework

This paper will comprehensively and objectively analyze the impact of the Guangzhou-Shenzhen-Hong Kong Express Rail Link as well as potential problems through a case study of the XRL.

The subsequent sections will follow the case study, analysis of this problem, and suggestions. Ultimately, the analysis of XRL will provide a reference for driving regional economic development and integration through the operation of high-speed railways.

## 2. Case Description

The Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) is a transformative infrastructure project that connects Guangzhou, Dongguan, Shenzhen, and the Hong Kong Special Administrative Region. The line starts at Guangzhou South Station and ends at Hong Kong West Kowloon Station, with a total length of about 142 kilometres and a total of seven stations, connecting Guangzhou City, Dongguan City, Shenzhen City, and Hong Kong Special Administrative Region to the China-wide high-speed railway network.

Establishing a public transport link between Hong Kong and the Pearl River Delta (PRD) region has been a longstanding idea. In 2000, the Hong Kong Transport Bureau published a new Railway Development Strategy entitled “Railway Development Strategy 2000”, which proposed six new railway corridors in Hong Kong, including the Regional Express Line (REL) linking Hung Hom and the border. Since 2001, the Hong Kong Government has been liaising with the Central Government on proposing a ‘Regional Express Line’ for Hong Kong. In 2004, the National Development and Reform Commission of the People’s Republic of China promulgated the Medium and Long-term Railway Network Plan, proposing the construction of the Beijing-Guangzhou-Shenzhen Passenger Dedicated Line, and the Ministry of Railways of the People’s Republic of China and the Guangdong Provincial Government divided the line into two sections, namely the Beijing-Guangzhou Passenger Dedicated Line and the Guangzhou-Shenzhen-Hong Kong Passenger Dedicated Line. At the end of 2005, the construction of the Guangzhou-Shenzhen section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) formally commenced and was opened to traffic in December 2011; in January 2010, the construction of the Hong Kong section of the XRL commenced and was opened to traffic in September 2018.

The Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) has seven major stations along its entire route, namely Guangzhou South Station, Qingsheng Station, Humen Station, Guangmingcheng Station, Shenzhen North Station, Futian Station, and Hong Kong West Kowloon Station in descending order from north to south. Guangzhou South Station is the major transport hub in South China, connecting the Pearl River Delta region to the national high-speed railway network. Shenzhen North Station and Hong Kong West Kowloon Station are the largest high-speed railway stations in the region and serve as railway transport hubs for two world-class metropolises. Qingsheng Station is located in Nansha District, Guangzhou, which is a demonstration zone for comprehensive cooperation between Guangdong, Hong Kong, and Macao. Humen Station and Guangming City Station are located in Dongguan and Guangming New District of Shenzhen City, respectively, with the former being dominated by manufacturing and trade and the latter having a large number of fast-growing high-tech industries clustered around it. Futian Station is the largest underground high-speed railway station in Asia, located in the centre of Shenzhen. It is connected to the Shenzhen Metro system. The stations along the Guangzhou-Shenzhen-Hong Kong Express Rail Link connect urban

centres with thriving populations and economies, districts with manufacturing and high-tech industries, as well as the Guangdong-Hong Kong-Macao Cooperation Area, providing comprehensive industrial coverage and diversified industrial structure for regional economic integration.

### **3. Analysis on the Problem**

#### **3.1. Influences**

##### **3.1.1. Economic Growth**

The opening of the Guangzhou-Shenzhen-Hong Kong railway has facilitated inter-regional exchanges and brought direct economic benefits to the areas along the railway. Among the cities along the route, Guangzhou, Shenzhen, and Hong Kong are world-class metropolises, and many factors affect their economic development. Therefore, it isn't easy to analyze the cause-and-effect relationship that is ultimately presented in the economic indicators. While Dongguan is a city with a relatively small economic volume and with manufacturing as its core industry, the improvement in transport and connectivity with major cities brought about by the Guangzhou-Shenzhen-Hong Kong Express Rail Link will be a significant boost to economic development.

The Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) has been in operation since 23 September 2018, and according to the Dongguan Municipal Bureau of Statistics (DBS), the GDP reached RMB 827.859 billion in 2018, an increase of 7.4% compared to the previous year. The growth continues in 2019 and 2020 but slows down in 2020, possibly affected by the epidemic. Transportation and Warehousing grew by 1.8% in 2018, a slight decrease compared to 2017, and grew significantly in 2019 and 2020, reaching 5.3% and 7.9%, respectively, showing the positive impact of the HSR on the transport sector. Wholesale and retail trade grew by 4.4 percent in 2018, a slight decline compared to 2017, before growth picked up to 4.9 percent in 2019 and 6.4 percent in 2020 due to the impact of the epidemic. The accommodation and food service sector grew at an increased rate of 3.3 percent and 5.1 percent in 2018 and 2019, respectively, showing the boost of the HSR to the tourism and related sectors, and declined sharply by 19.6 percent in 2020, mainly due to the impact of the epidemic. The financial sector grew by 6.9 percent in 2018, a significant improvement compared to 2017, and continues to grow strongly in 2019 and 2020, at 12.7 percent and 9.9 percent, respectively, reflecting the boost to business activity and investment from the HSR. The real estate sector declined by 1.2 percent in 2018 but grew by 6.6 percent and 8.8 percent in 2019 and 2020, respectively, demonstrating the long-term positive impact of the HSR on the property market. Declining growth picked up to 4.9 percent in 2019 and declined by 6.4 percent in 2020 due to the impact of the epidemic (Figure 1).

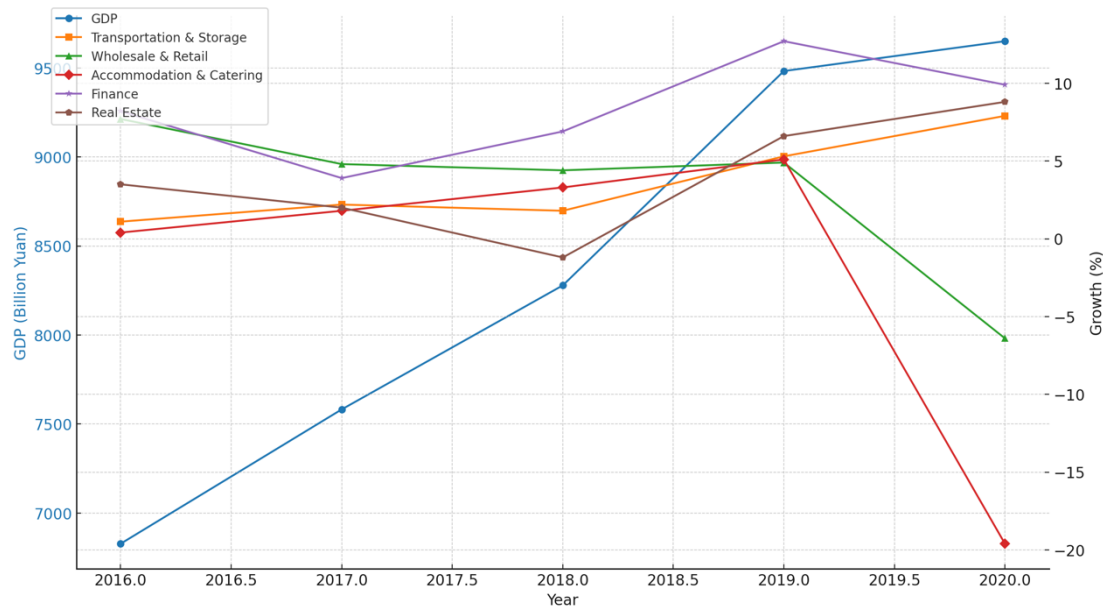


Figure 1: Impact of 2018 Hong Kong Section High-Speed Rail on Dongguan's Economy (Photo credit: Origin)

From the above data, the commissioning of the Hong Kong section of the XRL in 2018 positively impacted Dongguan's economy in various aspects, particularly in the areas of transport, accommodation and catering, financial services, etc. The data on economic growth in 2018 and 2019 show that the commissioning of the XRL has boosted Dongguan's economic vibrancy, increased business and tourism activities in the region, and promoted the development of related industries. Despite fluctuations in the 2020 data due to the epidemic, the overall trend shows that the HSR has had a significant economic boost for Dongguan City. Therefore, due to the convenience brought about by the opening of the Guangzhou-Shenzhen-Hong Kong Express Rail Link, there has been an increase in business exchanges along the route, boosting the economy of the regions along the route.

### 3.1.2. Integration of the PRD with Hong Kong

The commissioning of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) has greatly facilitated the integration of Hong Kong with the Pearl River Delta (PRD) and the development of the PRD into a multi-centre mega-city region. The XRL has strengthened the economic links and infrastructure between Hong Kong and the PRD cities, making the inter-city network more convenient and active and facilitating the economic role of specialization.

According to Zhao et al., the evolution of business networks supported by the XRL has enabled PRD cities, including Hong Kong, to develop and utilize their specialized economic sectors more effectively [9]. For example, Hong Kong's strengths in financial services are complemented by the technological and industrial capabilities of cities such as Shenzhen, creating a synergistic regional economy that capitalizes on the strengths of each city. These interactions are enhanced by the improved transport links provided by the XRL, resulting in a more fluid and frequent flow of capital, goods, and human resources.

The XRL also has a transformative impact on the spatial and economic structure of the PRD. By reducing travel time and improving accessibility, the XRL not only facilitates daily commuting and business interactions but also plays an integral role in the formation of a mixed polycentric structure, resulting in more balanced and integrated economic activities across the region [10]. The mixed



polycentric layout has led to the clustering of industries, facilitating the saving of transport and infrastructure costs by production factors, which is more conducive to the development of the regional economy. This has enabled the PRD, including Hong Kong, to become a more cohesive economic entity, enhancing economic efficiency and competitiveness on a global scale.

### **3.2. Problems: Impact on Local Vulnerable Economic Sectors**

Although the Guangzhou-Shenzhen-Hong Kong Express Rail Link promotes the region's overall economic development and strengthens regional integration in industrial clustering, the clustering of industries implies squeezing the viability of some local industries. Large-scale infrastructures such as XRL strengthen inter-regional connections, exposing local disadvantaged industries to competition and receiving direct impacts.

Industrial agglomeration offers the advantage of economies of scale. Neighbouring businesses can share infrastructure and resources, such as energy facilities and waste disposal systems, thereby reducing unit costs. In addition, local suppliers often emerge to meet the needs of these industries, and because of the high volume of business in concentrated areas, this can lead to more competitive prices and higher service levels. For example, production factors such as land prices and labour costs are significantly more expensive in Hong Kong than in other parts of the Greater Bay Area. Industrial enterprises in Hong Kong can significantly reduce their costs by investing in setting up factories on the Mainland. However, SMEs lack the capital for industrial transfer compared to large companies. Given the costs of land acquisition, construction, and transport, some SMEs without access to finance have to remain in their original areas and face gradual elimination in the face of increasing competition. As a result, XRL brings not only connectivity but also stronger competition, which is a serious test of survival for businesses that are already vulnerable locally.

## **4. Suggestions**

As mentioned in Section 3.1.1, the economic development along the railway lines has achieved remarkable results, especially in terms of its performance in the integration process of the Guangdong-Hong Kong-Macao Greater Bay Area. The integration of the Guangdong-Hong Kong-Macao Greater Bay Area has become an important driver of China's future economic development, which is reflected not only at the policy level, such as the Outline of the Plan for the Development of the Guangdong-Hong Kong-Macao Greater Bay Area issued by the State Council in February 2019, but also in the actual economic activities in recent years.

However, as discussed in Section 3.2, the increased level of integration, while contributing to overall economic performance, has also posed new challenges to disadvantaged industries and SMEs. While large firms may benefit from the industrial agglomeration effect, SMEs face constraints in various aspects such as finance, technology and market access. This problem could be mitigated by further promoting the development of regional economic cooperation. The recommendations will be centred on continuing to build on the strengths and address the problems.

### **4.1. Creating Regional Economic Zones**

The establishment of regional economic zones can effectively gather resources and technologies and, relying on the Guangzhou-Shenzhen-Hong Kong Express Rail Link, provide cost, technology, transport and other agglomeration advantages for enterprise development. Each of the four major cities along the ERL has a comparative advantage in a particular industry, and the extent of this advantage is not only regional but also global. Hong Kong, as an important financial centre and port city in Asia and the world, has absolute advantages in finance and trade; Shenzhen has gathered China's top hi-tech enterprises, such as Tencent and DJI, and continues to support the development

of hi-tech industries; Dongguan has a well-developed manufacturing industry, and is regarded as the “factory of the world”; advanced manufacturing industries, with automobile, electronics, and other industries dominate Guangzhou. Guangzhou is dominated by advanced manufacturing, with three pillar industries: automotive, electronics and petrochemicals. Therefore, the regions along the Guangzhou-Shenzhen-Hong Kong Express Rail Link can play a full role in the relative advantages of the production of various regions through further industrial diversification, so as to promote a more reasonable redistribution of resources.

The specific approach can be divided into three areas. The first is industrial clustering, that is, the establishment of specific industrial clusters based on the economic characteristics and industries of strength of each place. For example, in Guangzhou, emphasis can be placed on the development of advanced manufacturing clusters, while in Shenzhen, technological innovation industries can be strengthened. Within these economic zones, targeted policy support, such as tax incentives, financing support and talent introduction policies, will be provided to enterprises that meet the requirements so as to attract more enterprises to move in. The next step is to establish sound infrastructure, such as transport networks, logistics centres, R&D institutions and office space. This not only improves the operational efficiency of enterprises but also promotes cooperation and resource sharing among enterprises in the region, creating a virtuous cycle of economic ecosystem. Finally, there is policy coordination and support. Coordination and cooperation between all levels of government are needed in the long-term operation after establishment. In particular, exchanges between the Mainland and Hong Kong still involve cross-border issues. Through the Mainland and Hong Kong governments, a regionally unified policy framework should be formulated to reduce barriers to cross-regional cooperation and to facilitate the free flow of capital, technology and talent. The government should also dynamically assess the development of the regional economic zones and make timely adjustments to its policies and strategies to ensure that they are timely and reasonable.

## 4.2. Creating Development Opportunities for SMEs

SMEs, as a stage that businesses must go through to grow, are a constant source of creativity and economic vitality. However, it is also a relatively fragile stage for enterprises due to capital, volume and R&D cycle. Therefore, support for SMEs is necessary. The development of trade networks among different cities along the XRL routes and the establishment of business incubation centres can create more development opportunities for SMEs, help them better access new markets and enhance economic interactions within the region.

The Guangzhou-Shenzhen-Hong Kong Express Rail Link makes the flow of goods, services and information between cities along the route more convenient and efficient. This accessibility can be better utilized to promote cross-border trade amongst the cities along the XRL through the establishment of a trade cooperation platform combining online and offline services. For example, by taking advantage of the high-speed transport of XRL, a cross-border e-commerce platform can be established to help SMEs distribute their products to neighbouring cities or cross-border markets more quickly. The high-speed transport capacity of XRL also enables the supply chain management system to be more efficient, reducing logistics time and lowering inventory costs, thereby enhancing the market competitiveness of enterprises. In addition, the establishment of business incubators and innovation centres can help SMEs better access technical support and financial guidance, take advantage of the rapid transportation brought about by XRL, and strengthen cooperation with other cities along the route. With the support of incubators and innovation centres, enterprises can quickly apply their innovations to the market and make use of the convenience of the XRL to promote these innovations to a wider regional market.

To sum up, through the creation of a regional economic zone and the promotion of cross-boundary trade cooperation along the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL), not only

can we pool our resources and strengths to help enterprises integrate into the regional economy, but we can also make use of the transport advantages of the XRL to open up more opportunities for SMEs to expand their markets. These measures complement each other in enhancing the economic synergy within the region and promoting the sustainable development of SMEs amidst fierce competition, thereby achieving the overall prosperity of the regional economy.

## **5. Conclusion**

### **5.1. Key Findings**

By analyzing the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL), we found that the XRL has played an important role in enhancing regional connectivity and promoting economic integration in the PRD. The XRL has improved inter-regional exchanges, spurred the development of tourism, financial and real estate sectors, and promoted economic growth. However, enhanced connectivity has also posed challenges to local disadvantaged sectors, particularly small and medium-sized enterprises (SMEs), which face increasing competition to benefit from industrial clustering. To address these challenges, it has been suggested that regional economic cooperation could be further promoted through the establishment of specialized regional economic zones and the development of cross-border trade networks. These measures aim to capitalize on the strengths of the cities along the XRL and provide new development opportunities for SMEs while promoting a more balanced and integrated regional economy.

### **5.2. Significance of the Study**

This study has significant business value in that it provides insight into how large infrastructure projects like the HSR can be used to stimulate economic development while also addressing the disadvantages that disadvantaged groups may face. The findings and recommendations presented in this paper can guide policymakers and business leaders in enhancing regional cooperation in support of small and medium enterprises (SMEs). By strategically utilizing the connectivity of HSR, businesses can expand their markets and industrial development across the region can become more cohesive. In addition, the study also highlights the importance of creating a supportive environment for SMEs, which is crucial to fostering innovation, maintaining economic vitality and ensuring sustainable growth in the PRD and beyond.

### **5.3. Limitations and Future Research**

Whilst this study provides valuable insights, it is largely based on secondary data and may not be able to fully capture the impact of the XRL on the local economy. The lack of primary data, such as surveys or interviews with affected businesses, limits the depth of the analysis. Future studies could address this limitation by incorporating primary data collection methods to gain a more nuanced understanding of the impact of the XRL on SMEs and other disadvantaged groups. A longitudinal study could also be conducted to observe the long-term impacts of the XRL, particularly as the regional economy continues to develop. Such an approach would provide a more comprehensive understanding of the ongoing challenges and opportunities presented by the XRL, leading to the development of more effective policies and business strategies.

## **References**

[1] UIC. (2020). *High-Speed Lines in the World*. Retrieved from <https://uic.org/highspeed>



- [2] State Council, The People's Republic of China. (2019, 24 November). China's high-speed rail development. Retrieved from [https://english.www.gov.cn/news/topnews/201911/24/content\\_WS5dda58a1c6d0bcf8c4c17b9b.html](https://english.www.gov.cn/news/topnews/201911/24/content_WS5dda58a1c6d0bcf8c4c17b9b.html)
- [3] HKTDC Research. (2020, 6 May). PRD Economic Profile. HKTDC research. <https://research.hktdc.com/en/data-and-profiles/mcpc/provinces/guangdong/pearl-river-delta>
- [4] People's Daily. (2024, 18 July). Main passenger and freight transportation indicators of railroads in the first half of the year ranked first in the world. People's Daily. Retrieved 22 July, 2024, from [http://paper.people.com.cn/rmrb/html/2024-07/18/nw.D110000renmrb\\_20240718\\_6-01.htm](http://paper.people.com.cn/rmrb/html/2024-07/18/nw.D110000renmrb_20240718_6-01.htm)
- [5] Tao, R., Liu, S., Chun, H., & Tam, C. (2011). Cost-benefit analysis of high-speed rail link between Hong Kong and Mainland China. *Journal of Environmental Planning and Management*, 1(1), 36-45. <https://doi.org/10.32738/JEPPM.201107.0005>
- [6] Ding, Y., & Zhang, L. (2018). The impact of high-speed railways on urban development in the Great Pearl River Delta of China. *Transport Standardization*, 20-26. <https://doi.org/10.1145/3321619.3321633>
- [7] Sun, W., Wang, C., Liu, C., & Wang, L. (2021). High-speed rail network expansion and its impact on regional economic sustainability in the Yangtze River Delta, China, 2009–2018. *Sustainability*, 14(1), 155. <https://doi.org/10.3390/su14010155>
- [8] Bao, H. X. H., & Mok, D. K. C. (2020). A link between East and West: How the Guangzhou–Shenzhen–Hong Kong Express Rail Link affects property prices in Hong Kong. *TransportRN: Transportation & Society (Topic)*. <https://doi.org/10.2139/ssrn.3668448>
- [9] Zhao, M., Derudder, B., & Huang, J. (2017). Examining the transition processes in the Pearl River Delta polycentric mega-city region through the lens of corporate networks. *Cities*, 60, 147-155. <https://doi.org/10.1016/J.CITIE.S.2016.08.015>
- [10] Zhang, W., Fang, C., Zhou, L., & Zhu, J. (2020). Measuring megaregional structure in the Pearl River Delta by mobile phone signaling data: A complex network approach. *Cities*, 104, 102809. <https://doi.org/10.1016/j.cities.2020.102809>