Proceedings of the International Conference on Social Psychology and Humanity Studies
DOI: 10.54254/2753-7048/8/20230381

Patterns of Urban Transport Infrastructure in China

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Abstract: China has focused on heavily investing in transportation infrastructure for many decades, and this study has aimed to conduct a detailed discussion of China's transportation infrastructure and has also described the evolution of the transportation system over the past few decades. This report has examined that China has been aggressively focusing on transportation infrastructure to build stronger economic growth in the changing environment. The data was collected and extracted from secondary research, such as general articles and books. Results show that the Chinese government has heavily invested in different sectors, such as railways, airways, seaways and other commuting methods, to transform the infrastructure of the country's transportation system. The highly transformed transportation system also minimizes the gap between the urban and rural regions, helps the country to influence the economic growth, and opens a new source of business with international markets. Further findings of this report reveal that from the past few years, China government is also exceptionally accentuating the development of metropolitan public transportation foundations to limit the hole. The government has clarified that urban public transportation also requires financial investment to improve traffic conditions and encourage sustainable societal development.

Keywords: patterns, transformation, urban, transport infrastructure

1. Introduction

China has focused on heavily investing in transportation infrastructure for many decades. By advancing the transportation infrastructure of China, connectivity has been enhanced within the country and between other countries in China. The central government of China has been investing on a large scale. The local government and private sector have also been focusing on improving the financial mechanism to influence the sustainable and transformed infrastructure of the country to bring more economic prosperity [1]. This paper aims to conduct a detailed discussion related to China's transportation infrastructure and how the country has witnessed the evolution of its transportation system over the past few decades. In this regard, the paper will first provide a background of transportation system infrastructure and further discuss its evolution within the cities and country by highlighting the significant pros and cons, followed by the conclusion.

2. Background of Transportation System Infrastructure

The concept of transportation infrastructure mainly consists of a specific framework that supports the transport system, such as roads, railways, waterways, pipelines, terminals, and Airways. For the past

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two decades, China has aggressively been focusing on improving the country's transportation infrastructure by investing in a large amount. It has been evaluated that infrastructure investment is significantly required in China to support rapid economic growth in the changing global environment, which increases the demand for advanced infrastructure [2]. On the contrary, infrastructure development in China is also needed to combat the changing regional inequality within the culture, which will help bridge the gap between the inland provinces and coastal provinces [3]. Studies have revealed that China has viewed a significant improvement in connectivity, changes and land transport, such as with the change in time. The road mileage in China has increased by 4,463,900 km, which is three times higher from the past decade [4]. Besides, China has also improved their express system to prove the connectivity from one city to another and has developed a well-connected super highway network developed by the government's National Trunk Highway Development Programme [5].

It has been identified that the aim of developing the well-connected highway network was to effectively connect the provincial capitals and urban cities of China. Further analysis of China's transportation system and infrastructure reveals that China's national railroad network has also improved over the past two decades. Compared with other developing and developed countries, China's railway system was not modernised enough in the past. However, China's Ministry of Railways has recently accomplished several rounds of transformation and upgrade on the present railway lines that have gradually increased the speed acceleration. The government is also promoting the super-fast rail, which sustains speeds in the existing railway [6]. It is vital that the transport infrastructure of China not only contributes the economic development but also enhances agriculture and human society in the industrial sector. Over the past few years, China has viewed remarkable transport development and has witnessed improved social progress with holistic achievements of only constructed railway and airport terminals.

The innovation of new technology majorly influences the productivity of the transportation industry of China and aims to enhance the innovation aspect of the market revolution. The study has revealed that the improved transportation infrastructure of China has been significantly impacting the infrastructure investment on economic growth. Besides, it has also been identified that as the global economy is becoming more integrated, China is also focusing on arranging cross-border investment to improve the country's transportation infrastructure to decrease cross-border trade obstacles. Between the years 2005 to 2014, the amount of cross-border investment in transportation infrastructure has also grown from US$4.51 billion to US$ 39.5 billion [7]. Studies have revealed that the effects of transport infrastructure in different cities in China have different economic investment levels that highlight the urban ruler's income [8].

Further analysis of the intercity relationship in the transportation network of China reveals that cities like Beijing, Shanghai, Shenzhen, Kunming, Guangzhou and Chengdu have the most flights and trains to other cities and highlight the closest relationship in the railway and air transportation network [9]. These major cities have the most vertical for the significant food in China and as well as to other countries. Additionally, further investigation of China's inter-cities and economic network reveals that the infrastructure and economic development differ depending on the city. China's transportation infrastructure is different based on national, regional and provincial centres, which indicates that the government also invest in the transportation infrastructure in a different city based on the people and economic network.

On the other hand, China government is highly emphasising the construction of urban public transportation infrastructure to minimise the gap for the past few years. The government has pointed out that urban public transportation also requires economic investment to improve traffic conditions and promote sustainable development [3]. While analysing the case of a significant gap in the infrastructure and development of transportation between Central and urban cities of China, it has been evaluated that promoting the coordinated development in the urban public transportation

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infrastructure will ensure a smooth transportation process in urban regions as these cities have a large scale or above public transportation infrastructure, which is not being appropriately functioned.

3. Discussion on Transportation Infrastructure within the Cities

The transportation infrastructure of China has a noteworthy influence on overall social development. Further analysis reveals that the Chinese economy is significantly interlinked with international trade. Due to the advanced transport infrastructure, international trade is significantly improved as goods are being shipped over long distances, effectively increasing the country's overall business opportunities [10]. However, the shipping and logistic cost is high glass effective strategies to minimise the cost and to build a seamless transfer of goods, well, ditties and finished products through different modes of transportation. On the other hand, it has also been identified that multimodal transportation system and logistic network plays a significant role in freight transportation.

On the other hand, studies have also revealed that developing an advanced multi-model transportation system is lagging in China because the country focuses on building a strict hierarchal culture that creates restrictions over jurisdictional boundaries [11]. In this regard, companies face significant challenges in terms of developing an effective multimodal transportation system as it requires cooperation from the government and trade policies to provide freight transportation development through various more such as railways, Airways and water transportation. As a result, China’s logistic cost is significantly higher than other countries because of the high-interest charges in a fish and transportation system and Lindy transaction that leads to higher logistic cost to gross domestic product (GDP).

However, quantifiable direct and indirect costs and benefits, such as financial, eco-friendly, and social, are associated with establishing intermodal transfer hubs and smaller facilities. The Chinese shippers who transport these goods would see savings in shipping costs as a direct result. Besides, because of the development of a modern multimodal transportation system, profitability, market share, and employment could all rise [12]. A comprehensive multimodal transportation system could also provide indirect benefits. In addition to increased employment among those suppliers, these indirect benefits may also include increased business from suppliers of the companies that received the direct benefits of increased production and market share [13]. The increased sales of various Chinese companies to their employees, who receive direct benefits, and to their suppliers may also result in induced benefits. Expanding intermodal transportation facilities may make it possible to transport goods more efficiently from the various provinces to the ports, resulting in lower shipping costs and reduced shipping time. More specifically, the development of the highway network has reduced the truck travel time from 55 to 25 hours on the Beijing to Hong Kong route and from 31 to 14 hours on the Shanghai to Beijing route [14]. Dalsey, Hillblom and Lynn's (DHL) operations in China have enabled the company to shorten the time it takes to transport goods from a warehouse in Beijing to other Chinese markets. Because of the shorter shipping times, businesses in other countries could replenish their inventory more frequently, allowing them to store less inventory.

4. Advantages and Disadvantages of Transportation Infrastructure

4.1. Advantages of Transportation Infrastructure

Further investigation into China as infrastructure development reveals that the transportation infrastructure venture is being considered a vital channel through which the regulatory bodies of China again stabilise the country's overall growth. It has been evaluated that the government of China is majorly focusing on investing a significant amount in the transportation infrastructure of all cities because of its compacted communal product characteristics and enhanced economic balance [15]. However, most of the country's resources for developing transportation structures come from broad-

DOI: 10.54254/2753-7048/8/20230381

based funding resources. Therefore, when the country's economy witnesses an upturn, the government also upsurges the overall economic expenditure and enhances the transportation infrastructure investment to stabilise the overall financial development of the country [16]. Additionally, the significant advantage of enhancing the transportation infrastructure sector is the increased business opportunities in the change in the globalisation market. In the transportation infrastructure development programme, the high-speed tracks play a significant role in terms of allocating the total financial and social expansion in different cities. Besides being a leading service industry, railroad transportation has been considered an excellent channel for improving China's economic efficiency [13]. Therefore, investment in railroad construction in all regional and local cities of China requires an effective and robust strategy for overall development.

The construction of high-speed railroads necessitates significant investment, and high-speed rail transportation possesses quasi-public product characteristics. General businesses struggle to withstand the pressure of investment recovery. Railroad construction funds have been derived from financial allocations and bank loans for a considerable amount of time thanks to institutional characteristics of the railroad industry that unite government and businesses [16]. Due to the intensification of reform, varied investment and funding arrangements have started including domestic loans, special funds, overseas loans, and community financing. China's railroad construction currently relies primarily on domestic bank loans for funding. However, substantial new investment is required for the railroad industry's ongoing growth. Putting much faith in loans from state-owned banks will worsen the financial risk if the investment and financing structure is not optimised [17]. However, to address the issues of lacking contest, low productivity, and funding troubles in the railroad business, presenting outside capital and speeding up the venture change and supporting framework are essential components of railroad industry change.

The significant additional advantage of transportation infrastructure is poverty reduction. Studies have highlighted that poverty is really high due to China's vast population. Transportation infrastructure investment in China has been considered a significant aspect that helps contribute indirectly to poverty reduction by channelling various business opportunities and increasing overall economic growth. Recent empirical studies have also revealed that transportation infrastructure investment helps increase employment and income to minimise long-term poverty reduction. Besides, regarding income poverty, transportation infrastructure provides opportunities for the poor to increase resource productivity [1]. Transportation infrastructure in rural areas makes extension services and higher-priced output markets possible, where agriculture continues to be the primary source of income.

Additionally, when it comes to non-income poverty, transportation infrastructure can also have a direct impact by lowering the cost of services that the poor need and by working well in conjunction with programs that aim to make it easier for people to access health care, education, and other social services [16]. Poor households may also benefit significantly from transportation investments in reducing risks. The same study finds that investments in rural transportation made it easier for people in rural areas to get an education and healthcare services and made them more available. This made the poorer people more likely to participate in these programs. In the event of natural disasters, rural roads also made it easier to deliver emergency aid to the less fortunate.

4.2. Disadvantages of Transportation Infrastructure

Though it has been evaluated that spending on advanced railway construction and the overall transportation system of China can certainly influence the overall finances, employment, and environmental factors. In the advancement of transportation, there is a growing interest in the sustainability aspect. Significant issues such as increased carbon dioxide, nitrogen and harmful gases are affecting human health and causing climate change in the environment because of the excessive

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burning of fossil fuels [17]. The advancement of transportation infrastructure in China is significantly rising. The issue of sustainable development as transportation is leading towards a harmful impact on the environment, affecting human health and ecological integrity. Studies have revealed the raw materials in the construction of transportation. Infrastructure comes from high energy, consuming production sectors causing significant environmental issues [1]. Besides, China's highly developed transportation infrastructure also creates air pollution, including harmful gases, significantly contributing to global warming through carbon dioxide emission [18]. The increased harmful environmental issues are the major disadvantage of the transformed transportation infrastructure. Some studies have also revealed that the transportation system is also being impacted by environmental change. For instance, the aviation sector may witness increased atmospheric turbulence and heat-related degree decisions that will affect the overall aircraft performance because of the changing environmental aspects [19].

Although the Chinese government has effectively witnessed achievement in reducing distances through the development of rapid transportation, it has also contributed to environmental degradation. The environmental effects of transportation development have long been a source of concern. Various domestic and global governments and non-governmental organizations have contributed to the debate by developing their policy prescriptions and action plans in response to the growing recognition of the transport development's environmental impacts [17]. Modern industrial societies, on the one hand, seek economic growth through the open exchange of people, raw materials, energy, and goods and services in a more global marketplace. On the other hand, the transportation systems needed to allow this exchange may be burdening the environment so that natural ecosystems lose their functional integrity and quality to the point where it is difficult to maintain or even achieve sustainability in human societies.

Besides, the primary sector that will be affected by the environmental change is the marine sector, as new shipping routes in China might witness the issue of sea ice melting, and the roads will also be subjected to more freeze in some areas, which might affect the overall business growth in the globalisation process. Besides, more frequent weather extremes in China may also create challenges in the transportation infrastructure by causing ripple effects in the various channels [4]. In this regard, the Chinese government needs to implement new climate policies for national and international businesses to necessitate significant changes in their sustainable business strategy and implement changes in the transportation system that will improve the overall sustainability of the environment. In recent decades, innovation has been regarded as an efficient strategy for addressing environmental issues and ensuring sustainable development in both developed and developing nations. Transportation infrastructure construction has been deemed an essential component of communication between China's various regions and contributes to the overall economy's development, making it a key priority for the Chinese government [5]. However, the increased development in the transportation sector of China is also increasing the issue of carbon dioxide emissions. Further analysis of the transportation infrastructure of China also reveals that China has been experiencing rapid urbanisation over the past few years. Due to the advanced and improved extensive urban transportation infrastructure in the country provides the opportunity for the majority of the population to flow from urban to rural regions. It has been investigated that by the end of 2030, China is also planning to expand their urban and rural transportation infrastructure, which will result in more than 310 million new urban residents, and the overall urban population will increase by 1 billion [14]. Studies have revealed that the massive population movement in the country is also putting huge pressure on the urban transportation system.

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5. Conclusion

The transportation infrastructure refers to a system of public work design to facilitate more moments by investing the capital amount. While analysing the chosen business topic, which was the transportation infrastructure analysis for China, the country has been focusing on enhancing overall transportation for the past few decades. The government of China has been heavily investing in the overall infrastructure development, which indicates that high investment in transportation is bringing financial prosperity to the country and reducing the poverty rate by promoting more employment and facilities to commute from urban to rural areas.

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