

The Influence of Railways on Urban Development Based on a Resource-Based View

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Abstract: As the product of the first Industrial Revolution, the railway has been in existence for a long time and has made an indelible contribution to the urban development of mankind. However, the railway's status is declining in some countries, greatly affected by the development of aviation and road technology. In the academia, there is also a lack of analysis of the urban railway. In order to explore the railway's status in urban sites and extend the literature of the resource-based view (RBV), this paper will discuss the railway's impact especially on the urban sites based on RBV. We choose the city Ganzhou, Jiangxi Province, China, as a case study. Then we compare the data before and after the building of the railway. The comparison is based on the triple bottom line (TBL) principle, which means using three different aspects to show the changes. In the end, we reveal the importance of railway resources and the concrete impact of building a railway on various sites. We also propose some suggestions for building a new railway.

Keywords: resource-based view, urban development, economic growth, railway

1. Introduction

During the development of modern cities, the railway, as necessary transportation, has become an essential resource and undertakes many transportation functions. Cities with railways, even dense railways, have more growth opportunities and better future. However, there is a lack of theoretical analysis of the railways' role in cities, and it is imperative to figure out why the railway is a significant resource in urban development.

Previous academic studies have ever explored the resource-based view (RBV) in the area of market and enterprise analysis and assessment. Researchers who analyzed companies demonstrated the importance of pollution prevention, product stewardship, and clean technologies, which aligns with Hart's conceptualization of sustainability as competitive resources [1]. However, there are limitations in the past RBV theory. It cannot predict the volatility value for firms, resource inheritance and extinction, the impact of vicious competition, and the offset effect of insufficient resources. Therefore, more research on RBV needs to be extended simultaneously [2] and railway, as a dynamic type of resource, will be a great choice for it.

By 2020, over 95% cities with more than one-million population had been covered by high-speed railways [3], which had a significant impact on towns. Up to now, China has built one of the world's largest and densest railway networks. The opening of a high-speed railway helps to promote economic growth and adjust the urban industrial structure by improving transportation accessibility and

promoting the optimal allocation of resource elements [4]. Moreover, the spillover effect of inter-regional economic growth in China has indeed increased, proving that transportation has a growth effect on economic development [5]. However, there is still a lack of resource-based analysis of cities and a lack of theoretical analysis of railway-related resource benefits. As an essential resource, railways represent the significance of transportation and the railway industrial chain. Some railway hubs in China have flourished, some industries are railway equipment manufacturing, and some large cities and their railway development are mutually reinforcing. In this context, this paper aims to analyze the role of railways in different types of cities based on the RBV, and discuss why the railway in a town can be an essential resource and why a town becomes competitive after building the railway. Through urban development and data analysis, this paper intends to explain how railways change a city's industrial structure, and prove the importance of the railway.

The first part of this paper will review the classic literature and discuss the academic development of RBV. Next, the paper will analyze the industrial chain and economic scale of cities with different sizes and types. Then in combination with the railway resource utilization in a city, the paper will review the city development process and analyze how railways change the city's industrial structure. It aims to reach the conclusion that the railway in a town is an important resource. In the end, the limitations of this research and the direction of future research will be summarized and discussed.

2. Literature Review

2.1. The Resource-based View

In this paper, the resource-based view (RBV) will be used to explore the relationship between railways and cities. In 1984, the publication of "A Resource-Based View of the Firm" by Wernerfelt indicated the birth of the RBV [6]. He viewed enterprises from the perspective of resources rather than products, and opened up a new research path. In 1993, Peteraf proposed a generalized model of resources and performance that integrated existing research. Four conditions must be met to increase the advantage in the market: heterogeneity, ex-post limits to competition, imperfect mobility, and ex-ante limitations to match [7]. After another ten years, Barney and Wright put forward several possible research directions by integrating the RBV research in the past ten years, including resources, dynamic capabilities, and knowledge, enterprise management, management buy-outs and venture capital financing, institutional environment and etc. [8]. For example, in corporate governance, Chen and Wang adopted resource-based and strategy-based approaches to study the merger and acquisition performance of Chinese enterprises, which has advantages over previous techniques focusing on unilateral internal factors [9]. However, the RBV lacks research in dynamic perspective [2], such as resources extinction and value fluctuation. The railway, as a transportation resource, can realize the maximum benefit through rational utilization and development.

2.2. City Development and Railways

In the previous literature, scholars generally believe that high-speed railways can improve and strengthen the connection among cities [10-12]. A high-speed railway can reinforce the regional advantages of the original town, attract the aggregation of various economic factors, such as enterprise or employees [13, 14], and promote the rapid development of the service industry [15]. Currently, the research on the contribution of the railway to the city changes to the type of urban industry, the kind of population change, and the type of economic development impact. For example, Tang et al. used the Difference-in-Difference (DID) model to study the influence relationship between the high-speed railway and the spatial aggregation of the service industry. They concluded that the opening of high-speed railways significantly impacted the development of the urban service industry [16]. Alternatively, Jiang and Cai discussed the impact of the high-speed railway on China's urban

industrial structure by combining train frequency, time cost, and employment data with the market potential model proposed by Harris in 1954 [17]. They obtained that opening the high-speed railway enhanced the spillover effect of central cities. In particular, it is distributed around the major cities such as Beijing, Shanghai, and Guangzhou, and the cities on the radiation line are located. As far as the influence of high-speed railway on the city is concerned, this is the hottest research at present. Some other studies focus on the modern history of railway development and urban change, and analyze how a railway affects a city. For example, based on historical data analysis, Hu and Ju concluded that the railway development history in Xi'an was irreplaceable [18]. Nevertheless, they only summarized the surface data, and did not combine with theoretical analysis. This study will explain the positive impact of the railway on cities by referring to materials and literature, and combine the RBV to conclude that the railway is a vital resource.

3. The Influence of Railways on Sustainable Development

Based on the triple bottom line (TBL) principle, this paper will focus on economic development, environmental impact, and social aspects to illustrate the role of railways in urban development.

For medium-sized cities, railways can accelerate economic development, promote population expansion and mobility, and promote the expansion of small and medium-sized cities into large cities. Taking the city Ganzhou as an example, as a famous old revolutionary base area in Jiangxi Province of China, Ganzhou is surrounded by mountains on three sides. Before the emergence of the railway, although Gannan was rich in nonferrous metal mines, forests and water resources, the transportation condition was awful. Under this condition, the transportation cost of industrial products in Ganzhou was usually 30% higher than that in other areas of the province [19]. After the reform and opening up of China in 1978, Ganzhou became an important economic reform zone. The new policies have achieved positive results, but there are still some problems, such as underdeveloped industries, low economic benefits, inadequate funds, a so bad investment environment [20]. According to international experience, investment in municipal public infrastructure should account for 1.44%-3.90% of gross domestic product (GDP) [20]. However, the total investment in 1995 was 3.05 million yuan, accounting for about 1.34% of local GDP, which was much lower than the standard. The opening of the Beijing-Kowloon Railway in 1996 significantly improved the traffic environment of Ganzhou and had great impact on economy, society and environment. For example, it makes the travel to the south easier and regional economic development has been seriously accelerated.

The data show that in 1995, the total GDP of Ganzhou was 16.182 billion yuan, while the population was 7.655 million. In 2005, the total GDP reached 50.031 billion yuan, and the population increased to 8.524 million [21]. The development of the secondary industry and the tertiary industry was particularly remarkable with the GDP of the secondary industry 4.884 billion yuan, and that of the tertiary industry 4.123 billion yuan. In 2004, the figures were 12.967 billion yuan and 15.108 billion yuan respectively. The secondary and tertiary industries increased by about 15% compared to 2003 [22]. For the secondary industry, the light industries developed rapidly, especially in terms of output value. It increased from 469.87 million yuan in 1995 to 846.81 million yuan in 1998, and to 9144.75 million yuan in 2001. It showed that the opening of the Beijing-Kowloon Railway had driven the growth of Ganzhou's population and GDP, and accelerated the development of secondary and tertiary industries [23].

In addition, the Beijing-Kowloon Railway also changed Ganzhou's industrial structure. The tourism industry began to develop rapidly and occupied an increasingly important position in the city. Studies show that when economic development enters the stage of urban promotion, the added value of the tertiary industry in the city should be twice that of the secondary industry. Before the construction of the railway, the added value of the tertiary industry in Ganzhou was 1,13809 million yuan, and the ratio of the tertiary industry to the secondary industry was 0.86:1 [24]. Seven years after

the railway coming into service, the tourism revenue of Jiangxi Province in 2003 was four times that in 1996. In 2002, Ganzhou received 5.22 million domestic and foreign tourists, and the total tourism income accounted for 6% of the city's GDP, which played an essential role in the city's tertiary industry [25]. From 1990 to 2004, the proportion of secondary and tertiary industries in the GDP increased yearly. It is sufficient to prove that the opening of this railway drives the economic development of Ganzhou, and has a particular impact on the industrial structure.

From the perspective of environment, the opening of the Beijing-Kowloon Railway also has some effects. On one hand, the railway has a specific impact on the per capita green area and forest area of the region. On the other hand, the forest area of the region shows a trend of decreasing and then increasing. Taking 0-500 meters above sea level as an example, the specific data of the land coverage area of objects are shown in the Table 1.

According to statistics, from 1990 to 1995, the increase in artificial surface area was only 23%. However, from 1995 to 2000, the first five years of railway operation, the increase of artificial surface area reached 100%. Since then, the artificial surface area has kept increasing. The area of bare land also increased by 94%, followed by a massive expansion. At the same time, the ecological disturbance was the most serious during these five years. The area of forests fell by 1,500 square kilometers, the highest between 1990 and 2014. However, the agricultural population moved out from village with economic development, and the government promoted the policy of returning farmland to the forest. From 2000 to 2013, the number of people engaged in primary industries of agriculture, forestry, animal husbandry, and fishery decreased by 454,000 [27], resulting in a downward trend in the cultivated land area since 1995 and a gradual slowdown in the shrinking rate of the woodland area. It can be concluded that the city's new railway makes urban land area expand and destroys the natural environment to a certain extent. However, after some time, the increase in economic strength can provide financial support for environmental protection. The agricultural population decline can lead to more land for forests and thus facilitate ecological environment protection.

Table 1: Classification of land cover features in Ganzhou [26].

	forest	Grass land	Plowed land	Bare land	water	Artificial land
2014	31150.05	2871.21	3772.02	378.77	559.41	834.03
2009	31197.46	3468.31	3518.69	265.52	383.07	740.26
2004	31630.98	2602.85	4032.39	312.06	404.18	582.29
2000	30846.55	3766.05	4082.22	127.71	339.16	403.24
1995	32347.09	2161.09	4488.82	65.71	299.16	203.30
1990	33027.76	2449.78	3533.97	74.42	314.49	164.75

From the perspective of society, opening this railway has led to an increase in population of Ganzhou and the flow of surplus labor of the surrounding countryside. The worse natural territory and traffic conditions made the farmers hard to leave for the cities, and the railway addressed the problem. In 2001, there were more than 1.1 million migrant workers in Ganzhou, and the income of migrant labor services reached 6 billion yuan [23]. Population changes also have impacts on the level of urbanization. From 1996 to 2001, more than 20 small towns were built and renovated in Ganzhou, absorbing more than 100,000 agricultural population. In 2002, the urbanization level of Ganzhou reached 18.2% (according to China Urban Statistical Yearbook). In addition to the changes in population and urbanization, the average income of residents also increased significantly. The average wage of employees rose from 3,775 yuan in 1995 to 10,323 yuan in 2004. Furthermore, per capita savings deposits increased from 981 yuan in 1995 to 3,868 yuan in 2004. Meanwhile, the

consumer price index (CPI) did not change so much. It rose by 1.16% from 1995 to 2004 per year [22], which indicates that the railway has improved residents' living standards.

4. Policy Recommendation

Firstly, the railway has played a significant role in urban development, especially in recent years. The opening of the high-speed railway has changed the traditional regional economic connection mode and reshaped the regional economic space. For areas with underdeveloped transportation or areas lacking high-speed railway resources, the state should support or invest in building lines, and try to carry out the regional railway network construction or rail-related supporting facilities.

Secondly, the development of the railway will have a specific impact on the surrounding environment. The railway itself inevitably destroys the natural environment. With the economic benefits in the secondary and tertiary industries increasing, the increasing industrial output will also damage the environment. The urban expansion caused by the population growth due to the opening of railways will also exacerbate the environmental damage problem. City planners need to reasonably plan railway lines, and set boundaries and urban development to reduce new lines detrimental to the natural environment. For example, there are several nature reserves along the Qinghai-Tibet railway and designers tried to build the railway away from them. For the areas that cannot be avoided with built-in natural resources, designers chose to increase the number of bridges and introduced the ecological corridors for wild animals [28]. Noise impacts should also be considered in intra-city railways.

At the same time, abandoned railways in or around cities should also play a role. With cities' continuous expansion and transformation, and the upgrading of urban functions due to the urbanization process accelerating, these railways have hurt the urban landscape, traffic, land use, and urban vitality [29]. However, some of them can positively be utilized rationally. For example, the Qinghuayuan Station of the Beijing-Zhangjiakou Railway was not dismantled along with the line but retained as a cultural heritage, and a small museum to tell visitors about its history [30]. It is meaningful because the station represents the first railway built, which was designed by a Chinese engineer.

Finally, railway construction needs to consider the relevant economic benefits and social benefits, etc. If a site already had a railway, it is necessary to consider the upgrading or another construction of memorable railway lines in combination with other transportation modes. Railways play a significant role in Ganzhou because the region has great potential, such as rich ore resources, scarce earth minerals, and a large labor force, which can bring great economic and social benefits as it is located close to the economically developed areas of the Pearl River Delta. It is important to consider the income level of residents and whether the intensity of passengers flowing along the line can support the standard lines [31]. If the passenger flowing along the line or the income level of residents is not enough, the high-speed railway will be a waste. As the construction of high-speed railway requires an enormous amount of money, unprofitable lines will make it harder for local governments or railway companies to repay their debts, which will hurt economic development. The better the local economic level, the more actively the volume of guaranteed projects can guide the local construction. Blind local construction should be avoided to reduce funds waste and project failure [32].

5. Summary

In 1814, Stephenson successfully built the first steam-powered locomotive. And in 1825, the first commercial railway was put into operation. Two hundred years later, the railway was becoming more and more important, especially for urban development. Today, railways contribute to people'

wellbeing and become irreplaceable in urban development. Based on the support of RBV theory, it is obviously that the railway plays an important role in urban development. For some cities in developing countries, railway construction can have a positive impact by promoting urban economic development, population growth, industrial results change and so on. In recent years, due to the impact of the COVID-19 epidemic, the global economy has been sluggish, and some local economies are experiencing negative growth. Through the discussion of this paper, it is concluded that the city can rationally use or develop railway resources to promote development. And at meanwhile, the integration of resources could also be under consideration. That is, the environmental objectives are of equal importance as the economic objectives for further sustainable development.

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