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Research on the development of rail transit industry in second-tier cities in China

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Abstract

China's second-tier urban rail transit industry is in a stage of rapid development. With the acceleration of urbanization and the growth of population size, second-tier cities have an increasingly urgent need for efficient and convenient transportation systems. The purpose of this study is to explore the development status, challenges and future trends of rail transit industry in China's second-tier cities. Through the collection and analysis of relevant data, it is found that the second-tier urban rail transit industry has great development potential in technological innovation, capital investment, market demand and other aspects. However, due to various restrictions and challenges in urban planning, financing, operation and management, the rail transit industry in second-tier cities is also facing many difficulties. In the future, with the support of government policies and the improvement of market mechanism, it is expected that the rail transit industry in second-tier cities will usher in a broader space for development, provide more convenient and efficient solutions for urban transportation, and promote the sustainable development of urban economy and society.

Keywords

Second-tier cities, rail transit, industrial development, challenges, policy support.

1. Introduction

The development of rail transit industry in China's second-tier cities is of great significance and far-reaching influence. First of all, with the continuous advancement of urbanization and the continuous growth of population size, second-tier cities are faced with increasingly serious traffic congestion and environmental pollution problems, so the development of rail transit has become an important way to solve the urban traffic problems. Secondly, the development of rail transit industry can promote the promotion of urban economy and the sustainable development of society. Rail transit construction requires a large amount of investment and labor, which can drive the development of related industrial chains, create job opportunities and improve residents' living standards. At the same time, the operation of rail transit can also reduce vehicle exhaust emissions and improve urban air quality, which is conducive to building an ecologically civilized city. In addition, the development of the rail transit industry in second-tier cities also helps promote scientific and technological innovation and industrial upgrading. The introduction of advanced technology and management experience will improve the safety, comfort and intelligence level of the rail transit system, promote the development of related industries in the high-end and intelligent direction, and enhance the competitiveness of the domestic rail transit industry in the international market. In short, in-depth research on the development status of China's second-tier urban rail transit industry, the challenges faced and the future development trend will help to better understand and grasp the law of urban transportation development, provide a scientific basis for government decision-making, promote the sustainable development of urban transportation, and promote the overall progress of urban economy and society.

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2. Challenges faced by the rail transit industry in second-tier cities

2.1. Urban planning and land resource constraints

Urban planning and land resource constraints are important factors in the challenges faced by the rail transit industry in second-tier cities.

First of all, urban planning is not scientific and reasonable enough: the planning and construction of some second-tier cities are lagging behind, one-sided or excessive pursuit of economic growth, and the future development direction and rail transit line layout planning are not scientific and reasonable enough, resulting in the need for revision or reconstruction of rail transit construction. Secondly, the shortage of land resources: the land resources of second-tier cities are limited, and the urban expansion is limited by geographical and natural conditions. The construction of urban rail transit requires a large amount of land resources for line laying and station construction, but is limited by land supply, resulting in the shortage of land resources for the construction of rail transit. Secondly, land acquisition is difficult: due to the complexity of urban land ownership and use rights, the process of land acquisition may be hindered by demolition compensation, legal procedures, etc., resulting in the delay of the progress of rail transit construction, increasing the risk and cost of the project. Finally, environmental protection and ecological considerations: the construction of urban rail transit often requires a large area of land and may involve some sensitive areas such as ecological protection areas and farmland. Therefore, environmental protection and ecological protection factors need to be considered in the process of land acquisition and use, which also increases the complexity and cost of the project.

To sum up, unreasonable urban planning and land resource restrictions have led to the second-tier urban rail transit industry facing many challenges in planning, land acquisition, construction and other aspects. It is necessary for the government, enterprises and all sectors of society to work together to overcome these difficulties and promote the healthy and sustainable development of the rail transit industry through reasonable planning, scientific management and other means.

2.2. Insufficient fund raising and financial support

Insufficient financing and financial support are important reasons for the challenges faced by the rail transit industry in second-tier cities.

First of all, huge capital demand: rail transit construction requires a large amount of capital investment, including line construction, vehicle procurement, station construction, equipment purchase, operation management and other aspects of the cost, the capital demand is huge. Secondly, the source of funds is limited: due to the economic strength and financial revenue of second-tier cities compared with first-tier cities, the financial revenue of local governments mainly depends on tax revenue and land transfer revenue, but due to the restrictions of economic development level and land resources, the financial revenue is relatively low, which can not meet the huge capital demand of rail transit construction. Secondly, it is difficult to raise funds: As rail transit construction is a long-term, high-risk and high-investment infrastructure project, it needs coordination and cooperation between different regions, departments and stakeholders. The process of raising funds will be affected by various factors such as policies, laws and markets, making it more difficult. Then there is the long-term investment return cycle: rail transit construction is a long-term investment, its economic and social benefits take a long time to appear, so it needs sufficient financial support and continuous capital investment, but there is a certain difficulty in financing. Finally, financial pressure and restrictions: the financial expenditure of second-tier cities is faced with many pressures and restrictions, including the basic people's livelihood security, urban infrastructure construction, environmental protection

and other aspects of the expenditure needs, rail transit construction often needs to compete with other aspects of the expenditure, resulting in insufficient capital investment.

To sum up, insufficient funding and financial support is one of the challenges facing the rail transit industry in second-tier cities, which requires the joint efforts of the government, enterprises and all sectors of society to raise funds through various channels, increase financial support, and promote the healthy and sustainable development of the rail transit industry.

2.3. Operational management and technical problems

Operation management and technical problems are important reasons for the challenges faced by the rail transit industry in second-tier cities.

First of all, insufficient experience in operation and management: Compared with first-tier cities, the rail transit system in second-tier cities is usually relatively young and lacks experience in operation and management. In the daily operation and management, there may be problems in passenger flow management, vehicle operation and maintenance, safety management, etc., which require rich experience and effective management mechanism to deal with. Secondly, the technical level and talent reserve are insufficient: the rail transit industry involves many fields of technology, including track construction, vehicle manufacturing, signal control, station design, etc., which requires a high level of technical and professional talents. However, second-tier cities may not be able to reach the level of first-tier cities due to limitations in technical conditions and talent reserves, thus facing technical difficulties. Then there is the difficulty of equipment updating and maintenance: the equipment updating and maintenance of rail transit systems is a continuous and important work, which requires a lot of manpower, material and financial resources. However, due to the limitations of financial support and technical conditions in second-tier cities, it may lead to difficulties in equipment updating and maintenance, affecting the normal operation of rail transit systems. Secondly, the overall planning and management is imperfect: the rail transit system in second-tier cities is often built at a relatively late stage of urban development, and there may be incomplete planning and unreasonable layout. In the process of operation and management, there may be problems such as line congestion and unbalanced passenger flow, and the overall planning and management need to be strengthened. Finally, the application and innovation ability of new technologies is insufficient: with the continuous progress of science and technology, the rail transit industry is also constantly introducing new technologies, such as automatic driving technology and intelligent scheduling system. However, second-tier cities may face the challenge of insufficient application of new technologies and innovation capabilities due to their relatively weak technological base and innovation capabilities.

To sum up, operation management and technical problems are one of the challenges facing the rail transit industry in second-tier cities, which requires the joint efforts of the government, enterprises and all sectors of society to strengthen the accumulation of operation management experience, improve the technical level and talent reserve, strengthen equipment renewal and maintenance, improve the overall planning and management, and promote the application and innovation ability of new technologies. To promote the healthy and sustainable development of the rail transit industry.

2.4. Competition and cooperation

First, with the acceleration of urbanization and population growth, there is an increasing demand for rail transit in second-tier cities. However, at the same time, many second-tier cities are actively planning and building rail transit systems, leading to fierce competition in the market. Each city wants to build a high-quality rail transit network to attract more investment and talent, further intensifying the competitive situation.

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Secondly, the coexistence of cooperation and competition is an important feature of the development of the rail transit industry. In second-tier cities, the relationship is particularly complicated. On the one hand, cities need to cooperate to jointly promote the advancement and standardization of rail transit technology for more efficient and safer operations. On the other hand, due to limited resources, there will also be competition among cities for resources such as capital, technology and talent to upgrade their own rail transit systems.

In addition, second-tier cities also face competition with other modes of transportation in the development of the rail transit industry. For example, road traffic, air transportation and others are all competing for market share. Therefore, second-tier cities need to find a balance between rail transit and other modes of transportation to achieve sustainable development of urban transportation.

To sum up, the competition and cooperative relationship analysis challenges facing the rail transit industry in second-tier cities are complex and diverse. Cities need to seek development through cooperation and maintain an edge in competition to achieve sustainable and healthy development of the rail transit industry.

3. Future development prospects of the rail transit industry in second-tier cities

3.1. Continuous expansion of scale and network development

The reason why the continuous expansion of scale and network development have become an important aspect of the future development prospects of the second-tier urban rail transit industry.

First of all, the acceleration of urbanization has promoted the continuous expansion of urban scale. With the population gathering in cities and the expansion of urban space, the demand for efficient and convenient public transport systems is also increasing. As a large-capacity and high-efficiency public transportation mode, rail transit can meet the growing traffic demand of the city and alleviate traffic congestion. Therefore, the scale of the rail transit industry in second-tier cities will continue to expand to meet the growing traffic demand. Secondly, network development is the key to improving the operational efficiency and service level of the rail transit system. Through the effective connection of different lines and different modes of transportation, a complete rail transit network can be formed, which can realize seamless transfer of passengers within the city and improve travel efficiency. At the same time, the development of network will also help optimize the layout of urban transportation and promote the reasonable adjustment of urban spatial structure. For second-tier cities, the construction of a sound rail transit network helps to enhance the competitiveness and attractiveness of the city's transportation, and promote the rapid development of the city's economy and society. In addition, with the continuous progress of technology and deepening of application, the level of intelligence and automation of the rail transit system will continue to improve. This will help further improve the operational efficiency and service quality of the rail transit system and meet the increasingly diversified travel needs of passengers. Meanwhile, an intelligent and automated rail transit system will also help reduce operating costs and improve the economic benefits of the industry. Finally, policy support and market demand are also important factors to promote the continuous expansion and network development of the rail transit industry in second-tier cities. The government's strong support and investment for the rail transit industry has provided a strong guarantee for the development of the industry. At the same time, with the continuous development of urban economy and the continuous growth of population, the demand for rail transit will continue to be strong, providing a broad market space for the development of the industry.

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In summary, the continuous expansion of scale and network development are important aspects of the future development prospects of the second-tier urban rail transit industry. By continuously expanding the industrial scale, building a sound rail transit network, and improving the technical level and service quality, the rail transit industry in second-tier cities will usher in broader development prospects.

3.2. Technological innovation and intelligent upgrading

Technological innovation and intelligent improvement are important aspects of the future development prospects of the second-tier urban rail transit industry.

First of all, technological innovation is the key driving force to promote the sustainable development of the rail transit industry. With the continuous progress of science and technology, new technologies continue to emerge, providing unlimited possibilities for the development of the rail transit industry. For example, the application of new materials and new processes can improve the performance and safety of rail transit vehicles; The introduction of new energy technologies can reduce dependence on fossil fuels and reduce operating costs; And the development of intelligent transportation systems can improve operational efficiency and service quality. These technological innovations will continuously push the rail transit industry in second-tier cities to a higher level. Secondly, intelligent upgrading is an important trend in the development of the rail transit industry. With the rapid development of artificial intelligence, big data, cloud computing and other technologies, the rail transit system is gradually realizing intelligence. Through intelligent technology, real-time monitoring and intelligent scheduling of various links such as rail transit vehicles, signal systems and operation management can be realized, and operational efficiency and management level can be improved. At the same time, intelligent technology can also improve the passenger experience and provide more convenient and comfortable travel services. In addition, technological innovation and intelligent upgrading are also important means for the rail transit industry in second-tier cities to cope with challenges. With the continuous expansion of the urban scale and the growing traffic demand, the rail transit system is facing increasing pressure. Through technological innovation and intelligent promotion, the layout and operation mode of the rail transit system can be optimized, the carrying capacity and operation efficiency of the system can be improved, and the travel needs of citizens can be better met. Finally, technological innovation and intelligent promotion are also the key to improving the competitiveness of the rail transit industry in second-tier cities. In the context of globalization, the rail transit industry is facing fierce international competition. Through technological innovation and intelligent upgrading, the technical level and innovation ability of the rail transit industry in second-tier cities can be improved, and its competitiveness in the international market can be enhanced.

To sum up, technological innovation and intelligent promotion are important aspects of the future development prospects of the second-tier urban rail transit industry. Through continuous innovation and upgrading of the level of intelligence, the rail transit industry in second-tier cities will achieve higher quality development and make greater contributions to the sustainable development of the city.

3.3. Regional cooperation and industrial synergy

The reason why regional cooperation and industrial synergy are regarded as an important prospect for the future development of the rail transit industry in second-tier cities is mainly based on the following reasons.

First, regional cooperation helps to promote resource sharing and complementarity. In the rail transit industry, different cities may have different advantages such as technology, capital and talent. Through regional cooperation, these cities can jointly share resources and complement each other's advantages, thereby improving the development level of the rail transit industry

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in the whole region. For example, some cities may have advantages in rail vehicle manufacturing, while others may be experienced in rail transit operation management. Through cooperation, these cities can learn from and learn from each other and jointly enhance the competitiveness of the rail transit industry. Second, industrial synergy helps to form a close industrial chain and value chain. In the rail transit industry, vehicle manufacturing, rail construction, operation management and other links are involved. Through industrial collaboration, these links can form a close industrial chain to achieve efficient collaboration and optimal allocation of resources. This can not only reduce production costs and improve production efficiency, but also promote technological innovation and industrial upgrading. At the same time, industrial synergy can also promote the development of related industries, form an industrial cluster effect, and further enhance the competitiveness of the entire industry. Moreover, regional cooperation and industrial synergy can help promote market expansion and brand building. Through regional cooperation, second-tier cities can jointly explore the rail transit market and expand their market share. At the same time, through industrial synergy, these cities can jointly build rail transit brands with local characteristics and enhance the visibility and influence of the entire industry. This will help attract more investment and talent and promote the sustainable development of the rail transit industry. Finally, regional cooperation and industrial synergy are also important means to deal with challenges and risks. With the intensification of market competition and the continuous updating of technology, the rail transit industry is faced with many challenges and risks. Through regional cooperation and industrial synergy, second-tier cities can jointly deal with these challenges and risks and improve the anti-risk ability of the entire industry. For example, faced with the pressure of technological upgrading, different cities can jointly research and develop new technologies and products to achieve technological upgrading and industrial transformation.

To sum up, regional cooperation and industrial synergy can help promote resource sharing, form a close industrial chain and value chain, promote market expansion and brand building, and cope with challenges and risks, so it is regarded as an important prospect for the future development of the rail transit industry in second-tier cities.

3.4. Green environmental protection and sustainable development

The reason why green environmental protection and sustainable development are important factors for the future development prospects of the rail transit industry in second-tier cities is mainly based on the following reasons:

First of all, with the increasingly serious global environmental problems, green environmental protection has become a global consensus. In the rail transit industry, achieving green environmental protection not only means reducing environmental pollution, but also involves improving energy efficiency and optimizing resource utilization. By adopting clean energy, energy-saving technologies and environmentally friendly materials in rail transit construction, second-tier cities can effectively reduce carbon emissions, reduce the negative impact on the environment and promote the green development of the city. Secondly, sustainable development is the key to the long-term and healthy development of the rail transit industry. Sustainable development emphasizes the balanced development of economy, society and environment. As an important part of urban infrastructure, the sustainable development of the rail transit industry is of great significance to the overall development of the city. In the rail transit industry, second-tier cities can realize the coordinated development of economy, society and environment by optimizing planning, improving operational efficiency and strengthening safety management, providing strong support for the sustainable development of cities. In addition, green environmental protection and sustainable development are also the key to improving the competitiveness of the rail transit industry in second-tier cities. As the country continues to attach greater importance to environmental protection and sustainable

development, the green rail transit industry will have greater market potential and development space. By actively promoting green environmental protection and sustainable development, second-tier cities can attract more investment and talents, enhance the innovation capacity and competitiveness of the rail transit industry, and inject new impetus into the city's economic development. Finally, green environmental protection and sustainable development are also an inevitable requirement to meet people's ever-growing needs for a better life. With the improvement of people's living standards, the requirements for environmental quality and transportation are getting higher and higher. By building green, environmentally friendly and efficient rail transit systems, second-tier cities can meet people's demand for convenient, comfortable and safe travel, and improve urban livability and happiness.

4. Conclusion

To sum up, green environmental protection and sustainable development are important factors for the future development prospects of the rail transit industry in second-tier cities, which will help promote the green development of cities, enhance industrial competitiveness, and meet the needs of people for a better life. Second-tier cities should actively respond to the national environmental protection and sustainable development policies, strengthen technological research and development and innovation, and promote the green transformation and upgrading of the rail transit industry.

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