Analysis of the impact of public transport on the city
Taking the current situation of public transport in Jinan as an example

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Abstract—The development of public transport will have an important impact on the survival and development of the city. The deterioration of the traffic situation will lead to urban problems, such as energy waste, environmental pollution, urban development lag. In some areas, the priority development strategy of public transport has been adopted and adhered to for a long time. Not only can the rapid economic development, land and energy resources be effectively utilized, but the ecological environment is also protected from damage, and the strategic decision of sustainable development is implemented.

This paper takes the most representative bus in urban public transport as an example for analysis. Taking the current situation of public transport in Jinan as the breakthrough point, this paper discusses the impact of public transport on the development of Jinan, and discusses the direction of improvement. At the same time, this paper puts forward some views on how to develop urban public transport in Jinan and how to realize the direction of building a central city in the Yellow River Basin.

1. TRAFFIC SITUATION

With the continuous improvement of living standards, people's choice of means of transportation is gradually not dominant. As far as convenience is concerned, most people prefer electric cars and private cars when they choose to travel. The number of people who choose to take bus or walk is significantly reduced, resulting in a large number of road vehicles, increasing the urban traffic pressure.

The existing road traffic capacity of Jinan City is weak, especially in the old city. Many urban roads are out of shape in the original streets, and the urban traffic capacity is far from meeting the demand. According to the investigation on the traffic congestion in Jinan, the vast majority of people in Jinan often encounter traffic congestion. At present, Jinan has not yet formed a reasonable and feasible urban traffic system, which often leads to the phenomenon that where the congestion occurs, the regulation is arbitrary, and the traffic management and traffic rules can not be effectively implemented. In addition, pedestrians and non motor vehicles will "drill empty" at will, which will affect the normal operation of vehicles, making the congestion more serious.
2. **Influence of Existing Traffic Conditions on the Development of Jinan**

2.1. *Population density leads to excessive bearing pressure*
Urban traffic congestion will lead to obstacles in the connection between urban functional areas. In terms of reducing the economic cost and time cost of travel, it is the first choice for people to live near the workplace or school to shorten the daily commuting time. Local excellent medical and educational resources and enterprises are mostly concentrated in the old urban areas, which attracts many citizens to live in the old urban areas. [2] The volume of Jinan old city is limited, and the road bearing capacity is low. The huge population pressure will inevitably lead to traffic congestion, resulting in a vicious circle. It hinders the development of the city in time and space.

2.2. *Waste of resources and energy*
In order to reduce the pressure of urban traffic, it is necessary to expand roads, which will directly lead to the waste of land resources. Road expansion consumes a lot of manpower, material and financial resources, which will cause waste of resources. Traffic congestion leads to the vehicle staying on the road for a long time, which inevitably leads to the waste of energy such as gasoline. It is understood that among the key construction projects in Jinan in 2019, 25 projects are traffic engineering projects. In terms of the process of large cities, this is the necessity of urban development, but to some extent, it also reflects the waste of resources caused by the unreasonable development of cities.

3. **The Importance of Improving Public Transport**

3.1. *Enhance the ability of urban sustainable development*
Traffic accessibility is one of the comprehensive urban capacities of national central cities. From the perspective of the history of urban development, in terms of transportation, only by attaching importance to and developing urban public transport can the city really have sustainable development power. According to big data analysis, the road area occupied by 50 cars is 23.75 times that of a bus; the transport capacity of a bus is about 60 times that of a car; from the perspective of lane separation efficiency, the bus is 1.6 times of that of a car; and the exhaust emission of cars is about 35 times that of a bus, as shown in Picture 1. [3]

![Figure 1. Comparison between private cars and buses](image)

Therefore, bus priority is the right way of urban traffic development. Jinan realized this ten years ago. Since October 2012, Jinan has established the strategic goal of developing "transit city". Since then, Jinan's urban public transport has been vigorously developed. By October 2019, Jinan's bus routes will increase from 209 to 350, more than 500 customized buses will be opened, and 30 BRT free transfer lines will be opened; the public transport capacity will be significantly improved, and the charm of public transport will be greatly increased; the public transport share rate in the central urban area will reach 54.25%, 10% higher than that in 2013; the satisfaction degree of public transport will reach 85.58%. [4] Compared with 72.77% in the initial stage, as shown in Chart 1, it increased by 12.81%... Jinan has made some achievements in improving public transportation, but it still needs efforts, which is the inevitable guarantee for Jinan to become a central city in the Yellow River Basin.
3.2. Increase the attractiveness of the city
What is the attraction of talents to the development of cities? With the improvement of urban traffic conditions, urban environmental pollution will also be improved, which can improve the livability of the city. When people travel in the city, the cost becomes lower, the efficiency becomes higher, and the accessibility is enhanced, which can increase the attraction of the city to a certain extent. The inflow of urban population can stimulate urban activity to a great extent. A city with vitality is a basic standard for becoming a national central city. At the same time, talent is the productivity and the driving force of urban economic development. The influx of talents will inevitably make the city have the ability of scientific and technological innovation, promote the redevelopment of Jinan's economic and cultural center function, and make it more central in the whole country. The development of the city is bound to bring a lot of opportunities. For talents, the city has a new attraction, which ensures the persistence of talents in Jinan.

3.3. Maintain the balance between the inside and outside of the city
To promote the balanced distribution of population has a regulatory effect on the market economy, so as to rationalize the pace of economic development. The urban public transportation is smooth, the citizens travel conveniently, and the population living is not easy to concentrate. The scattered residence of population will have a certain regulatory effect on the market. For example, the real estate enterprises and the supply enterprises of living commodities will not develop too fast or too slowly, and the development of urban economy will enter the most reasonable development rhythm, which is the guarantee of the sustainable development of the city.

On the other hand, we should strengthen the connection with the surrounding cities and strengthen the radiation and leading role of Jinan. Jinan, as the capital city of Shandong Province, is connected with other cities around by highways in all directions. However, it is not enough to rely on the development of expressways, and the internal traffic of the city is also an important part of the impact.

3.4. Promote the prosperity and development of urban economy
Marx believed that all economy is time economy, and all saving is time saving. The healthy development of urban public transport will inevitably bring many opportunities. Taking express delivery industry as an example, the smooth urban traffic will inevitably improve the work efficiency of enterprises, which not only saves the economic cost, but also saves the time cost, and reduces the inventory cost. In this way, the economic income of enterprises will be improved. At the same time, because of the high efficiency of enterprise work, it attracts a large number of customers and ensures the supply of goods. Jinan launched the "zero hour bus" to build a "well" and "meter" night service network, known as a night food map by the public. "Zero hour bus" makes it easier for citizens to travel at night, promotes the prosperity of night life and directly drives the economic development of the city. [5] The improvement and development of public transport is a shot in the arm for the urban economy. Developed transportation is the guarantee for the development of all enterprises, which has been a social consensus, and Jinan should also follow this law.
3.5. Ensuring the status of Jinan as a transportation hub

With the development of public transportation, the circulation of airport and EMU station will be improved. The comfort and convenience of public transportation will promote the rapid inflow and outflow of the city. This will promote and protect Jinan's position as a national transportation hub. As a transportation hub, a city can bring the "corridor economy" effect of the transportation corridor and the "hub economy" effect of the hub city itself, and can more effectively promote the radiation and flow of personnel, capital, information, technology and advanced ideas from the hub city to the surrounding small cities, small towns and rural areas. Jinan has been a transportation hub since ancient times. The new strategic goal of urban development puts forward higher requirements for its hub function. Smooth urban public transportation is one of the basic guarantees. Especially in recent years, the continuous construction of Intercity Railway in Shandong Province has greatly shortened the time distance between Jinan and the surrounding cities, making the communication between Jinan and surrounding cities intensive. If the external traffic is smooth, there must be a matching traffic environment inside the city. Otherwise, the close relationship between Jinan and the surrounding cities and other central cities in the Yellow River Basin will not play a maximum role.

4. THE DIRECTION OF IMPROVING AND DEVELOPING PUBLIC TRANSPORTATION IN JINAN

4.1. Establish the innovative concept of urban public transport development

In order to build Jinan into a national central city in the Yellow River Basin, we should learn from the advanced practices of some cities at home and abroad, and establish the advanced concept of developing public transportation. Such as the establishment of public transport priority "bus system", public transport oriented "TOD" mode. Under the guidance of advanced concepts, Jinan can keep up with the pace of international development, correct the shortcomings of the current urban bus development, truly improve the public transport system, and make the development of the city truly sustainable.

4.2. Optimizing the bus route network pertinently

It has become a consensus to vigorously develop urban public transport, but there is a strange phenomenon when Jinan promotes this project: the road is wider and wider, but the speed of the bus is getting slower and slower. The average speed of Jinan bus has decreased from 18.3km/h to 13.8km/h in the past five years. The slow speed has become an important factor that most people do not choose to take bus.[6] This phenomenon also tells us that simply widening the road can not fundamentally solve the congestion problem in Jinan. In the development process of each city, the root causes of the same problems may not be the same. To solve the problems of Jinan, we can only analyze the reasons of Jinan itself. At present, there are three main problems in Jinan's public transport network: unreasonable bus stops, too few bus stations and seriously uneven distribution of suburban line network. Only by solving the city's own problems can we really solve the urban traffic problems. In the setting of bus stops, the bus lines in most sections are relatively dense, which is easy to form bus trainning and cause long delay at the bus stops.[7] In this regard, the relevant people proposed that the right side of the road should be widened to form a multi-channel bus stop, allowing multi-line buses to enter the station at the same time. The bus station is the key node of bus parking and scheduling, passengers getting up and down and transfer. The lack of bus station also brings inconvenience to the majority of passengers. Jinan west railway station is unevenly distributed, most of which are located in the periphery of the city.[6] In order to solve this problem, Jinan should learn advanced ideas, combine the above ground and underground space, and pay attention to comprehensive development and three-dimensional development.

At present, the density of public transport network in Jinan is only 1.2km per square kilometer. According to the relevant requirements, the density of public transport network should be 3-4 km / km2. Jinan still has a lot of work to do in improving the capacity of public transport and encrypting the road network.[8]
4.3. Develop various forms of three-dimensional public transport

Developing various forms of public transport is a feasible means to improve the utilization rate of public transport. For example, Jinan, in addition to the ground bus, has been developing BRT bus. At the same time, despite the disadvantages of "Spring City", it has also been developing underground rail, and several lines have been completed and opened to traffic. Through the joint development of rail transit and road public transport, the development vitality of buses is increased. However, due to its special geographical conditions, the prospect of rail transit is not optimistic, and the development of ground bus is the top priority.

4.4. Improve service level

In order to attract citizens to take buses, preferential policies should be implemented and customized public transportation and smart public transportation should be developed. Jinan bus company carries out preferential cards, commemorative cards and other activities, so that citizens feel the economic benefits of taking buses. The development of "customized bus" and "smart bus" service has increased the bus's rapidity and convenience. "Customized bus" is a one-stop direct urban bus from residential area to destination. [9] Citizens can submit travel demands through the wechat app of "Jinan bus customized bus", and the line can be opened when the number of people reaches the standard in the same direction and at the same time. "Smart bus" provides citizens with intelligent data such as whether the vehicle is leaving or not and the arrival time of the vehicle, which facilitates the reasonable arrangement of travel time.

5. CONCLUSION

From the history of urban development, such as New York, Beijing and other cities, urban transportation first adopted the method of encouraging automobile traffic, which led to traffic deterioration. In turn, urban public transport was developed and car traffic was suppressed. Although the traffic situation was improved to a certain extent, the resulting problems such as energy waste and environmental pollution were very serious. Now, Jinan's urban transportation development has entered a critical period, so it is necessary to turn the priority of public transportation into the only choice for citizens. Form a convenient and reliable bus travel environment, so that we can better choose public transport travel. The improvement and development of urban public transport will certainly bring new urban vitality to Jinan, and will play an indispensable role in the process of building Jinan into a national central city in the Yellow River Basin.

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