

A Research on the Coordinated Development of the Transportation System and Socio-economy in the Guanzhong Plain Urban Agglomeration of China

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Abstract: Transportation plays an important role in the coordinated development of urban agglomeration economy and society. It is an important tool to improve the level of coordinated development. This study takes the Guanzhong Plain urban agglomeration as the research area, which has a good foundation in comprehensive three-dimensional transportation network and needs to be improved in regional economic and social integration, and discusses the coordinated development of the economy and society in this area from the perspective of transportation system. Firstly, discuss the current situation of transportation and economic and social development in the Guanzhong Plain urban agglomeration; Secondly, analyze the problems in the coordinated development of transportation and regional economy and society; Finally, by integrating literature research, the coupling mechanism and improvement path between urban smart transportation and port economy and the Guanzhong Plain urban agglomeration are proposed, in order to improve the mechanism and system for coordinated economic and social development in the western region, and provide scientific reference and policy recommendations for promoting the benign interaction between transportation and regional economic and social development.

Keywords: Guanzhong Plain Urban Agglomeration, Smart Transportation, Port Economy, Coordinated Economic and Social Development, Improvement Path.

1. Introduction

In the process of coordinated economic and social development in various countries around the world, the driving role of the transportation system cannot be underestimated. The social system is composed of multiple subsystems such as economy, society, and transportation, with complex and close relationships between each subsystem. Therefore, in order to achieve sustainable development of the economy and society as a whole, various subsystems need to adapt and cooperate with each other. Transportation is a key factor in the development of social economy. The transportation system is the foundation and leading sector of the national economy, serving as a link and bridge connecting various links of social production, distribution, exchange, and consumption. It forms the basic conditions for the development of various industries in the region and the main body of the regional investment environment, ensuring the normal progress and development of social and economic activities [1]. A good transportation system can effectively connect resources and markets, making the supply and demand cycle of resources more efficient. In addition, it can promote inter-city connectivity, enhance population and service mobility, and promote economic and social development [2]. The completeness of the transportation network often determines the efficiency and scope of regional economic coordinated development. When the transportation system lags behind or is too ahead of the economic and social development, it can be considered that subsystems are in an unbalanced state of uncoordinated development, which will hinder the progress of the economy and society [3]. Therefore, the coordinated development between regional economy and society largely relies on the coordinated development of the transportation system. The research on the coordinated

development of transportation and economic society has gradually attracted scholars' attention.

The relationship between transportation and regional economic and social development has always been the core proposition of regional economics. Regional transportation conditions are one of the basic conditions to ensure the flow of regional factors and the development of economic activities. From the "port economy" to the "Silk Road", the construction and development of transportation have formed an inseparable organism with the local economic and social development. Under the requirement of high-quality economic development, transportation, as a prerequisite and service industry for economic and social development, has received increasing attention from scholars. Promoting the coordinated development of transportation and economic and social development is a problem that local governments and relevant research institutions should pay attention to. Existing research mainly focuses on the evaluation of coordinated development, and scholars mostly analyze it by establishing indicator systems and using mathematical models. In terms of development status, Fang [4] and Ma [5] believe that the construction of transport infrastructure needs to be further improved and has good development prospects. In terms of coupling relationship, the railway transportation situation has not been improved at the corresponding level with the socio-economic level [6], while Du et al. [7] stated that the socio-economic level determines the development of the transportation system. In terms of solutions, Sun et al. [2] believe that transportation should be developed based on urban development needs and sustainable development requirements, while Xiong and Ning [8] should increase investment in the transportation field. In summary, scholars' research on the coordinated development of transportation and economic society mostly starts from the perspectives of

individual transportation modes and traditional transportation systems. Further research is needed on the relationship between the comprehensive transportation system and the coordinated development of regional economy and society, and research on the development level of national policy key urban agglomerations and urban agglomerations is relatively scarce.

This research takes the Guanzhong Plain urban agglomeration as the research area and conducts relevant research on the driving role of its transportation system in the coordinated development of economy and society. Firstly, investigate the overall regional overview of the Guanzhong Plain urban agglomeration. Secondly, by collecting information on the existing road network structure, airport network layout, and land port development of the Guanzhong Plain urban agglomeration, we can grasp its current status and development trends, and explore potential transportation issues. Similarly, by exploring the overall level, development differences, and development models of the social and economic development of the Guanzhong Plain urban agglomeration, the existing problems in the coordinated development of transportation and social economy are pointed out. Next, based on existing literature, the practical significance of smart transportation construction for the Guanzhong Plain Urban Agglomeration will be discussed in detail, and the methods and paths for building smart transportation will be explored. Furthermore, specific plans will be proposed to promote the coordinated economic and social development of the Guanzhong Plain Urban Agglomeration through smart transportation. In addition, a detailed explanation will be given on the promoting role of land ports and airports in the coordinated economic and social development of the Guanzhong Plain urban agglomeration, and specific measures will be proposed on how to better develop and utilize port resources to promote economic development in the Guanzhong Plain urban agglomeration. Finally, a summary will be made on the coupling mechanism and improvement path of transportation and economic and social coordinated development in the Guanzhong Plain urban agglomeration, and the shortcomings of the research and further prospects will be pointed out. This will provide scientific guidance and useful reference for the economic and social coordinated development of the Guanzhong Plain urban agglomeration, and also provide ideas for future related research.

2. Analysis on the Current Development Status of the Guanzhong Plain Urban Agglomeration

2.1. Regional overview of the Guanzhong Plain Urban Agglomeration

According to the Development Plan of the Guanzhong Plain Urban Agglomeration, the planning scope of the Guanzhong Plain Urban Agglomeration includes five cities in Shaanxi Province (Figure 1): Xi'an, Baoji, Xianyang, Tongchuan, and Weinan, Yangling Agricultural High tech Industry Demonstration Zone, Shangzhou District, Luonan County, Danfeng County, and Zhashui County of Shangluo City, Yuncheng City (excluding Pinglu County and Yuanqu County) of Shanxi Province, Yaodu District of Linfen City, Houma City, Xiangfen County, Huozhou City, Quwo County,

Yicheng County, and Hongdong County Fushan County, Kongtong District, Huating County, Jingchuan County, Chongxin County, Lingtai County, and Qingyang City in Tianshui City and Pingliang City, Gansu Province. The total area is 107100 square kilometers, with a population of approximately 39 million.

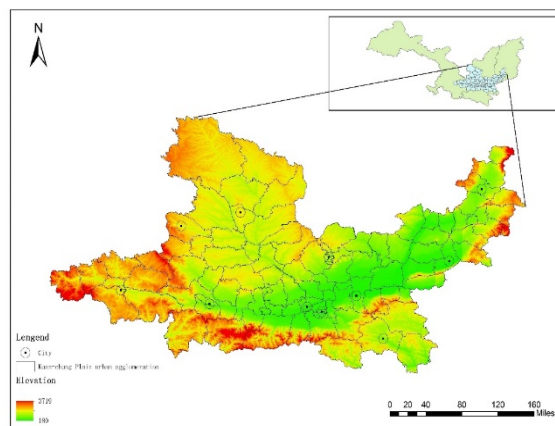


Figure 1. Urban Planning Scope Map of the Guanzhong Plain Urban Agglomeration

2.2. Current traffic situation of the Guanzhong Plain Urban Agglomeration

The Guanzhong Plain Urban Agglomeration is centered around Xi'an, connecting the northwest and central plains, central China, southwest, and other regions. It is an important gateway for the western region to the eastern and central regions, and also an important pivot for the Eurasian Continental Bridge. Therefore, its transportation location is so important. The following will analyze the transportation status of the Guanzhong Plain urban agglomeration from three aspects: road network structure, airport network layout, and land port development.

2.2.1. Road network structure

Road traffic connects the connectivity between cities in a region and is an important indicator for measuring the development of transportation in a region. The road network structure of the Guanzhong Plain urban agglomeration has basically taken shape. At present, the government has planned a highway main skeleton network of "two vertical and four horizontal", an intercity railway network of "one vertical and two horizontal", a primary trunk highway skeleton network of "two vertical and three horizontal", and a secondary skeleton network of "four vertical and four horizontal". Meanwhile, in order to further improve the problem of transit traffic congestion in the central urban area and promote the coordinated development of transportation, economy, and society, the government has also planned a transit transportation system for the central urban area with "one axis, two rings, six bridges, and nine radiations". The transportation between cities, counties, and townships mainly relies on county roads and highways, especially the comprehensive transportation network that combines railways and highways.

However, the distribution of expressway networks in the Guanzhong Plain urban agglomeration is uneven [9]. The expressway network around the central city Xi'an is densely distributed, while the expressway network in corresponding parts of Shanxi and Gansu is relatively sparse. Moreover, there are no direct passenger routes between cities in the two

provinces, which usually require transit to reach them, especially with the extremely low coverage of the highway network in the three cities of Gansu Province. Therefore, once the railway stations in the Guanzhong Plain urban agglomeration fail, there are very few road travel modes available for passengers to choose from, which will lead to an overall decrease in the anti-interference ability of the road network structure. In addition, most of the nodes with high node density in Putie Station, High speed Rail Station, and Highway Passenger Station are concentrated on the Beijing Kunming Development Belt and the Longhai Industrial and Urban Development Axis. Once these nodes fail, the development of both axes will be seriously affected, and the transportation efficiency of the Guanzhong Plain urban agglomeration network will also be reduced, which is not conducive to achieving coordinated development of transportation, economy, and society. It is expected that in the future, intelligent transportation can provide decision-making support and scientific analysis for the next step of road network planning.

2.2.2. Airport network layout

The Guanzhong Plain Urban Agglomeration has two major international airports: Xianyang International Airport and Xi'an Xianyang International Airport, as well as several local airports such as Baoji Feitian Airport and Hanzhong Chenggu Airport. Among them, Xi'an Xianyang International Airport is the largest airport in the region and has become the largest aviation center in northwest China. Its service scope covers various parts of the country, Hong Kong, Macao, and Taiwan regions, as well as international cities. Xianyang International Airport is also one of the important hubs in the region, with a relatively complete flight network and high service quality. In addition, local airports such as Baoji and Hanzhong also play an important role, providing support for local economic and tourism development, and achieving coordinated development of transportation, economy, and society to a certain extent. Although there are already many airports in the Guanzhong Plain urban agglomeration, there is still a significant gap in the distance between airports. The distance between Xianyang International Airport and Xi'an Xianyang International Airport exceeds 50 kilometers, while the distance between Baoji Feitian Airport and Xianyang International Airport exceeds 80 kilometers. It means that although there are many airports in the Guanzhong Plain urban agglomeration, the connectivity between airports is not high, making it difficult to achieve complementary development.

2.2.3. Land port development

The development of land ports in the Guanzhong Plain urban agglomeration is mainly due to the significant role played by Xi'an Port. Xi'an Port is the "Silk Road Window" that connects the inland regions of China to the whole country and the world. Goods from 29 provinces, regions, and cities across the country are distributed and distributed at Xi'an Port, with over 70% of exported goods to Europe and Central Asia originating from Xi'an Port [10]. The China Europe train "Chang'an", "Xi'an Islamabad", and "Xi'an Kathmandu" South Asia trains are operating simultaneously, further improving the freight network layout of the China Europe train "Chang'an". Xi'an has since become the core gateway to South Asia from the northwest and even central regions. Although the land port network of the Guanzhong Plain urban agglomeration is currently relatively weak, it is expected to experience stronger development in the future due to the

demand of its regional economy, logistics, and transportation conditions.

2.3. Current situation of social and economic development in the Guanzhong Plain Urban Agglomeration

2.3.1. The overall level of socio-economic development in the Guanzhong Plain Urban Agglomeration

In the national "14th Five Year Plan", the Guanzhong Plain urban agglomeration belongs to a large and developing urban agglomeration, and there is still a significant gap between it and the developed urban agglomerations of the Yangtze River Delta and the Pearl River Delta. This section describes the economic development of the Guanzhong Plain urban agglomeration. Overall (Figure 2), the Guanzhong Plain urban agglomeration belongs to the "one core driven, diversified development" model, with a high degree of primacy in the urban agglomeration. Among them, Xi'an has a relatively high level of economic and social development, and is the only city within the urban agglomeration with a gross domestic product exceeding one trillion yuan, which has a significant gap with other cities. The development level of other cities in the Guanzhong Plain urban agglomeration is in a balanced and low-level state, with good prospects for development. The regional gross domestic product needs to be further improved, with Baoji, Xianyang, Yuncheng, Linfen, Weinan and other cities belonging to the second tier, and other cities being the third tier.

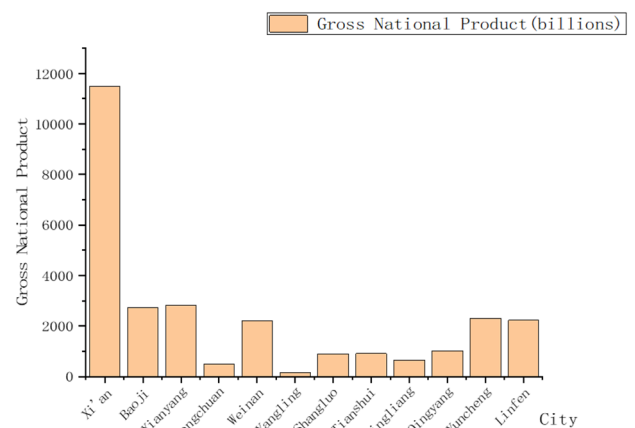


Figure 2. Gross Domestic Product Scale of the Guanzhong Plain Urban Agglomeration

From the perspective of per capita disposable income level (Figure 3), the per capita GDP development of the Guanzhong Plain urban agglomeration is relatively good, with certain differences within the group. In 2020, the per capita GDP of Xi'an ranked first among all cities at 40241 yuan. It is worth noting that the per capita disposable income of Tongchuan, Yangling and other places with low total economic development is relatively high, indicating that the living standards of residents in this area are relatively good and have higher external attractiveness. However, Shangluo, Pingliang, Qingyang and other places not only have small GDP and low per capita disposable income, but also have underdeveloped traffic conditions in terms of spatial scope. The main high-speed rail lines and airports in the Guanzhong Plain urban agglomeration are far away.

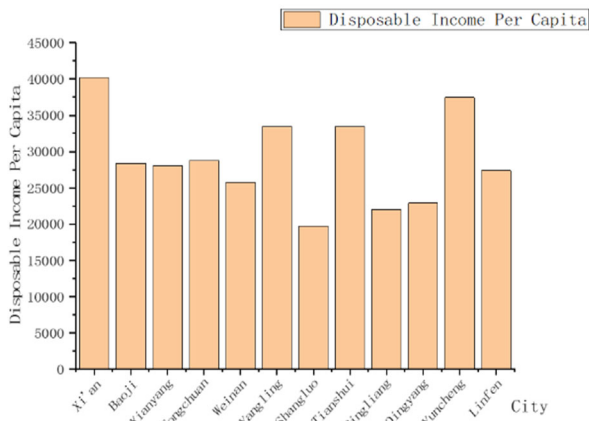


Figure 3. Per capita disposable income level in the Guanzhong Plain urban agglomeration

2.3.2. Differences in socio-economic development of the Guanzhong Plain Urban Agglomeration

From the perspective of the composition of urban agglomerations, it includes not only Xi'an City, which is at the forefront of economic development in the country, but also Baoji City and Xianyang City, which have average development levels, as well as most of the cities in the country, such as Tianshui and Pingliang, which have just separated from poverty-stricken counties. This section compares various indicators of economic development between central cities and node cities in urban agglomerations. From Figure 2, it can be seen that the economic development level of the central city of Xi'an is significantly higher than that of other cities, almost four times that of Xianyang, the second largest city in economic development. In the Guanzhong Plain urban agglomeration, Xi'an is located at the intersection of multiple highways and railways, which can attract a large number of production factors and further strengthen its position on the existing good industrial foundation and large scale of service industry in Xi'an.

2.3.3. Economic development model of the Guanzhong Plain Urban Agglomeration

From the perspective of total import and export value, the total import and export value of Xi'an in 2022 was 447.41 billion yuan, far greater than other cities and about 25 times that of Xianyang, which ranks second in economic development level. The development of import and export trade in Tongchuan, Pingliang, and Qingyang is severely lagging behind, and the driving force for economic development almost exclusively comes from domestic sources. Compared with other node cities, Xi'an has a good level of social and economic development and a relatively complete internal and external transportation system. There are more foreign direct investment enterprises in Xi'an, and the construction and development of airport and dry port are more perfect. The import and export business of the Guanzhong Plain Urban Agglomeration is mainly carried out through developed central cities, and then operates through the internal transportation system of the Guanzhong Plain Urban Agglomeration. Therefore, for other cities, the status and prospects of socio-economic development level are closely related to the construction of internal and external transportation systems within urban agglomerations and central cities.

2.4. Problems in the coordinated development of transportation and socio-economic development

High quality development requires that China's economy has shifted from a stage of rapid growth to a stage of high-quality development. In the critical period of transforming the economic development model, optimizing the economic structure, and comprehensively building a socialist modernized country, urban agglomerations, as high-level forms in the urbanization process, play an important role in factor agglomeration, internal and external trade, and modernization. This section mainly integrates and compares the current development status of transportation and socio-economic development in the Guanzhong Plain urban agglomeration, and summarizes the problems in the coordinated development of transportation and socio-economic in the Guanzhong Plain urban agglomeration in combination with the "14th Five Year Plan".

2.4.1. The concentration level of factor resources needs to be improved

With the deepening of reform and opening up, urban agglomerations have gradually become the focus and main track of high-quality regional economic development. The Guanzhong Plain urban agglomeration, as an important national level urban agglomeration in the western region, has a broader platform for social and economic development. Compared with Chengdu Chongqing metropolitan area, a national urban agglomeration in the same western region, the economic and social development level of the central cities of the Guanzhong Plain urban agglomeration is not enough, and the efficiency of the agglomeration of urban agglomeration element resources needs to be improved. Accelerating the agglomeration of factor resources, especially industrial and population factor resources, is particularly important for the development of economic competition. However, the lack of international transportation in the Guanzhong Plain urban agglomeration has led to weaker foreign trade and talent exchanges, thereby slowing down the speed of foreign investment and industrial transformation and upgrading. For the inner part of the urban agglomeration, in the context of the gradual disappearance of the demographic dividend, social and economic development has a greater demand for resources such as talents. The social and economic development of the urban agglomeration mostly relies on the urban population and the population of industrial parks. However, the transportation between the larger cities such as the central city Xi'an and node cities and other medium-sized cities and small cities is not developed, leading to the transfer of population and other factors to other megacities and urban agglomerations. It has caused an unfavorable situation for the infrastructure construction and economic and social development of the urban agglomeration.

2.4.2. The construction of Urban Agglomeration Transportation System needs to be improved

A comprehensive overview of internationally influential urban agglomerations both domestically and internationally, such as the Tokyo Bay Area and Yangtze River Delta urban agglomerations, is a developed area for internal and external transportation systems in the world today, forming a spider like transportation system centered around multiple large cities and numerous small and medium-sized cities. This is the basic support and support for the agglomeration and development of urban agglomeration industries, as well as the

channel for resource allocation and regional economic development. The Shaanxi part of the Guanzhong Plain urban agglomeration has a relatively good industrial foundation, with three national level economic and technological development zones distributed. However, the level of industrial chain coordination between each other needs to be developed, and the level and scale of undertaking industrial transfer in other areas of the urban agglomeration, such as Gansu, need to be improved. The current situation of uncoordinated development in these regions restricts the accelerated growth of the social and economic development of the urban agglomeration.

The imperfection of the transportation system is an important reason. The development and expansion of the urban agglomeration cannot be separated from the efficient comprehensive transportation system and developed transport infrastructure. At present, there is only one horizontal railway line in the belt shaped Guanzhong Plain urban agglomeration with a length of more than 500 kilometers, and no radioactive road network has been formed, which reflects that the construction of the transportation system is seriously lagging behind, limiting the market scale and consumption scale, It also limits the volume and efficiency of interactive exchange of urban element resources. It is urgent to coordinate the industrial development strategy policy within the urban agglomeration with the development of the urban agglomeration transportation system for high-level positioning and development. The transportation connection between the central city Xi'an and node cities such as Tianshui, Baoji and other cities needs to be strengthened. Xi'an's external transportation system includes the construction of Xi'an Xianyang International Airport Airport Area. Taking into account the economic and social ties and transportation links with other cities in the urban agglomeration, it needs to be implemented as soon as possible.

In terms of the construction of the airport area, compared with the domestic developed urban agglomeration, the Guanzhong Plain urban agglomeration area urgently needs to build a number of high-level, differentiated and coordinated airport cluster systems. The airport cluster system and urban agglomeration coexist and have a mutually reinforcing and mutually reinforcing relationship. For example, the airport cluster in the Yangtze River Delta urban agglomeration, with Shanghai airport as the international hub, supports the development of cities at different levels in the Yangtze River Delta. Airports with different functions and scales should cater to the various needs of urban agglomerations with different functions, such as domestic and foreign passenger and freight transportation, and are an important channel for the economic and social development of urban agglomerations. The construction of a comprehensive airport system in the Guanzhong Plain urban agglomeration is relatively scarce, with only one large-scale 4F level airport. Other cities are limited by their economic development level, and aviation development is also lagging behind, further slowing down the high-quality economic development of the urban agglomeration.

2.4.3. The level of intelligent transportation construction needs to be improved

The concept of digital governance is gradually receiving attention in the renovation of old urban areas and the construction of new areas. The smart city road system plays a role in perception, calculation, and collaborative governance of the current traffic situation and traffic patterns. The

relevant technologies have been applied in the Yangtze River Delta urban agglomeration, and analysis of the urban transportation system has been achieved through platforms such as GIS and BIM. However, under the condition of underdeveloped existing transportation network, the lack of intelligent transportation further leads to low efficiency in analyzing the transportation network and road operation status of the Guanzhong Plain urban agglomeration, as well as the allocation of resources and goods. Moreover, due to the integration of smart transportation with the Internet of Things to collect information on passenger and freight transportation, the lack of smart transportation also hinders the entire operation of the transportation system and the full life effectiveness of transportation infrastructure, affecting the sustainable development of the social and economic development of urban agglomerations.

3. Action Plans for Coordinated Economic and Social Development of the Guanzhong Plain Urban Agglomeration

3.1. Smart transportation construction

In the field of transportation, smart transportation can fully utilize information technologies such as the Internet of Things, big data, cloud computing, spatial perception, and mobile internet. By utilizing theories and tools such as artificial intelligence, transportation science, system methods, and data mining, with the main goals of comprehensive perception, active service, deep integration, and scientific decision-making, it can build a dynamic information service system, deeply mine relevant transportation data, construct problem analysis models, and achieve improvements in resource optimization, behavior management, public decision-making, and public services [11]. Intelligent transportation can adopt scientific decision-making to achieve a reasonable distribution of road network structure and land use structure, thereby solving the problem of structural imbalance between transportation supply and demand; New technologies can be used to coordinate the operation of various transportation modes and solve the problem of coupling imbalance between transportation supply and demand [12]. The road network structure of the Guanzhong Plain urban agglomeration is unevenly distributed and has low anti-interference ability. Once a node in the middle fails, it will have a serious impact on the transportation efficiency of the entire region, leading to the disharmony between transportation and economic and social development. Therefore, this article believes that the introduction of smart transportation construction is crucial for the coordinated economic and social development of the Guanzhong Plain urban agglomeration. Based on this, this article will propose the following three solutions for the construction of smart transportation.

3.1.1. Optimize the road network structure

The road planning and construction of Guanzhong Plain urban agglomeration are lagging behind, the road network is sparsely distributed, and the road network structure is unevenly distributed, leading to long-term traffic congestion problems. Traffic congestion can directly lead to an increase in transportation time costs, a decrease in transportation efficiency, and thus affect the development of the logistics industry, reducing the speed of economic growth. Meanwhile, traffic congestion can also lead to inefficient personnel

mobility such as commuting and business trips, affecting work efficiency and enterprise productivity, reducing overall economic benefits, and thus hindering the coordinated development of transportation, economy, and society. Intelligent transportation can provide scientific data analysis and decision-making support for road network optimization decisions by collecting and processing traffic data, such as traffic flow, road capacity, congestion, traffic accidents, etc. The system uses data to analyze the entire road network and obtain road condition information for each time period, thereby establishing a relatively accurate traffic model. This model can predict the current road conditions, such as predicting which road sections are prone to congestion and when congestion will occur. Meanwhile, the intelligent transportation system adopts technologies such as the Internet of Vehicles, intelligent traffic management, and intelligent driving to monitor and optimize traffic flow in real-time through intelligent and automated traffic control methods, improving the functionality and capacity of the road network. For example, intelligent signal lights can change the level signal based on information such as traffic flow and road conditions, thereby coordinating traffic signals and optimizing the operational efficiency of the road network.

1.1.1. Link urban development with transportation construction

Urban transportation information sharing is the foundation for the application of intelligent transportation technology. The traffic management departments of various cities in the Guanzhong Plain urban agglomeration can establish an information sharing mechanism to achieve the sharing of traffic data and information between cities. Through intelligent transportation, cities can share transportation networks, traffic congestion, weather data, and industrial and commercial distribution information, achieving the exchange and sharing of data and information between cities, thereby helping to achieve coordinated development between transportation and economic society. For example, installing smart transportation systems in each city of the Guanzhong Plain urban agglomeration collects public transportation information, vehicle operation status, traffic navigation, and urban congestion information, and transmits them through cross city data sharing to form a data sharing network. Tourists and citizens can access information such as public transportation route planning, arrival times, ticket prices, and services in different cities through mobile apps or query terminals, indirectly facilitating the development of tourism and commerce in the Guanzhong Plain urban agglomeration.

3.1.2. Improve green and sustainable transportation

The coordinated economic and social development of the Guanzhong Plain urban agglomeration still needs to move towards sustainable and green development in transportation construction. Intelligent transportation systems can dynamically optimize traffic signals through traffic data analysis and traffic scheduling. Providing green waves during low traffic flow improves traffic efficiency, reduces vehicle waiting time, reduces the amount of exhaust emissions and environmental pollutants, and achieves low energy consumption urban transportation benefits. The improvement of urban transportation efficiency can increase mutual visits and exchanges between different regions, reduce the sense of distance and certain inconvenient factors, and deepen exchanges and cooperation in trade, culture, education, and other aspects, making economic activities more flexible, and using their respective advantages to assist in the sustainable

development of the economy and society of the Guanzhong Plain urban agglomeration. Meanwhile, smart transportation in urban planning and transportation facility construction can achieve efficient utilization of urban resources, improve the quality and economy of transportation facility construction, reduce waste of urban land resources, and promote sustainable development of the Guanzhong Plain urban agglomeration. The improvement of the sustainable development of the urban agglomeration will promote the coordination and cooperation among different cities within the urban agglomeration, strengthen the regional connection and connectivity between cities and between urban and rural areas within the urban agglomeration, improve the smoothness of the material flow, information flow and population flow within the urban agglomeration, so as to build a more unified and coordinated urban agglomeration.

3.2. Build dry ports and airports and develop port economy

Xi'an Xianyang International Airport is the largest air transportation hub in the northwest, located within the Guanzhong Plain urban agglomeration and the Xi'an Xianyang National New Area. Through its huge passenger and cargo throughput, it has formed a huge "magnetic field effect" in airport transportation, and is positioned as the only international level airport in the Guanzhong Plain urban agglomeration. After more than a decade of development, Xi'an International Land Port has become a large-scale comprehensive operation service provider in mainland China. In terms of promoting coordinated socio-economic development, the port economy mainly includes improving the efficiency of economic activities through on-site production promotion, channel advantages, industrial layout, etc., and creating a new model of coordinated economic development in urban agglomerations by developing logistics industrial parks and supporting living services.

Port economy is a new competitive channel in regional economic development. Existing research results mainly focus on the significance of the airport area. Yang [13] believes that Zhengzhou Airport Area plays a significant strategic role in the economic growth and social development of the Central Plains urban agglomeration; Shan and Tang [14] believe that in the context of the Belt and Road Initiative, China Europe Train has become an important starting point for inland cities to develop port economy in the new era, and should focus on the coordinated development of ports, industries and cities; Chen and Li [15] believe that it is necessary to promote the construction of a hierarchical layout of port related industries, build modern industrial clusters, and enhance the guiding role of port related economic zones in social and economic development; Building a port economy should be planned and constructed based on national strategies [16]; Strengthening the linkage between port areas should stimulate the multiplier effect of the port economy and achieve geographical regional integration [17]; Wang et al. [18] analyze the harmonious development between humans and nature in the construction of the port economy from the perspective of land use.

In summary, scholars' research has mostly focused on the role and significance of port economy in coordinated socio-economic development in different urban agglomerations. They all believe that port economy plays an important role in regional economic development and is the foundation for sustainable development of urban agglomerations. Inland

cities can focus on land port economy and airport economy, respond to national key strategic planning, rely on transportation system, introduce new industrial clusters, focus on port industry city co construction and land use spatial layout, and promote coordinated development of port economy industrial parks and regional economy and society.

In the process of coordinated development between port economy and regional socio-economic, this study suggests that the first priority should be given to the co construction and sharing of regional infrastructure, in order to enhance the connectivity of urban agglomeration infrastructure. By constructing an interconnected comprehensive three-dimensional transportation system, we aim to achieve transportation connectivity between other areas within the city and the port economic zone, thereby enhancing the level of regional public service integration. Taking the opportunity of transportation integration, promote the coordinated development of the Lingang Economic Zone and other regions' social economy. Secondly, using systematic thinking and taking the construction of the Lingang Economic Zone as an opportunity, we aim to enhance the level of collaborative governance between cities. In terms of the regional sharing of industrial and resource value brought by the airport economy, this study believes that cooperation among cities in the Guanzhong Plain urban agglomeration, especially Xi'an and Xianyang, should be strengthened and further efforts should be made in the coordinated development of industries. For example, the government should further improve the logistics service system, optimize the types and structures of logistics services in different regions, rely on the construction of a comprehensive logistics system, and enhance the level of coordinated economic and social development in urban agglomerations. Finally, this study believes that under the guidance of national strategy, in the context of deepening cooperation and high-quality development between China and countries along the "the Belt and Road", we should build a national hub of the "the Belt and Road" in the Guanzhong Plain urban agglomeration, one of the important bases for China Europe regular train operation, and create a highland for port economic development and a gateway for coordinated socio-economic development. In the future development of the port economy in the Guanzhong Plain Urban Agglomeration, it is necessary to rely on the advantages of this region for development, in order to strengthen the leading role of the Guanzhong Plain Urban Agglomeration in the northwest region and its position as a channel in international trade, stimulate the potential of the port economy, and under the guidance of policy effects, attract people, funds, and logistics to cluster in the Guanzhong Plain Urban Agglomeration, improve the productive and service functions of the port area, and promote coordinated social and economic development.

4. Conclusion and Discussion

4.1. Conclusion

This study integrates existing research and combines the shortcomings in the coordinated development of transportation and economy and society in the Guanzhong Plain urban agglomeration to preliminarily construct two plans to enhance the level of coordinated development. This provides scientific reference for addressing the development opportunities of opening up to the west and seeking coordinated economic and social development in the

Guanzhong Plain urban agglomeration area. The specific conclusions are as follows:

(1) The transportation system of the Guanzhong Plain urban agglomeration has a certain foundation, especially with a certain road network structure and excellent location conditions for developing the port economy. In terms of spatial distribution, Shaanxi mainly radiates from Xi'an City, while the road network structures of Gansu and Shanxi need further improvement;

(2) Overall, the development level of the social and economic system in the Guanzhong Plain urban agglomeration is still insufficient. In terms of total output, Xi'an is the only city with a GDP exceeding one trillion yuan, and its economic priority is relatively high. The development level of most other cities is relatively evenly concentrated between 2000 and 3000, and there are also a few cities that are still in preliminary development and construction. In terms of per capita disposable income, the level of each city in the Guanzhong Plain urban agglomeration is relatively consistent. Unlike the gross domestic product, the difference between Xi'an and other cities has narrowed, which is in line with the positioning of a large and developed urban agglomeration;

(3) The current situation analysis shows that there are still some problems in promoting the coordinated economic and social development of the Guanzhong Plain urban agglomeration through transportation, mainly including three aspects: the level of factor agglomeration needs to be improved, the construction of transportation system needs to be improved, and the scale of smart transportation construction is relatively small;

(4) Finally, this study proposes some action plans to enhance transportation so as to promote coordinated economic and social development.

4.2. Discussion: shortcomings and prospects

The research in this paper mainly focuses on the coordinated development of transportation and economic society in the Guanzhong Plain urban agglomeration. Although certain research results have been achieved, there are still some shortcomings. Firstly, in terms of data sources and collection, due to time and resource constraints, the data sources in this paper are slightly singular, and the number of selected samples is also relatively limited, which has a certain impact on the generalization and reliability of the study. Secondly, further exploration is needed to explore the influencing factors and mechanisms of the development of urban agglomerations in the Guanzhong Plain, and more empirical research and theoretical analysis should be combined to improve and enhance them. In the future, we can further expand the research scope and improve the research quality by supplementing samples and optimizing the establishment of empirical models, explore more innovative and practical research issues, and promote the sustainable development and growth of the economy and society in the Guanzhong Plain urban agglomeration.

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