Research of Measures of Handling Traffic Congestion in Developing a Smart Dazhou

Zhaojun Feng[1,a], Xiaolu Ye[1,b]

[1]Sichuan University of Arts and Science, Dazhou, Sichuan, 635000, China.

[a]1019399858@qq.com; [b]yexiaolu0396@163.com

Abstract

The issues of traffic congestion and traffic safety have come with the rapid development of the social and economic development, against the backdrop of the accelerated construction of urban buildings, the rapidly increasing urban population, the soaring number of car ownerships and usage frequencies, the prosperous transportation and logistics industry, and the continuing growing demand for urban road traffic since 1990s. Traffic pollution, traffic congestion, and management brought by traffic congestion have brought great threats to the city economic development and people's daily life. Today, it is hard to improve the urban traffic condition only through expanding the construction of traffic facilities or widening the newly-built roads. Therefore, it is extremely urgent to solve the problems of traffic congestion efficiently. With the appearance and rapid development of the new technologies such as cloud computing, big data and so on, many countries and cities start the construction of the informationization-oriented smart city. Taking Dazhou as the example, this research analyzes the situations and causes of traffic congestion firstly. Then, make a comparison among the cities with advanced smart traffic development at home and abroad, and learn from their experiences. Finally, based on the real traffic situation in Dazhou, it puts forward relevant measures and suggestions of handling the traffic problems in developing a smart Dazhou in the information age.

Keywords

Smart city; Traffic congestion; Measures.

1. Introduction

Traffic trip is basic element of people's daily life in every corner of the world, and a vital part of urban economic and traffic development. The problems of traffic congestion is appearing among big cities at different levels, as a result of the the rapid development of itself, the proliferating population, automobiles and demand of logistics, and the overloaded operation of the urban traffic. The series of problems caused by the traffic congestion have great influence on local residents' travel and daily life. The traffic congestion is listed as a hot issue to be solved urgently in developing a modern comprehensive transportation system by the State Council in 2012[1]. It is useless to relieve the pressure through broadening roads, and building underpasses and overpasses. Therefore, new measures and new technologies must be adopted to explore new urban development models. Actually, to build a smart city, the key is to introduce intelligent transport, which can truly embody the "wisdom" of the smart city.

2. Concept and features of the smart city and transportation

2.1 The concept of smart city

Today, the definition of smart city is still in controversial. The "Smart Planet" plan was firstly put forward by the IBM company, and the concept of smart city is derived from thatc[2]. Sooner or later, many domestic and foreign research institutions and scholars put forward their opinions of smart city construction from their own views. Li Deren, an academician of the Chinese Academy of Engineering and the Chinese Academy of Sciences, pointed out that smart cities were new cities that added cloud

computing and the Internet of Things under the premise of digital city construction [3]. From the perspective of economic growth, the International Smart City Forum (ICF) defines smart cities as smart industries that can achieve efficient growth and lasting sustainable development based on communication and information technology and other aspects of intelligent industry, which accounts for a large proportion of the overall urban economy[4].In a word, smart city is a brand-new urban form that taking the digital city as the premise and cloud computing and the Internet of Things. It is a city that owns fully-scaled network, high-end industrial system, highly intelligent and popularized application.

2.2 The features of the Smart City

The feature of "intelligence" is the core of a smart city. The extensively covered information network, deep interconnected information system, a collaborative information sharing mechanism, intelligent process of information, and expansion of open applications of information.

2.3 The Concept of Intelligent Transport

Intelligent Transport means establishing an intelligent transportation information management system. The system is based on Internet technology, establishing an information management system through advanced information technology [5], which can coordinate cities such as people, vehicles, roads, and the environment. Traffic congestion problems are solved with an Internet-connected thinking, so that comprehensive support for city management and services are provided.

2.4 Features of Intelligent Transport [6]

As the main trend of the transportation industry in the future, intelligent transport has the following characteristics:

2.4.1 Efficient and time-saving

Smart traffic analysis and predict data can not only effectively avoid traffic congestion, but also strengthen road traffic planning, improve the efficiency of road facilities utilization, respond to vehicle service needs in a timely manner, scientifically guide traffic flow, and create good travel conditions for the general public.

2.4.2 Safe and convenient

Intelligent transport provides the latest and accurate information to related departments and drivers by IoT related technologies, so that traffic accidents can avoid and ensure the travel safety.

2.4.3 People-oriented

Intelligent transport by serving people's livelihood, leading demand, opening up and innovation, and people-oriented as the idea, aims at meeting people's travel needs at a high level providing transportation participants a safe, caring and efficient transportation environment, according to individual needs.

2.4.4 Energy saving and environmental protection

Intelligent transport can improve the smoothness and efficiency, suppress vehicle carbon emissions, reduce environmental pollution, thus provide a green and safe travel environment for the public, and promote the sustainable development of transportation.

2.5 The effect of intelligent transport in forming a smart city [7]

2.5.1 The development of intelligent transport fit for the demand of smart city construction

On the one hand, confronting with two major "City disease" (the traffic congestion and pollution), the intelligent transport integrate the new and high-technology, which can reduce the travel pressure and accident, and indirectly reduce vehicle exhaust emissions. Therefore, it makes breakthrough in effective management of urban traffic stubborn diseases. On the other hand, based on the demand for the development of intelligent transport, governments and transportation departments at all levels have applied advanced technologies such as cloud computing and the Internet of Things to daily traffic management.

2.5.2 Intelligent transport is a pioneer in building smart cities

Intelligent transport is a main part of a smart city. During the processing, it has promoted the services, like intelligent transportation, information service, intelligent parking, and solved the problem of people's livelihood in a large extend. Later, in the constructing process, it is necessary to provide more favorable conditions on the basis of technologies such as cloud computing and cloud management, to promote the sustainable development of cities.

3. The analysis of the traffic condition and traffic congestion condition in Dazhou

3.1 The present traffic condition in the urban area of Dazhou

Located in the upper stream of the Jialing River water system, Dazhou is a typical valley city [8]. This region is limited by mountains and divided by rivers with a narrow incomplete area, which may develop into a band-like cluster structure along the valley after reaching a certain scale. In recent years, Dazhou has achieved rapid development of the economic construction, the quickly changing urban road traffic, and the urban construction. The network framework and basic structure of the roads in the urban area have been shaped. According to the incomplete statistics, the number of motor vehicles in Dazhou was up to 767,000 by 2018. it is obvious that the present roads can't satisfy the rapidly growing demands for motor vehicle out-driving, which brings high pressure for the road traffic in Dazhou. Besides, the problems traffic congestion and difficulties in driving, parking and riding are very prominent in local area, bringing severe challenges to a typical valley city which is aimed at building into a central city in the area of the conjunction of Sichuan, Chongqing, Hubei and Shaanxi in the future. Through investigation and analysis, summarized The general situation of traffic congestion in Dazhou is summarized as follows through investigation, research and analysis.

3.1.1 The urban land layout

The urban land layout in Dazhou adopts the mode of "extending to the south, expanding to the west, and developing to the north in a controllable way." Expanding to the west refers to the area of Lianhua Lake, Fuxing, Shuanglong. Extending to the south means the area of Heshi and Tongbao River. And developing to the north in a controllable way indicates to spread to the gully area at the root of Fenghuang Mountain. And it is likely to form a cluster-layout of "one city and five districts" structure that develops along Zhou River, with "the West District as the city center and the South District and the Old City as the city sub-center".

3.1.2 Distribution of Central Urban Road Network

 The road network is not perfect, which mainly shows that the main road is narrow, the layout is unreasonable, the length of the road extension is not enough, some sections have guillotine road, bee waist road, many deformed intersections, and the nodes are not smooth. There are some structural defects of the urban road network, the distribution of road network is not balanced, the area with high road network density is mainly concentrated in the old urban area and the south urban area, and the density of road network in the west urban area is relatively low. The grade gradation of road system is not reasonable, there are few expressways in urban area, and the ratio of main road, secondary trunk road, and branch road is 1:3.5:7:7, which is far from the ratio of 1:3:4:10 stipulated by national standard. The standard of the road class is not reasonable enough, and due to the influence of terrain, there is a certain gap between the number of road and the requirements of the code. What's more, the growth trend of motor vehicle is not optimistic, since the connection road standard of urban export is low, and the traffic distribution is not smooth.

3.1.3 The tenure of cars

In recent years, with the rapid economic and social development, the acceleration of urbanization and the steady improvement of residents' living standards, the urban population has grown rapidly, the demand for transportation has increased, and the number of motor vehicles has also increased dramatically. According to statistics, the number of motor vehicles reached 767,000 in 2018, an increase of nearly 50% over 2010. Therefore, the rapid growth of motor vehicle ownership will

inevitably lead to the rapid growth of traffic demand, resulting in the traffic load of the main and secondary roads becoming more and more heavy.

3.1.4 Public transportation

Till now, for lacking of rail transit and rapid transit system, the main transportation there are still buses and taxis. There are 36 bus lines in the main urban area, with a total length of more than 320 kilometers. There are 373 bus vehicles, which transport nearly 90 million passengers per year. The city has 4.6 bus stations for every ten thousand people. Taxi is an important supplementary part of the urban public transportation system, and the total number is kept at a relatively stable level by various policies and regulations.

3.1.5 The parking service in urban areas

In the city, there are less than 8 parking spaces per 100 vehicles, and parking spaces are mainly allocated for buildings. There are very few off-street public parking lots that are independently invested and constructed. At the end of 2018, a smart public parking project was introduced, which eased the pressure of parking difficulties. However, with the increase of motor vehicles, there is still a large gap in the supply of parking facilities in the urban area. It mainly manifested as follows: the shortage of both commercial parking in the old city and residential parking berths in high-rise buildings, the low rate of parking spaces in off-site garages in residential areas, and the unfitted supplement of social public parking lot for the parking demand. While, many underground parking garages are idle for low utilization rates and serious parking disorder, as a result of inadequate parking management laws and regulations, poor management of relevant departments, disconnection between construction and use, and lack of effective supervision.

3.2 The traffic congestion in Dazhou's urban area

3.2.1 The main traffic problem in the urban area

Today, the main roads of the urban city has been faced the problem of overload generally. The east Chaoyang Road, North Tongchuan Road, and Centre Tongchuan Road are the most crowded among the city's, which connected the old urban area and the western, southern and northern part. The transport condition in other parts is the same as above said, including the Nanba Road between the southern and western part, and the Laifeng Road, Heye Road, and the Daxi Road in the old city area. There is heavy traffic congestion in rush hours. Among the following intersections, Xiaohongqi Bridge, Daba Intersection, Laocheba, Hongqi Bridge South Head, Tongchuan Bridge, Wutongliang, Phoenix Head, and Hongqi Hospital Entrance, have almost become the main bottleneck of urban traffic, and it becomes extremely serious during the peak period. In addition, the capacity of road intersections is low. The road intersections are plane there, which are basically in shape of "Y" and "T". Therefore, the traffic capacity in these places is low, and vehicles cannot be cleared in time, which becomes a road bottleneck. The large number of people crossing the street in the urban area has a serious impact on the lateral interference in traffic operation. There are few overpasses and underpasses (only 3 overpasses and 2 underground pedestrian walkways in the whole area). As a result, citizens cross the street from the main road for a long time, which interfaces the transport efficiency of the roads and intersections. Here, the traffic order is chaotic, people's awareness of traffic laws is weak, and they cross the traffic lanes at will. Therefore, the interference of people to vehicles is serious, making traffic management difficult and the task heavy. In addition, in recent years, the construction of urban roads has increased, and the road occupation is relatively serious, making the current situation of traffic congestion worse.

3.2.2 The more prominent problem of "difficult parking" in downtown areas

According to investigations, there are less than 8 parking spots for every 100 cars in the urban area, which is too far from theNational Urban Road unblocked standard. There are not enough parking spaces, and the supply and demand of parking in the area is seriously imbalanced. In addition, the parking infrastructure in some residential areas is seriously inadequate, which makes parking difficult. Therefore, due to the lack of parking spaces, citizens often choose to park along the road, leading to a lot of road resources are occupied, and the traffic is greatly affected.

3.2.3 The increasingly apparent problem of "difficult to catch a car" in urban areas

At present, 1,903 taxis are provided in downtown. While, less than 3 taxis can be shared by per 1,000 people. And there are 373 urban buses, 36 bus lines, less than 5 buses for every 10,000 people. Most of citizens report that, no matter how hailing a taxi or catching a bus, it is prominently hard to travel during peak hours and festivals. So, citizens do not choose public transportation as the main option.

4. Experiences and Enlightenment of Intelligent Transportation Construction in Cities at Home and Abroad

Based on current situation of smart transportation construction, its own development, and the existing problems in developing smart transportation, Dazhou has to learn from the experience in developed cities at home and abroad, which is of great significance for accelerating the development of smart transportation. This section selects some representative cities at home and abroad, such as Singapore, Japan, Hangzhou, Wuhan, etc., and analyzes their smart transportation construction and development process, which has a certain reference value to the next countermeasures for smart transportation in Dazhou.

4.1 Japan: Framework Architecture of Intelligent Transportation System (ITS)

Since 1968, Japan has promoted its R&D, applications of intelligent traffic control. In 1973, Tokyo took the lead in adopting a fully automatic intelligent traffic control system. And in July 1996, the Japanese Police Agency, the Transportation Bureau, and the Vehicle Association jointly formulated the "Japanese Framework Architecture of Intelligent Transportation System (ITS)". Japan's traffic management technology is high because it establishes a perfect traffic management and service system through widely used computers, information, networks, and communication technologies.

4.1.1 "Intelligent" traffic control

The timing of Japanese traffic signals has been fully automated. For example, there are 133 computers in the Tokyo Traffic Control Center. According to the road traffic flow, the center intelligently and automatically controls 7247 traffic lights in the 14447 signal control hubs in the city. The Traffic Control Center of Shizuoka City has 17 computers that automatically control 2,880 signal lights throughout the city.

4.1.2 "Real-time" traffic information broadcasting

In Japan, Traffic Information and Communication System (VICS) is an organization that is responsible for collecting and processing traffic information. After the information been collected and processed, it will be broadcasted by electronic information screens, traffic radio and television, and in-vehicle electronic navigation systems in real time. Now, there are 1296 information display boards, 7 radio stations, and 160 roadside broadcasts on the roads in Tokyo.

4.1.3 Facilitation of urban parking

On the one hand, provide parking space query service. In 2009, the "Tokyo Metropolitan Public Corporation for Road Improvement and Management developed "S-PARK" parking lot search site in Tokyo. Through the platform, car owners can check where the nearby parking lot is and find out if there any parking spot available. As a result, the random parking on the road is reduced. On the other hand, parking is free within one hour. Tokyo promotes "free parking within 30 minutes" at more than 40 bus parks in the downtown area under the viaduct, including Roppongi and Tokyo Metropolitan Station, aiming to prevent car owners who want to park without paying from parking indiscriminately.

4.1.4 Promote "cooperation" mechanism

On the one hand, the government has beefed up investment in smart transportation. The Japanese government invested 16.1 billion yen for R&D of ITS from 1996 to 1997, and 128.5 billion yen for infrastructure. In 1996, the government invested about 7.8 trillion yen to promote the realization of the overall of intelligent transportation concept [9]. On the other hand, the government has continuously innovated and cooperated with R&D institutions and enterprises. What's more, in order to stimulate the enthusiasm of enterprises and institutions, the government promises them to profit.

4.2 Hangzhou: "City Brain" fights against traffic congestion

The Hangzhou City Brain can use big data and artificial intelligence technology to analyze amounts of data in real time and assist the government to make some decisions, so as to realize the automatic allocation of public resources and affect people's life in all aspects. Therefore, it is regarded as the hub of the city's artificial intelligence. The system is characterized by its comprehensive analysis, rapid response, and intelligence. Urban brain operation is based on massive data, including traffic operations, operators, and public services that collected by more than 50,000 cameras. Then an algorithm model is constructed through an open platform, so that it can perceive the vehicles on complex roads, thus providing a "smarter" route. For example, where should be prohibited from turning left? How long can the traffic lights at each intersection be set to achieve the highest traffic efficiency? After that, the information will be input into the traffic facility management system, then the facilities present related signals according to regulations. According to calculation, 150,000 traffic policemen can be saved by intelligently controlling traffic. In September 2016, the Urban Brain Transportation Project conducted a preliminary test in Xiaoshan District. It indicates that once the traffic lights adjusted by intelligent system, the average speed of road vehicles could be increased by 3% to 5%, and 11% of pilot road sections.

4.3 Enlightenment for smart transportation planning in Dazhou

According to the previous analysis of the status quo of smart traffic development in cities at home and abroad, smart traffic technology can alleviate the traffic jam situation, improve the level of traffic services, and promote the development of urban transport. Drawing on and learning more advanced technologies of smart transportation at home and abroad, it will play a guiding role in the urban traffic management of Dazhou.

First, make a comprehensive plan of intelligent transportation in accordance with the actual development of Dazhou. Under the premise of the national smart transportation organization structure, making a scientifically local smart transportation structure should set out from the current status of urban development and the actual needs of transportation. And optimize and adjust the smart mechanisms in various regions appropriately, combining the top-down and bottom-up models.

Second, vigorously develop key technologies of intelligent transport. With the development and application of technologies such as the Internet of Things, the Internet, mobile communication networks, sensor networks, and cloud computing, transportation operations and management are becoming intelligent. However, the core technology, like the integration of IoT technology and information collection, timely traffic guidance, vehicle identification, cloud computing and information processing, network information security, the application of IoT technology in low-carbon emission, human-vehicle-road collaboration and other has yet to be developing and try to make a breakthrough. Therefore, the state and relevant departments should try every effort to promote the R&D of key technologies for smart transportation through various incentive policies and economic means.

Third, optimize the construction of institutional mechanisms and share traffic information. Compared with other country, the management model in our country is special. Because its functions of information construction, traffic management and traffic operation belong to each management department, and each department formulates its management mechanism in its own need. Therefore, to build an intelligent transportation mechanism, Dazhou should focus on creating a platform for information sharing and exchange, avoiding information being isolated and promoting the information resources being shared.

5. The strategy and suggestion for the traffic congestion of the smart city construction

"Intelligent transportation" is launched in the context of "smart city" construction, emphasizing people-oriented and sustainable development. The core of the intelligent transportation is to apply traffic data to analyze decisions and provide services, and pay more attention to the interaction

between traffic users and transportation. This article puts forward the following suggestions on how to accelerate the construction of intelligent transportation in Dazhou.

5.1 Improve the intelligent traffic management mechanism

The construction of intelligent transportation should set out from people's demand, realize intelligent public travel, road management, transport, and provide intelligent public transportation. At the same time, the construction of an intelligent transportation system requires the full support of governments at all levels. First of all, we should increase efforts to establish a multi-party coordinated management mechanism, starting from intelligent transportation management, key technologies, policy guidance, publicity, etc. And form intelligent transportation framework architecture in the whole society that taking the transport management as the main methods and the participants' self-discipline as supplementary measures. Secondly, as the leader of urban intelligent transportation construction, the government should plan for intelligent transportation construction. It can learn from the development experience of other developed countries and form a semi-official organization to integrate all transportation resources in Dazhou. The traffic management functional departments in Dazhou formulate industry standard, and achieve the management and utilization of intelligent transportation construction. Rebuild a comprehensive network management mechanism for interconnection again, promote the construction of urban smart road networks as soon as possible, strengthen the scope of infrastructure, improve the detection mechanism of smart road networks. And make further progress in realizing the coordinated operation of the integrated management of cross city and trans provincial smart road network, effectively improve the emergency response capacity of the road network, and truly realize the network service of the national road network. Finally, it is suggested that the smart traffic construction in Dazhou should consider adopting the government and social capital cooperation (PPP) model, organically combining transportation informatization development planning, market supervision, public services, social capital and technological innovation to improve the quality and efficiency of public services.

5.2 Promote the use of intelligent management technology of traffic congestion in Dazhou

Firstly, improve the traffic information collection technology. The traffic information collection method in Dazhou is simple, which mainly based on the video collection system and supplemented by the traffic police feeding back information on-site. This method is neither efficient, nor timely, which reduces the serving efficiency. Thereby, in order to improve the service, some advanced technologies should be used. For example, add magnetic frequency detector to the main road to collect traffic information effectively, provide accurate and efficient data for the processing step. A wave frequency detector is added to the secondary road and branch road to measure the vehicle speed and vehicle type, which can judge the traffic capacity of the road, provide powerful data for the diversion of the congested trunk road, and provide accurate information for the traffic participants to choose the optimal road. Then, strengthen the use of satellite navigation system technologys. The use of satellite navigation system not only provides more convenient real-time information for residents to travel, but also provides high-quality navigation guidance and better services for residents. What's more, it tells where the crowded road is in real time, benefitting to improve residents' travel efficiency. Thirdly, we should seek high-efficiency and low-cost traffic information transmission technology, such as dedicated short-range communication, which can provide single or two-way interactive communication between vehicles and roadside facilities [10], timely and quickly transmit information to big data platform, complete real-time information interaction, make scientific basis for road traffic guidance in time, and complete the information transmission between service providers and participants more efficiently and quickly, and provide strong support for improving the information interaction. Finally, cloud computing technology is used to process massive traffic data. The efficiency of data processing can be increased several times, and instantaneous data analysis and processing can be completed.

5.3 Build a comprehensive data platform for Dazhou's intelligent transportation

The intelligent transportation concept in Dazhou has been preliminarily formed, with basic functions such as the establishment of a data platform and the use of a public service platform already available. While, due to the independent service of each industry, and the development of technology also requires a certain amount of time, the smart traffic information platform in Dazhou should be established step by step, improved at different levels. And establish an "Internet + management + service" comprehensive data platform to achieve information sharing. The platform serves residents more conveniently, efficiently and reasonably, and helps to enhance the service coverage of intelligent transportation and even smart city.

5.4 Establish an intelligent transportation service coordination system

From the current intelligent transportation construction in Dazhou, the convenient information service is weak, and the construction of intelligent transportation service system should be strengthened. The traffic management department should improve the online platform and establish a complete transportation construction and information system to effectively enhance the quality and transparency of municipal government's information and achieve information being shared at all levels. Simultaneously, it is planned to promote the effective sharing of traffic information resources by official functional departments, and use high-tech technologies such as mobile Internet, cloud computing, and network payment for traffic travel to reduce unnecessary time waste and achieve the goal of effectively alleviating traffic pressure. In addition, it is recommended that Dazhou focus on building an intelligent parking system. Smart parking is an important part of the intelligent transportation industry. First of all, Dazhou parking data management platform is established to collect parking information, analyze and guide smart parking, optimize parking efficiency, and improve the utilization rate of existing parking spaces. Secondly, it combines mobile terminal parking software to provide parking spaces. Intelligent services, such as intelligent inquiry, appointment, avoid crowded time period sharing, and intelligent payment. Finally, a new intelligent mechanical three-dimensional parking garage will be built to make full use of existing resources.

6. Conclusion

With the continuous development of the social economy of the city, the contradiction between the supply and demand of road resources is deepening. The traffic congestion problem seriously restricts the development of Dazhou. The effective construction of an intelligent transportation system can effectively alleviate the traffic congestion problem. However, from the perspective of the strength and use of the intelligent transportation construction of the Dazhou Municipal Government, there are certain deficiencies. In response to these problems, according to the experience of intelligent transportation construction at home and abroad, this article puts forward some personal suggestions for the development of intelligent transportation construction in Dazhou. It is mainly completed from four aspects, improving the intelligent traffic management mechanism, promoting the application of intelligent management technology for traffic congestion, creating an all-round data platform for intelligent transportation, and establishing a smart transportation service coordination system, which has positive practical significance for promoting the construction of intelligent transportation in Dazhou.

References

[1] The State Council of the people's Republic of China:The Planning Outline of the Mid Long Term National Science and Technology Development (2006-2020), Science & Technology for Development, Vol.(2016)No.01,P.55-63.

[2] J.x.Wang: Urban Intelligent Public Transportation Management System(The Ministry of Construction of Peoples Republic of China, China 2008),P.43.

[3] D.r.Li, Y.Yao, Z.f.Shao: The Concept, Supporting Technology and Application of Smart City, Journal of Engineering Studies, Vol.(2012) No.04.

[4] Technical and Economic Research Department of Development Research Center of the State Council: The Internet of Things: Influence on the Future, (China Development Press, China2011).

[5] H.p.Lu, R.m.Li: Present Condition and Development of Intelligent Transportation System, Journal of Engineering Studies, Vol.(2014) No.03,P.10.

[6] X.Leng: Research of the Present Condition of Intelligent Transportation System, Management & Technology of SME, Vol.(2016) No.06, P.107-109.

[7] Z.w.Zhang, N.Xu: The Function of Intelligent Transportation in the Construction of a Smart City, Journal of Architectural Engineering, Vol.(2017) No.03,P.125.

[8] Z.b.Xue: Research on Traffic Congestion Governance of Valley-City in West China A Case Study of Urban Centre Districts of Dazhou, Journal of Chongqing Jiaotong University(Social Sciences Edition), Vol.(2012) No.12, P.20-23.

[9] R.Li: The Introduction and Experience of Japanese Intelligent Transportation System, China ITS Journal, Vol (2011) No.01, P. 123-126.

[10] N.b.Xie, Y.Gu: Dedicated Short Range Communication and Its Application in Traffic Navigation System, Journal of Southwest Jiaotong University, Vol.(2001) No.02, P.62-66.