Design of Information Service System of Urban Bus Terminal under the Background of Mobile Internet

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Abstract. With the rapid development of highway transportation industry, the traditional manual passenger transport management mode can no longer meet the requirements of the development of highway passenger transport industry in the new period. From the perspective of passenger service in urban bus terminal, this paper puts forward a design scheme of passenger service information system in passenger terminal based on mobile Internet technology in view of the increasing service demand of passengers and passenger terminal. By using modern computer technology and information technology, the information service system of urban bus passenger station is upgraded, so as to realize timely and accurate collection and transmission of information, maximize information sharing, and enhance the on-site decision-making and command ability of the station. By integrating the information of various modes of transportation, we can realize the way of information sharing and provide high-quality information services for passengers.

Keywords: Mobile Internet, City Bus Terminal, Information Services

1. Introduction

At present, China's highway passenger transport service enterprises are facing increasingly fierce competition from railway, aviation and water transport. The opening of intercity high-speed railway provides passengers with a fast and comfortable ride experience, but it also has a great impact on highway passenger transport enterprises to some extent [1]. In some areas, the passenger stations follow the past passenger transport system, which leads to some incongruities between the passenger transport system and modern urban traffic. For example, the passenger stations and other building structures need to be integrated and designed. The application of advanced vehicle position acquisition equipment and information communication equipment to research and develop bus arrival information service system is of great significance for realizing the informationization and intelligence of the
system service of urban bus passenger stations and improving the management level and service level of urban bus passenger stations [2].

In order to ensure the rational, orderly and sustainable development of urban traffic, it is necessary to plan and design the urban road traffic system rationally from the internal mechanism of urban traffic system and the interaction between it and external environmental conditions. Under the background of mobile Internet, urban bus passenger stations should focus on service and management informatization construction, improve information management system, gradually form a complete information system of passenger stations, realize service modernization of passenger stations, and promote leap-forward development of road passenger transport.

2. Internal information construction of passenger station

With the continuous development of information technology, the relatively independent and single-function business system of passenger station can no longer meet the needs of information development, so the station service system of passenger station appears, which centrally processes the data of all business systems of passenger station. As far as self-development is concerned, passenger stations must constantly improve their service quality in order to maintain their long-term competitive advantage and realize their long-term development. Using SQL structured query language to query, modify and delete the relational database [3]. As shown in Figure 1, the government, as the investor and supervisor of information services, pays attention to the utility of information services, that is, the construction cost and social benefits of information service systems; As the operator of information service, enterprises pay attention to the operating cost and economic benefit of information service system; As users of information services, passengers pay attention to the accuracy and availability of information services.

![Figure 1. Stakeholders of bus arrival information service system](image)

As an organic part of the urban highway transportation system, the contemporary urban bus station bears the responsibility of connecting external traffic and internal traffic. Passengers arrive at any time during each operation period of the bus station, and then leave by bus according to the vehicle frequency. The key to the efficient operation of bus passenger station is to build a regional transportation transfer connection system with passenger station as the core. Although the running time of long-distance buses has been reduced by half an hour, on the whole, the travel time of
passengers has increased. The comprehensive information service system of digital passenger station is established, so as to lay the foundation for sharing information resources and establish a new image of digital passenger station service. Translate the "voice" of customers into specific service elements [4]. In the service design of passenger station, it is necessary to fully identify passenger demand and match it with service elements, so as to realize the optimization design of service elements based on passenger demand.

The needs of users are embodied in the provision, preservation, update and query of various information, which requires that the database structure can fully meet the output and input of various information. On the one hand, it is necessary to establish a standardized and portable arrival information service system to reduce the construction cost of the system; On the other hand, it is necessary to reduce the error caused by time delay in the process of information processing and improve the quality of information service. The integrated design of surrounding traffic emphasizes the coordinated solution of people and vehicles distribution at the level of the overall traffic structure, so that bus passenger stations and surrounding stations become an organic part of the whole urban traffic system, and become a place where urban traffic transfers, distribution centers and people gather various activities.

3. Composition of passenger service information system

3.1. Passenger service information automatic inquiry subsystem

The function of passenger service information automatic inquiry subsystem is mainly realized with the help of touch screen tools. Users touch and press the arrival station to inquire the trains and arrival time that can be taken in this station, enter the inquiry arrival interface, select the direction and arrival station to be inquired, and the system automatically lists the relevant train information. The running state of bus arrival time prediction system can be divided into a limited number of states, and each state is driven by discrete events. Using scientific and reasonable technical design means, various modes of transportation in this transfer and connection system can be effectively connected within the system and among various modes of transportation, and the overall benefits of the transportation system of this bus terminal can be brought into play; From the experience of large and medium-sized cities at home and abroad, transportation hubs in large cities tend to be integrated, because it is more conducive to the realization of "zero distance" connection [5]. The scope of online ticket sales can be expanded step by step. The first step is to realize online ticket sales at all stations in the city, and then realize inter-city, inter-provincial and even national online ticket sales.

City bus terminal is a place where people flow together, which bears the responsibility of displaying city image, city culture and economic strength, and the external space is its main display place. As the satisfaction of passengers will not increase with the increase of this kind of service quality elements, but dissatisfaction will bring customer dissatisfaction, so it is only necessary to ensure that this kind of service quality elements meet its specifications, and the set goals only need to meet the basic requirements. As a fixed way of publishing information, the electronic stop board publishes comprehensive information, but its service area is limited. Mobile phones are easy to carry and have a wide service area, which makes up for the shortcomings of electronic stop board publishing. The user touches the passenger satisfaction survey to enter the survey interface, which includes the overall and individual satisfaction survey. It mainly introduces the general situation of the
station, passenger and freight service items and extended services such as catering, accommodation, entertainment and tourism provided by relevant enterprises.

3.2. Telephone inquiry subsystem of passenger service information

As an organic part of urban space, the outer space of the station should not be separated from the urban space environment, but should keep a certain continuity and interaction with the overall urban environment. The function of passenger service information telephone inquiry subsystem is mainly realized by means of voice card program. With the increase of departure frequency and the decrease of shift interval in bus stations, the unbalanced distribution of service capacity of passenger facilities such as ticket office, waiting room and platform begins to appear. Urban bus passenger stations or urban and rural buses mainly play the role of transfer. Therefore, when designing the general layout of transportation planning for urban bus passenger stations, it is necessary to optimize the layout of bus stations and systematically set up different modes of public transportation such as transit public transportation and arrival public transportation in the station area. It can be considered to take advantage of the traffic advantages of the fast ring road, and arrange the passenger stations nearby as much as possible to facilitate the passengers' transfer between the passenger stations [6].

Mobile phone-based bus arrival information service can adopt two modes: broadcast and application response, as shown in Figure 2. Broadcast mode is the arrival information service provided by the bus information service center to all authorized users, which is suitable for publishing public information that meets the needs of most people, such as accident information, bus route change information, traffic control information, etc.

![Figure 2. Bus arrival time service mode based on mobile phone](image)

By integrating the resources of various passenger stations, a passenger service platform is built to provide the public with various passenger information services and form a service system framework. Based on passenger transport information, the passenger transport service platform serves the public
through portal website, call center, short message platform, radio and television, etc [7]. The application response mode is that the user inquires the required arrival time information from the bus information service center according to the personalized travel demand, and the center sends the information according to the passenger's customized request. The final importance of service quality elements of passenger stations is transformed into the importance of service technical elements of passenger stations, and the key service technical elements of passenger stations are extracted and analyzed.

3.3. System maintenance subsystem

The system maintenance subsystem is used for daily maintenance of system parameters, train number information, station name maintenance, personnel information, passenger survey statistics, etc. It is proposed that the original shift plan should be changed during the peak period, and fully loaded vehicles should be allowed to leave the station earlier than the original schedule under the strict implementation of the quota carrying system. Within a relatively reasonable riding distance, passengers can reach the bus terminal conveniently by using non-motor vehicles. Therefore, bus passenger stations in these cities should try their best to create safe and comfortable traffic conditions for short-distance travel of various non-motor vehicles, including bicycles; The announcement of the station mainly publishes the passenger trains operated by the station.

Train information maintenance is mainly to add, modify and delete train basic information and detailed information. Although bus stations are generally not within the design scope of passenger stations, they should be considered and reasonably organized and laid out as a whole. Coordinate with relevant departments in time. In the data storage of the intelligent terminal, some system configurations and the management of topics subscribed by customers are mainly saved; The other is data storage on the server side, including service station data, topic data and other related contents.

4. Structural design of passenger service information system in urban bus terminal

4.1. System logic structure design

According to the production operation characteristics, existing information system status and system construction objectives of urban bus passenger stations, the overall structure of the system is determined: building a unified and integrated management platform at the station level and establishing an internal and external information interaction channel of the passenger service information system, which is the guarantee for realizing the station operation information sharing [8]; Passengers can access the passenger service information system platform through the wireless local area network provided by the station by using the portable mobile terminal to inquire information and obtain the information and entertainment services they need. It is designed as a distributed structure as a whole; Vertically, it is divided into layers according to physical location and management level, that is, settlement center database and local bus passenger station database; Horizontally, according to business functions and information connotations, it is divided into two categories: comprehensive database and business database.

Based on requirements analysis, construction ideas and the above analysis of the overall structure of the system, the overall structure of the system can be obtained as shown in Figure 3 below:
Figure 3. Logical structure of station passenger service system

The security mechanism of wireless LAN in passenger station is mainly realized by network access layer, that is, LAN communication gateway can only access legal AP nodes, while AP nodes only allow legal LAN communication gateway to access. Realizing the information management of station passenger transport operation is the link of fully exploiting the information value of the station, which is not only conducive to improving the work efficiency of the passenger transport production department, but also conducive to realizing high-quality passenger service, and finally realizing the intelligentization and informationization of the station. In the system design, the touch screen is used as a man-machine communication tool, which simplifies the user's operation, at the same time, the interface changes no more than 3 times, minimizes the number of user selections and prolongs the service life of the system. At the same time, in the general layout design of the bus station, it is necessary to provide necessary parking spaces and corresponding transportation facilities for these non-motor vehicles in time. Meet the interrelated requirements of various systems in the station, give a unified data interface specification for information exchange among various systems, and complete orderly, controlled and timely exchange of information among various systems.

4.2. System physical structure design

The data exchange platform is a core system module of the core function part of the information system of the passenger transportation center management platform, which is mainly responsible for collecting data information of various modes of transportation, exchanging data between the information systems of various modes of transportation and the information system of the passenger transportation center as required, and persisting the data locally. This process needs the active cooperation and participation of users, and whether users can actively cooperate and participate is also an important issue in the demand acquisition stage. Automobile route management provides five button functions of inquiry, reset, add, edit and delete, which can realize the functions of manual entry, modification, deletion and inquiry of a route. The data transmission layer is composed of floor switch and WiFi wireless network. The fixed equipment of the station internal management personnel is accessed by the floor exchange; The data collection of internal business database is directly carried out by each business department in the process of office, business processing and management, and the principle of "who applies, who builds the database and who maintains" should always be implemented.
The passenger service system of urban bus station can be divided into three categories, which are basic system, core service system and common application system. The design scheme of various systems is shown in Figure 4 below:

![Figure 4. Structure diagram of passenger transport business system in urban bus terminal](image)

When we start to do needs analysis, we first look at the existing documents, tables and files, collect basic information, and find out the organization chart. Through this system, passengers can conveniently inquire about train times, directions, bus information, taxi information, etc., and make passengers' trips more convenient. By monitoring, limiting and changing the data flow across "firewall", it shields the information and structure of the protected network from the external network as much as possible, and realizes the security protection of the network. With the aim of serving the working areas of professionals in the station and providing a variety of information services for passengers, the WiFi network system of the station covers the waiting room, platform, ticket gate, exit and ticket office of the whole station. From the data elements in the common data exchange area, the unified data exchange standard and the total data set exchanged by the supply system are extracted, which is called data bus. With the data bus, the change of the core business system will not affect the common application system.

### 4.3. System database design

The main content of database design is to construct a data pattern with good performance, which can meet the requirements of different users and be accepted by the selected database management system under a given hardware environment, operating system and database management system. Passengers or station office workers move in the specified area of the station, and the AP deployment in all areas is also known, that is, the communication gateway of passenger station LAN can predict the next AP it will access. The management of symmetric keys through public key encryption technology makes the corresponding management simpler and safer, and at the same time solves the reliability and authentication problems existing in the pure symmetric key mode. The system management system is taken as the guarantee system for system operation, and data query, analysis, statistics, evaluation and
prediction are carried out based on the environmental geospatial database, so as to form command information with pictures and texts, and accurately and clearly express and show the situation of each position in the passenger transport center.

User and privilege management is to manage the users who use this software and their privileges. According to users' identities, define their roles when using software, and assign corresponding rights. If the query criteria are not blank, the interface will be queried according to the query criteria, and if all the query criteria are blank, all the tables will be queried. In the bus station, many businesses have strong procedures, standardized management and sound management system, which can meet the requirements of computer management. To provide passengers with various passenger transport information and passenger trip related information inquiry services, including train operation diagram information, train schedule information, remaining ticket information and train delay information. In order to prevent the application system from being paralyzed due to network interruption, and to reduce the network congestion and delay of system response caused by frequent access to the database by the application system, each application subsystem except the monitoring and management subsystem is provided with a local database. By means of information technology, meeting the needs of banquet work for passenger transport center to deal with multiple emergencies at the same time embodies the characteristics of high efficiency and informationization provided by modern information technology in emergency response.

5. Conclusion

In this paper, a quantitative service design model of passenger station is constructed based on the integration research of mobile Internet and the passenger demand. Based on the demand analysis of passenger service information system in urban bus terminal, the system construction goal is defined, the overall framework of the system is determined, and the data flow among subsystems is analyzed. Practice has proved that only by adhering to the people-oriented concept and the basic principles of the construction of passenger stations can the passenger stations serve the vast number of passengers better. Such as ticketing, scheduling, scheduling, etc., it also includes the necessary analysis and evaluation of the station operation, which can realize the functions of online ticketing, booking, refund, etc. The construction of passenger service information system based on mobile Internet technology will greatly improve the service quality and image of urban passenger transport, and contribute to the informatization construction of urban passenger transport in China.

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References

[1] Ye Zhen, Liang Keke, He Mingguang. A survey of driver-oriented urban taxi service stations——Taking Liuzhou City, Guangxi Zhuang Autonomous Region as an example[J].
Urban Transport, 2018, 16(001): 39-46 , 62.

[2] Li Binglian. Intelligent system information exchange of urban automobile passenger transport hub[J]. Science and Technology Innovation, 2017, 000(022): 15-16.

[3] Shen Lu. Research on the design of urban transportation complex based on the concept of fusion symbiosis——Taking Guiyang West Passenger Transport Station as an example[J]. Jiangxi Building Materials, 2017, 000(010): 26-27.

[4] Yang Chaoqun. Improve the public transport service system to meet the travel needs of citizens[J]. Urban Public Transport, 2017, 02(2):9-9.

[5] Li Xiaopeng. Provisions on the Management of Urban Bus and Tram Passenger Transport[J]. Urban Public Transport, 2017(04):5-12.

[6] Li Jing, Zhou Jiajing. Research on the development of urban automobile passenger tourism routes based on the "combination of transportation and tourism" model——Taking Xuzhou as an example[J]. Modern Communication, 2017, 458(12):31-32.

[7] Zhou Jing. "Administrative Regulations on Urban Bus and Tram Passenger Transport" is promulgated and implemented [J]. People's Public Transport, 2017, 000(004): 32-33.

[8] Fu Xiangjun, Zhang Chi. A Discrete Location Model of Coach Stations Based on the Perspective of Public Transportation[J]. Science and Fortune, 2018, 000(013):254.