

Research on the Development of Railway Intelligent Passenger Station Based on Big Data Information Platform

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Abstract: Along with the continuous development of the social economy, the traditional industry began to supply structural reforms. The railway transportation industry is using Internet thinking to continuously develop its management model and industrial structure to cope with the diversified market structure. With the help of artificial intelligence technology and Internet big data, we will gradually expand the comprehensive product and service forms of high-quality projects such as organizational scheduling, smart passenger stations and intelligent services. At the same time, we adhere to the market and value orientation, and continue to introduce new concepts of special services according to customer needs to promote the sustainable development of the railway industry. This paper analyzes in depth from the aspects of network information, big data platform research and development, intelligent management and control, etc. The development and operation mode of “Smart Railway” will become a powerful driving force for railway development.

1. Introduction

The “smart passenger station” is to build the passenger integrated intelligent system (Intelligent Integrated Automatic System, IIAS system), and interactively connect the vehicle data (driving, passenger transport), maintenance, vehicles, electricity, roads and other resources, and other system data[1]. It integrates five platforms: intelligent office, intelligent transportation, intelligent management, intelligent customer service and intelligent travel service to realize judicious management of transportation production, safety management, daily office and passenger transportation services[2][3].

2. Smart platform construction

2.1 Creating a smart office platform to make office management easier and faster

Creating a comprehensive management information platform, including document circulation, safety foundation, technical regulations, performance appraisal, vocational education training, problem supervision, construction management, equipment management, personnel management, etc., to achieve process management automation, data analysis automation, automated performance appraisal, equipment management bar code, and intelligent personnel management.[4]

Through the use of intelligent office platforms, we will greatly streamline the personnel and expenses in the office process, vigorously streamline regulations and report books, vigorously streamline human intervention in the assessment management process, and vigorously streamline equipment management and maintenance costs to achieve a true paperless office and scientific management. Therefore, it can fundamentally improve management connotation and management quality.

With the improvement of facilities in the customer service system and the extensive use of high-tech equipment, each equipment or facility has the units of use, management and maintenance. [5] Inside the station, there are workshops and departments responsible for management and use. At the same time, there are also some workshops and departments responsible for professional maintenance. However, their duties of repairing, managing, and using are unclear. There is no clear inventory. The problem of unclear management is very prominent. With the help of “cleaning up the bottom of the family”, the station equipment and materials are all recorded to the management module in the device of the intelligent office platform. Each piece of equipment spare part has “registered residence” and “identity card”, which clearly identifies the responsibility for repairing, and implements daily inspection, regular maintenance, and closed-loop management of fault repair. It is able to configure production materials on site. Enter the system and you will know what’s there, what is missing, where it is, and what is the state. Thus, the refined management is realized, and the problem of disorderly expenditure and waste will be solved.

2.2 Creating an intelligent transportation platform to make the transportation organization more scientific and efficient

Through using all kinds of data from transportation organization comprehensively, we can establish 7 modules such as automatic plan editing system, automatic transmission and delivery system, automatic shunting system, automatic number management system, automatic workload statistics system, automatic inquiry system, and automatic key reminder system for transportation. It completely break the traditional organization model of railway transportation that has been used for decades. We can computerize transportation plan, start shunting plan with microcomputer, and arrange the pick-up and start-up line automatically. All these ways of working will be realized in today’s railway transportation process that we didn’t dare to think before. Such as:

2.2.1 Automatic plan editing system

To automatically edit 1h driving plans, 1h passenger working plan, and shunting operation plan. These will be released to relevant personnel after auditing.

2.2.2 Automatic transmission and delivery system

To automatically generate the access, control the direction, notify the related personnel about inspection, passenger transport of the service, and control card of anti-slip, inspection, feed-water, luggage and other operations.

2.2.3 Automatic shunting system

It is the automatic generation of the way, automatic card control derailment and other links.

By creating an intelligent transportation platform, the transportation organization is more scientific and reasonable, the on-site operation is more standardized, and the trainers are more capable.

2.3 Creating an intelligent management platform to make security management more standardized and more controllable

To integrate and optimize the safety management and integrated assessment system in the

integrated management information platform, we will establish early automatic warning system about operational risk, key operational alarm system, automatic risk warning system for control risks, automatic assessment and evaluation system about work quality, emergency command system. According to this, a safety management system integrating civil air defense, physical defense and technical defense is formed, which realizes the automatic identification, early warning and control of safety risks. It can automatically evaluate the quality of operations, analyze and replay the operation track. The control safety is intelligent, which will effectively implement the main responsibility of safety management in the station, the responsibility of supervision and inspection of cadres at all levels, and the post control responsibility of front-line workers.

2.3.1 Highlighting the risk management of the operation process.

For the operation process and standards of a class, setting the operation point, key part, inspection time, feedback receipt towards the risk control of the employee's operation safety. After the completion, the system will automatically receive the receipt of which job to do, which parts to watch, and when to go. If it is not completed, the system will automatically alarm to ensure that the on-site operation is always in an orderly and controllable state.

2.3.2 Highlighting the risk management and control of management responsibility.

According to the management responsibilities for the cadre safety, setting up the real-time recording module that the cadre must arrive, must watch, must check and must manage. On the other hand, completing the automatic statistics, qualitative and automatic analysis of the problem, automatic evaluation of work quality, automatic alarm of loss and of control. At the same time, the "problem supervision" module in China Unicom's intelligent office platform is included in the system management from the problem proposal, responsibility definition, tracking rectification, rectification and number cancellation. Recording and analyzing in real time who will solve it, who will check it, when to solve it and how to solve it. In this respect, we might scientifically evaluate the quality and effectiveness of their safety management duties, and comprehensively improve the standardization of safety management.

2.3.2.1 Early automatic warning system about operational risk

According to the 1h operation plan, the system automatically determines the key operations of traffic and passenger transportation, determines the operation risk, and prompts the operator.

2.3.2.2 Key operation alarm system

Canceling the receiving and shunting roads, using "enforcement", and some sealed and locked buttons of the auxiliary, the total personnel solution, district solution, etc. to change the shunting operation plan.

2.3.2.3 Automatic risk warning system for control risks

The automatic warnings include misconduct in the workplace, excessive number of problems, out of control of risk points, key personnel on duty, construction risks, and progress in the performance of cadres' due diligence assessment.

2.3.2.4 Automatic assessment and evaluation system about work quality

Self-control rate of the train, self-control rate of shunting approach, punctuality rate of the train, signal time, quality evaluation of 1-hour plan, ticket sales, transportation revenue.

2.3.2.5 Emergency command system

Emergency disposal process, emergency telephone, rescue resources, rescue radius of portable satellite system.

2.4 Creating an intelligent customer service platform to make the service experience more convenient and more autonomous

In order to integrate the original function of customer service system, considering the passengers' requirement and experience, we establish automatic service system of passenger ticket, automatic ticket checking system, automatic security inspection system, automatic guidance system, automatic answering system, automatic reminding system of key service, automatic management system of passenger safety, etc. Meanwhile, a large number of digital, intelligent and self-service facilities are used to enable passengers to complete the journey of the station stage in the fastest speed and the most compact way, from ticket purchase to boarding, from getting off to outbound. All the conveniences will be given to passengers, the service quality will be improved on an all-round approach, and the passengers of the post will be greatly reduced to achieve equipment efficiency, service efficiency, and staff reduction.

2.4.1 Developing mobile phone's app terminal of customer service and "one button" connects the whole station.

When the passengers enter the station, they may directly link client service APP terminal pass the WIFI in the station, which can perform "one-click" services such as the inquiry of train information, facility navigation, passenger information push, alarm and lost item search, and key passenger demand. Furthermore, through the APP terminal, in the future, we can also customize services for passengers, make reservations, and provide services such as "Little Red Riding Hood" reservation handling, special car transfer, VIP room service, station shopping, and car delivery according to passenger needs. Besides of service demand, passenger service personnel can be saved.

2.4.2 Adding self-certification system in the real-name and "brush face" is full of all-stop.

In the real-name verification department, the device of self-service verification is installed, and the face recognition technology is used to compare with the second-generation ID card information and ticket information of the passengers. If they are consistent, the gates will be opened and the passengers can wait for the bus. The real-name verification information is related to the information system of the ticket gate, and the passenger can directly enter the station when checking the ticket. Under special circumstances, trains that are out of service or late should be limited in passing time and number of trains in order to avoid false detection. In the meantime, it can also relate to the anti-terrorism and pursuit information on the public security department, and restrict the key personnel to enter the station.

2.4.3 Adding intelligent service equipment about passenger inquiry and "human-machine" dialogue is all-site communication.

At the passenger and ticket sales 12306 services desk, intelligent robots, passenger transportation of Unicom station and APP information terminals will be provided to provide passengers with accurate guidance and inquiry services through human-machine dialogue, which can provide accurate service information for passengers and reduce human conflicts.

2.4.4 Increasing the function of the control room towards passenger transport, and the organization command of passenger transport is through the whole station.

The control room of passenger transportation will be expanded and transformed. The 355 analog cameras of the station will be changed into digital cameras to clearly and intuitively reflect the on-site operation situation; The function of organization command about the passenger transportation will be integrated to establish an intelligent command system of passenger transportation. Moreover, the train operation and the dispatching line operation will be used. Delayed information is automatically generated and automatically released. In the event of an emergency, the integrated control room directly communicates with the scene screen, directly

directs emergency response, and realizes emergency management on-site.

2.4.5 Adding self-sale (taking) ticket equipment, and passengers will purchase tickets at all stations.

We will continue to increase the investment to add self-sale (taking) ticket equipment to the squares of north and south, passenger passages, arrival halls and other parts. Then the equipment will be timely expanded to shopping malls, hospitals, banks and other crowded places so that passengers can buy tickets and pick up them at any time. Even within a certain period of time, the passengers can directly purchase tickets to enter the station. We will further develop the ticket system, allowing passengers to independently handle ticket sales, change it, replace it, refund it, and automatic certificate it, which would greatly facilitate passengers to choose railway travel.

2.4.6 Adding an automatic guidance system.

Prompting automatically ticket gates, waiting areas, walking routes, etc.; Broadcast, access control, escalator, lighting, guide screen, and passenger position in the waiting room area are automatically monitored by the integrated control room platform.

2.4.7 Adding automatic management system about passenger safety.

The station is equipped with automatic safety door or landmark lamp with automatic reminder car number and warning line. If the passenger crosses the border the alarm will ring. The same goes for long delays on the platform, following up by many person in the gate machine, and falling into the platform.

2.5 Creating an intelligent travel service platform to make resource allocation more precise and scientific

We will make maximum use of all data and resources of passenger transportation to establish the evaluation system of passenger car, terminal system of Shen Tie customer service, service system of Shen Tie 12306, and integrated service system. Through comprehensive analysis, research and judgment, we are confident of providing accurate train operation plan and precise management of equipment and facilities. Passenger demands are adequately provided, maximizing revenue and expenditure, then maximizing operating efficiency.

2.5.1 Bus evaluation system

Carrying out detailed calculations on the passenger revenue, transmission volume and passenger load rate of each train, and automatically generating recommended schemes such as bus operation, addition and subtraction grouping.

2.5.2 Customer service terminal system

Establishing service terminals in various regions, networking with road, civil aviation, school exhibitions, business networks, hospitals and other flow information to form an accurate passenger flow calculation and train operation plan.

2.5.3 Railway 12306 service system

Reserving hotels, travel service of different cities, and “Little Red Riding Hood” services.

2.5.4 Integrated service system

It is connected with the industry such as Shenzhou car rental, Didi taxis, and scenic ticket reservations, and carries out paid services.

3. Conclusion

It can be seen that the degree of marketization of the railway industry will continue to increase in the future, and collaborative interaction with other industries will become closer and closer. As an important allocation function of the national transportation system, the railway's technological innovation and its core competitiveness will surely be highlighted. "Internet + Railway" is a far-reaching change that stresses the objective requirements for the optimization and upgrading of the transportation industry. According to the requirements of the important development strategy of the "One Belt and One Road", from the aspects of network information, ecological civilization construction and supply-side reform, the operation mode of "Smart Railway" will become a powerful driving force for the development of railway transportation enterprises.

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