Design of Logistics Transportation Dispatching Management System Based on GPS

Ningjie Wu

School of management, Hubei University of Traditional Chinese Medicine, Wuhan, Hubei 430065, China

Abstract

The development of modern logistics has only focused on the decentralized logistics functions, and attracted more and more attention to the integration of logistics processes. It is not only the integration of material flow, but also a flow of information integration process. The establishment of a high-speed smooth with dynamic interconnection of standardized information systems has become to enhance the competitiveness of the entire logistics enterprises to accelerate the development of logistics enterprises as one of the important factors. GPS-based logistics and transportation scheduling management system is designed to electronically use standardized format and the use of computer networks for full platform data exchange and data sharing to achieve vehicle transport network, information and digital management, which can also reach vehicles and optimize the loading of goods and improve vehicle utilization and volumetric utilization rate. We can speed up the operation efficiency of the whole transport enterprise, realize the standardization of enterprise operation and control the automation and reduce the operating cost of the enterprise.

Keywords: logistics transportation dispatching management, GPS system, sub-function modules.

1. INTRODUCTION

The GPS-based logistics transportation dispatching management system divides the system into six main functional modules through the analysis and extraction of the pre-acquisition needs, which contains namely the basic information module, the customer management module, the daily business module, the transportation cost management module, the statistics query module and user management module. The daily business module is the main module of the system, which completes the transportation service from the order to receive the return to the entire transport business process, but also the system is the most complex (Zheng, 2009). The system analysis describes the most time with a module. The design of daily business module has a direct impact on the promotion of logistics and transportation scheduling management subsystem products (Ochieng, 2003).

The basic information module is a functional module that provides the management of the basic transportation information in the transportation organization. It is the basis of the operation of the whole logistics and transportation information system, which includes personnel information, vehicle information, vehicle type information, carrier company information, carrier quotation information, carrier contract information, line information, key information, proportional setting information and material category information (Tan, 2012). It records the original data of personnel, vehicles and lines, and then manages the historical information of the transportation company or the existing resources of the enterprise. In addition, it provides the basis for the operation of the whole information system (including dispatchers, loading and unloading workers, etc.). Vehicle management includes both the management of its own vehicle information, the management of external vehicle information, the management of external vehicle information, which are mainly through the contract with the contractor signed a contract in the form of the management of the vehicle (An, 2016). Line management is the company's fixed line information management in order to provide the transport control department, and it can also provide the basis for reference lines of transport. Of course, line information can also be transported and need to add, modify or delete in a timely manner. In order to realize the flexibility of the line, the concept of the transportation node is specially introduced in the system, and the transportation node information management function is set up (Heywood, 2009). The so-called transportation node is the network of the logistics system network. The nodule connecting the logistics line is called the node. The node plays an important role in
optimizing the whole logistics network. It not only realizes the convergence of logistics network but also provides the management and service of logistics information (Che, 2014).

In the transport process, with the help of GPS technology to provide services to the transit transport vehicles in real-time monitoring, it can understand the driving state of the vehicle to grasp the completion of the cargo task to prevent the driver to increase the operating costs of private lines (Lu, 2012). In addition, it can provide customers with the transit goods and vehicle information query function to facilitate customers for grasping the transport of goods and the completion of the situation. The daily business management includes these sub-function modules such as the information management of the consignment note, the management information of the departure orders, the information management of the injury, the management of the income settlement, the management of the expenditure settlement, the management of the contracted vehicles and the return business (Zhao, 2009). The main function of daily business management is from the business to complete the delivery process. To complete the process, it is based on documents, whether it is the receipt of goods, shipping stowage, transportation costs settlement or transport accident payments. And they are based on the business process of the shipping order, then the departure of two major documents can be carried out, which is also in line with the general transport business operations model (Zhang S, 2015).

2. DETAILS OF THE MAIN BUSINESS FUNCTION

2.1 Main business process

The main business is the logistic transportation dispatching management system from receiving the shipping order according to the order of loading vehicles, and then beginning to transport, and finally confirming the receipt of whole transportation dispatching management business process. It is the core business of transportation organization. It is the key link to create enterprise profit and improve enterprise benefit. The optimization, implementation and accomplishment of the main business are directly related to the survival of the enterprise. Therefore, it is also the most critical business module in the logistics and transportation information system. Figure 1 shows the main business workflow, and the task scheduling center first documents receiving freight. A major source of these documents is that customers fill through online or customers book documents sent by fax (Ren, 2009). Whether it is the kind of way to get the transport task list, we should go through after the formation of a unified standard format.

![Figure 1. Master business process diagram](image-url)
The bill of lading includes suppliers and distributors of information and delivery shipments in line and address and goods information and date information and so on. Then, the dispatching departments have been confirmed to transport goods to single, weight or volume of vehicles, personnel and line scheduling, grid generation single print car. In addition, the driver door loads, confirms the print orders and confirms the dispatch center in transit vehicles and vehicle tracking system at any time. Thus, it can provide customers with the operation of the vehicle. Finally, after the completion of the transportation, we can receipt the confirmation according to the transportation situation. And the driver to the settlement center of the settlement and settlement of freight, freight settlement center and the customer (Yao, 2009). As shown in figure 1, master business process diagram is given in details.

2.2 System analysis and implementation

Use case refers to the user from the user point of view, which describes the external things (activities) and the system interaction. And it expresses the function of the system, that is, the services are provided by the system, and it point out the function of the operator. The use case diagram is a visualization tool that describes the use case, which uses a simple graphical element to represent the activities of the system. The use case and the relationship between them can provide services with the exact expression of the interaction between the activities of the system. The use case diagram is concise and clear, and the description of the requirements of the norms can better avoid the ambiguity of expression. The user and system developers can understand the needs of the system to reach a consensus. The use case diagram includes the activities, the use cases, and the links between them. The actor is a role that the user acts on the system. The actor represents the role that the system user can play. These users may be human, and may be some other hardware or even other software systems. The only standard is that they must be outside the system part that is divided into the use case. They must be able to stimulate the system part and receive the return. Its graphical representation is a villain. We use the line without arrows to connect the role and use cases, which is said the exchange of information between the two, called the communication link. As shown in figure 2, the logistics transport scheduling management system is given in details.

![Figure 2. Logistics transport scheduling management system use case view](image)

According to the results of the previous research, the use of Microsoft Visio tools design the logistics transport scheduling management system use case view combined with the UML knowledge points. The use cases at the system level point out the six major sub-use cases of the logistics transport scheduling management system. These sub-use cases include basic information use cases, customer management use cases, major business management use cases, transportation cost management cases, user management use cases, and statistical query use cases.
3. SYSTEM ANALYSIS AND IMPLEMENTATION

3.1 Actuator selection

Building a software system architecture is the core element of a software system, the most difficult part of the system, and the basis for building the rest of the software system. Therefore, the system architecture is fundamentally determined based on the architecture. The quality of the software system and the software development process are an important work, but also a very difficult job. Based on the .NET enterprise architecture model, this system designs the software system architecture of the n-tier architecture, namely: browser, business interface layer, business rule layer, data access layer, stored procedure, entity table. In fact, it basically still is a three-tier architecture of the system. One of the business logic layer is divided into business interface layer, business rules layer, data access layer and other layers, which can improve the system scalability and integration.

3.2 N - layer structure

As shown in figure 3, the N - layer structure diagram of logistics transportation dispatch management system is given in details.

![N-layer structure diagram](image)

**Figure 3.** N - layer structure diagram of logistics transportation dispatch management system

4. EXPERIMENTAL TEST

In the system test, most of the work is done manually by the project team members due to the lack of testing tools, which are automatically tested within the enterprise. Before the system test, the project team first does the test software system to prepare a reasonable set of test data, set the error handling channel for these data and write test cases for the functional test. For the robustness test, the project team simulates a set of erroneous data, analyzes the system's error handling capabilities, and ensures the normal operation of the system. For the security testing, project team members simulate illegal users, the system for a variety of operations checks the system security vulnerabilities and improves system security. After the test, the tester gives the preparation of the wrong results according to the test results. In the process of testing the whole system, the project team members have limited knowledge of the test, and the setting and execution of the non-functional test only stay in the general sense of understanding, and we concern more about the system function to achieve the problem. Then we take the example of the management of the single operation and the process of system testing.
Figure 4. number of factory vs cost of time

From the above figure 4, we can find that using the scheduling algorithm proposed in this paper can effectively improve the efficiency of the system. This is because this method can coordinate the relationship between vehicles and goods. Thus it can greatly improve the load of vehicles, and it can avoid vehicle return when the car has no-load.

Figure 5. number of factory vs profit

From the above figure 5, we can see that the use of this algorithm can get the profit of the logistics system to maximize the profit. Because the use of this method of the vehicle's load factor has been increased, you can
effectively improve the profits of logistics enterprises. Therefore, this system can not only improve the utilization of resources, but also bring more profits for the logistics business.

5. CONCLUSIONS

The establishment of a high-speed smooth with dynamic interconnection of standardized information systems has become to enhance the competitiveness of the entire logistics enterprises to accelerate the development of logistics enterprises as one of the important factors. GPS-based logistics and transportation scheduling management system is designed to electronically use standardized format and the use of computer networks for full platform data exchange and data sharing to achieve vehicle transport network, information and digital management, which can also reach vehicles and optimize the loading of goods and improve vehicle utilization and volumetric utilization rate. We can speed up the operation efficiency of the whole transport enterprise, realize the standardization of enterprise operation and control the automation and reduce the operating cost of the enterprise.

REFERENCES