The overall framework of intelligent distribution system for real‑time response to customer change instructions

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Abstract

Logistics is closely related to our daily life, and the quality of its service directly affects the user experience. With the development of modern fast-paced lifestyle, people's physical geographical location is changing at any time, at present in the field of logistics and distribution customers can only passively wait for signature, this kind of logistics distribution method can not fully meet the needs of customers. Aiming at this realistic problem in logistics distribution service, this paper puts forward the "delivery method of real-time response to customer change instructions". The content of this paper will first expound the basic concept and characteristics of intelligent distribution system, secondly, show the design process of intelligent distribution system, and finally build the overall framework of intelligent distribution system to respond to customer change instructions in real time according to design ideas and principles, so as to realize the goal of "real-time response to customer flexible change directive".

Keywords

Real-time response, change instructions, system design.

1. Introduction

Logistics service activities, logistics and distribution directly to the vast number of customers, its quality of service will affect the overall logistics operation efficiency. Compared with the traditional distribution methods, real-time response to customer change instructions have a unique advantage. First, meeting the needs of customer flexibility. In the Internet era, any product or service must be centered on customer needs, customers can participate in the distribution process in real time through the information system platform, timely feedback their preferences and claims so as to ensure the quality of delivery tasks, and the second is to greatly reduce logistics costs. Cost is an important factor for enterprises to consider, logistics enterprises through the system platform can quickly respond to the dynamic needs of customers, reduce duplication and ineffective work, to maximize the use of modern computer technology means to complete the distribution task; third, stimulating the logistics enterprise's sense of innovation. In order to meet the flexible needs of our customers, logistics enterprises must subvert the traditional management concept and seek a more efficient way of operation.

With regard to the study of logistics system architecture, Kim J (2015) designed the transceiver and sorting query system with UHF RFID technology, which is based on a radio Wave identification label, the REID technology, which can detect errors immediately by detecting relevant data in real time, thus enabling real-time sending and receiving, inventory management and delivery history tracking, solving the errors about sorting the goods, measurement, receipt and delivery and so on；Aiming at the field of logistics management in large manufacturing industry, Straka M（2018）uses hierarchical analysis structure and simulated computer recognition ability to design the system architecture, and uses a simulation model to construct the whole system, which greatly improves the effectiveness of logistics system design; Xiaoyan Liu（2014） analyzed and studied the realization of distribution system, sorting service planning system and electronic label assisted picking and matching system,

and optimized and upgraded the logistics system in combination with sorting operation mode, sorting strategy and electronic information technology.

At present, the domestic logistics distribution information system only simply reflects the relevant logistics and distribution information, customers are not really involved in it, the system not only can't effectively carry out information interaction, but can not respond to customer change needs in real time. The overall performance of the distribution system is rigid, information feedback hysteresis. Based on this realistic problem, this paper designs an intelligent distribution system that responds to customer change instructions in real time, thus subverting the traditional distribution method, so that customers can truly participate in and lead the logistics distribution activities.

2. Basic conception of the system

The intelligent distribution system for real-time response to customer change instructions studied in this paper is aimed at non-specific user groups, providing our customers with online change of distribution parameter service through Internet Information technology, promoting their ability to participate in and lead the information system of distribution activities. This system puts the flexible demand of customer change receipt information first, give full play to the advantages of information system agglomeration distribution information resources, and realize the distribution service of responding to customer change instructions throughout the process.

Fig.1 below depicts the whole process of logistics distribution activities and customer management decisions for distribution logistics information. Express distribute through the delivery Point——Distribution Center Division——Distribution Center level three logistics node for layers. At any time in the distribution process, the customer can send the change information instruction request, the intelligent distribution system can give feedback in real time, and perform the change task in the next logistics node.
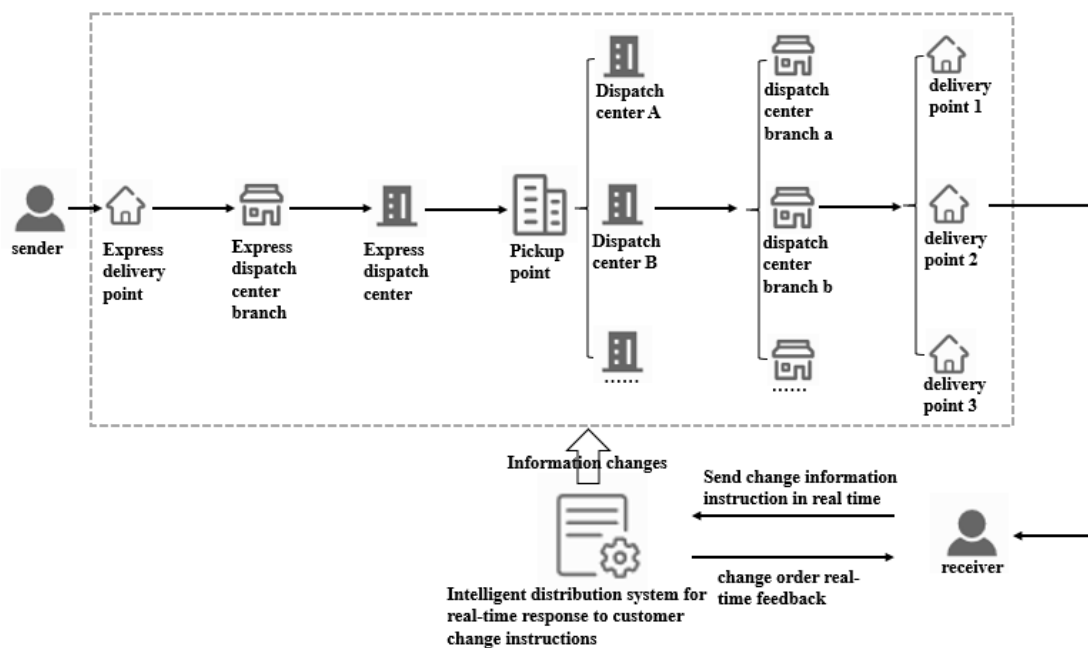

Fig.1 Intelligent distribution system for real-time response to customer change instructions

Note: The arrows in the box represent the decision area, and recipients can change the receipt information within this area

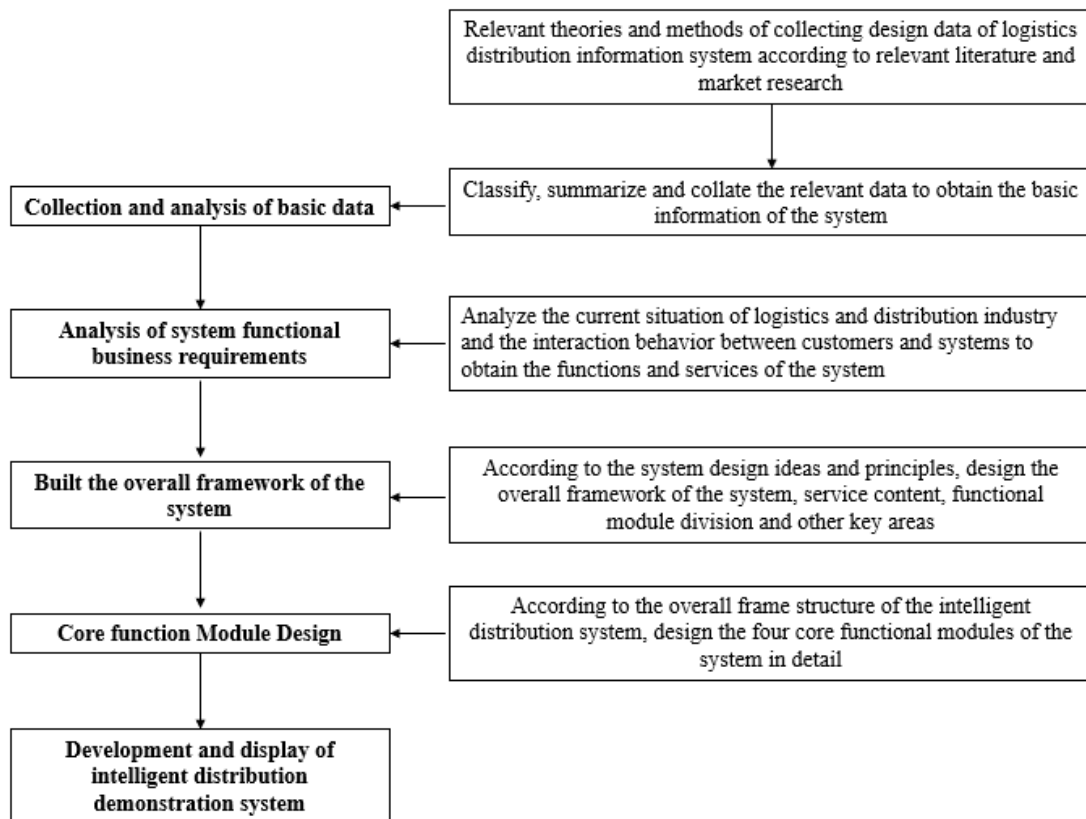## 3. Design flow of the intelligent distribution system

Fig.2 Intelligent distribution System design process for real-time response to customer change instructions

1. Collection and analysis of basic data

The first task of system design is to collect and analyze a lot of relevant data. Including relevant literature, regional economic development, logistics information system construction degree and other relevant theoretical information. Information is obtained mainly through field visits to research, online interviews, academic seminars, relevant seminars and so on. Through the summary, classification and analysis of this data, the basic information needed for the system design is obtained and used as the basis for the design.

2. Analysis of system functional business requirements

Requirement analysis is the premise and foundation of information system design and development, which directly determines the application function module of system service. According to the service object determined by the information system, the functions and services to be realized by the logistics information system and the interconnection requirements with the related application interface are analyzed. At the same time, from the point of view of System application, the data flow of information system is analyzed and predicted, which provides relevant support for the later design scheme.

3. Built the overall framework of the system

According to the idea and principle of system construction, combined with the correlation analysis of business function requirements, the system network topology map, overall frame structure and function module division are described in detail, which lays a theoretical foundation for the design and realization of the subsequent core application function.

4. Core function Module Design

This part expounds the four core application function modules in the above application layer from three aspects, such as module overview, Operation flow and module sequence diagram.

5. Development and display of intelligent distribution demonstration system

The development of the system is an important part of the design of this system. The application of the core function of the system is realized by using the computer related programming language, and the system test is carried out from two aspects of function and performance, which verifies the stability and reliability of the system operation.

4. System design ideas and principles

The intelligent distribution system of real-time response to customer change instructions aims to build a unified logistics information sharing and information real-time interaction system, to achieve real-time exchange of information between customers and logistics enterprises, so that customers truly dominate the distribution activities. Therefore, in the design part of intelligent distribution system, it mainly reflected in the overall framework structure design of the system from the Intelligent Distribution System function Module Division, core function module design and intelligent distribution system development and display and other aspects of specific elaboration.

4.1 Design ideas

1. To customer demand-oriented. Excavating the market pain point of goods in transit that the current logistics information update is not timely and customers can not dominate through the actual investigation of customers and logistics enterprises, this paper puts forward the design scheme of logistics information system to solve this problem, and studies the related application functions of the system, so as to improve the business processing efficiency of logistics enterprises, improving the quality level of logistics service.

2. In-depth analysis of the current status of logistics distribution information System, make full use of the existing mobile communication network, business system resources, data resources and other basic conditions, and through the construction of a unified information interactive logistics system to achieve real-time exchange and sharing of information, form the intelligent distribution System Information Database.

3. Through the intelligent distribution system, logistics enterprises and customers and other subjects can carry out real-time exchange of logistics information, for enterprises that already have information systems, we need to dock with their information, exchange real-time electronic data to achieve integrated management. In other words, intelligent distribution system should have powerful information sharing processing ability, and can realize real-time exchange and connection of information across systems across the system.

4.2 Design principles

By analyzing the demand of logistics information system, the principle of practicality should be placed first in the process of system construction, guided by concrete practical application, we also should take full account of the openness, extensibility, security, reliability, ease of use and maintainability of the system, as shown in Fig.3 below.
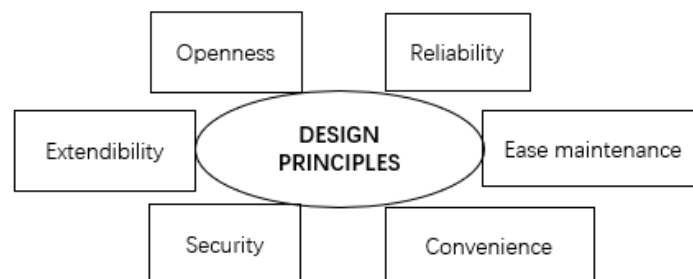

Fig.3 Design principles of intelligent distribution system

1.Openness

In the construction of intelligent distribution system, the compatibility of the system should be fully considered, so that the information system and other systems or platforms can be transmitted in real time, so as to integrate data from different sources.

2.Extendibility

Distribution system design should fully consider the future development trend of China's logistics industry, the system should be scalable, when new market demand appears, the system can be timely function update and application expansion.

3.Security

Intelligent distribution System is open to users such as logistics enterprises and the general public, so when planning and designing the system, we should consider the security of the system, strictly manage all kinds of user rights, adopt the relevant network security technology, prevent illegal intrusion and malicious operation behavior and cause the system to be paralyzed.

4.Reliability

Intelligent distribution System can provide 24 hours of uninterrupted service throughout the year, in the early stage of system planning and design, we must fully consider the reliability of the system, analysis of the probability of the occurrence of various events, so as to avoid the loss due to the problem that a certain link caused.

5. Ease maintenance and convenience

Intelligent distribution system should have a friendly operation interface, user interface should be as beautiful and concise as possible. In the design and use, should reduce the technical difficulties of operators, the realization of "silly" mode of operation, to the maximum extent to meet the use of users.

5. Framework design of intelligent distribution system

5.1 Choice of System architecture patterns

The design pattern of information system architecture is divided into two main types: Client/Server structure mode and Browser/Server structure mode, that is, C/S and B/S structure mode. Table 1 provides specific differences in two modes. The system requires users to be able to send change instruction information in real time through intelligent terminal, that is, users can access the system at any time without geographical restrictions. In addition, the system is for non-fixed user groups, the software reusability requirements are high. Therefore, the system architecture design mode selects B/S structure mode.

Table 1 A comparative analysis of B/S structure and C/S structure

	B/S structure	C/S structure
Hardware environment	Built on a wide area network, with a stronger range of adaptation	Built on a small private network, LAN provides data connectivity and switching services through dedicated servers
Target group	For non-specific user groups	Facing relative fixed user groups
Security	Relatively weak security control capability	Strong ability to control security
Application architecture	Based on a more optimized basis, fully support the network component building system	More attention to the process, can be multi-level verification of permissions, less consideration of the stability of the system
Software reusability	With multiple structures, components have a relatively independent function, can achieve better reuse	The reusability of components is not as good as that of B/S structure requirements
System maintenance	Support individual replacement of components to achieve seamless system upgrade and minimize system maintenance costs	Must be considered as a whole, system upgrade is difficult
User interface	Built on a browser, communicate with users in a richer and more vivid way	Mostly built on Windows platforms, with limited performance and high requirements for user operational skills
Information flow	The flow of information is ever-changing and interactive	Centralized mechanical handling with relatively low interactivity

5.2 System architecture design based on B/S mode

According to the comparison and analysis of the above two architectural models, the system adopts B/S structure design mode. Its general operating logic is: (1) The client sends a request: The user submits the form operation on the browser page, sends a command request to the server, waits for the server to respond; (2) Server-side processing request: After the server receives the user command request, the request is processed by the application processing technology (such as JSP) and the response is generated ；(3) server-side Send response: The server searches the database for data (such as Web files, pictures, audio materials, etc.) according to the user's request, and returns it to the browser[0]. Details are shown in Fig.4 below.

Fig.4 B/S system structure diagram

Based on the system structure diagram of B/S design pattern, the three-layer structured system framework of intelligent distribution system is constructed according to the systematic principle and combined with the practical application of the system (see Fig.5 below), namely: representation layer, application layer, data layer. Each level requires the use of data resources at the previous level.
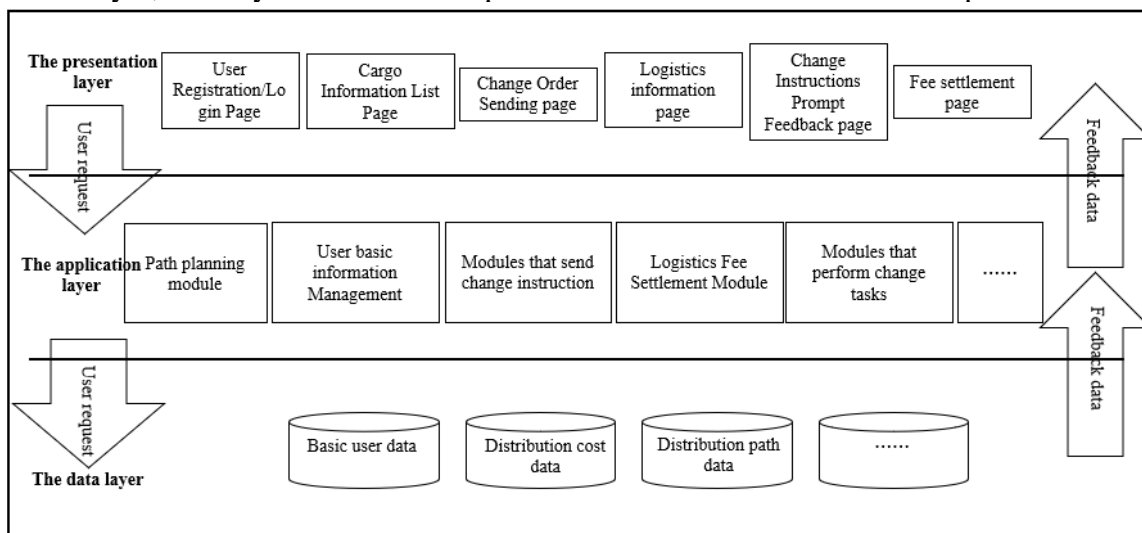

Fig.5 Schematic diagram of intelligent distribution system architecture

1.The presentation layer

The presentation layer is at the outermost layer of the system's overall framework structure and is used to render data entered and accepted by the user, providing the user with an interactive interface. The interface in this system includes: User registration/login page, cargo Information List page, Change Order sending page, logistics information page, change instruction prompt feedback page, fee settlement page, etc. The presentation layer of an intelligent distribution system that responds to customer change instructions in real time is presented through JS pages and HTML documents. The JS page is primarily a display of the dynamic effects of Web pages, and static pages are rendered through HTML documents[0]错误!未找到引用源。. Users access the Representation layer page through a browser page. The specific design structure of the presentation layer is shown in Fig.6 below.
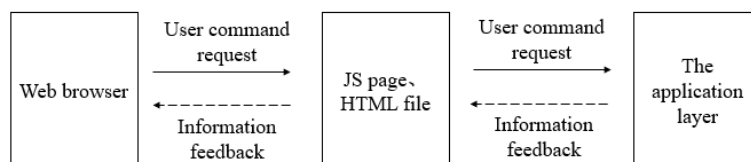

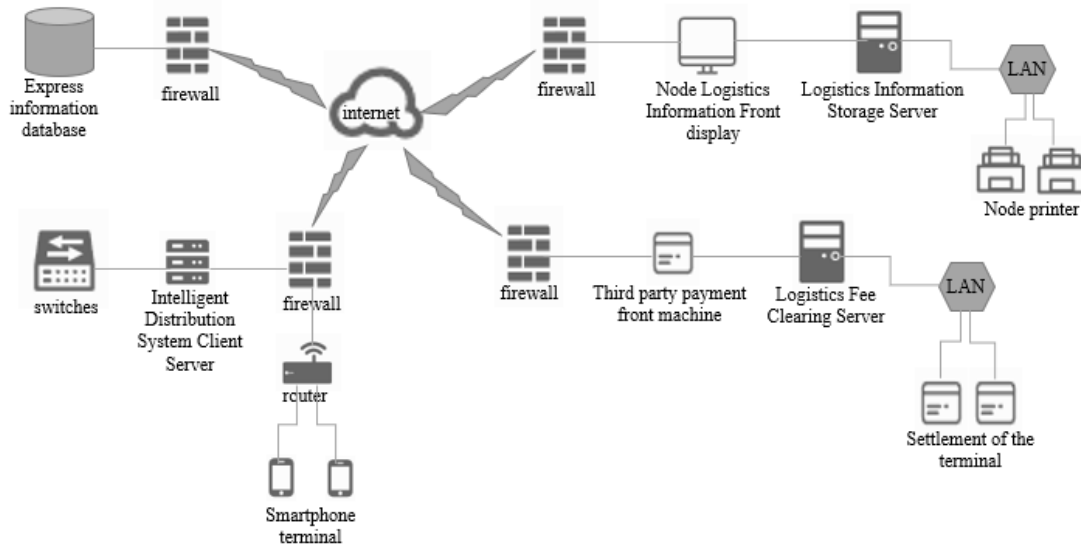Fig.6 Design of representation layer of intelligent distribution system

Fig.7 Network topology diagram of intelligent distribution system

2.The application layer

The application layer of intelligent distribution system is mainly to realize all the application functions of the system, according to the various instruction requests sent by users in the representation layer, provide a variety of application function services, and feedback these information to the user.

The functions implemented by the application layer of intelligent distribution system include: User login management, cargo information management, logistics information management, change instruction sending management, logistics cost settlement. User Login management enables verification of user accounts and password logins to ensure that users have normal access to the system. Cargo information management includes the operation of increasing, reducing and deleting cargo information, and the user can carry out the related operation of cargo information through the representation layer. Change instruction sending management is the core application function of this system, the user can modify the receiving information operation in the representation Layer Web interface. Logistics cost settlement management mainly according to the relevant distribution cost pricing rules to account for the distribution costs, through the introduction of third-party payment tools to achieve the successful completion of settlement tasks.

3.The data layer

The data layer of the intelligent distribution system mainly stores the data information related to the application function, including the basic user information: The user name, the user contact number, the user address. Cargo information includes: Product name, product picture, product details, place order time and order number, etc. Logistics information includes: Logistics company name, Waybill number, logistics distribution route, logistics details, receiving information, sending information, change instructions feedback tips. Logistics cost settlement includes: Fee amount, payment method, Payment account number, payment password. The data layer stores and manages this data and transmits and interacts with the application layer for data.

5.3 System network topology

Network topology refers to the interconnection of various physical devices through the transmission media, that is, how to connect computers, intelligent terminals and printing equipment in the network 错误!未找到引用源。. Network topology refers to the interconnection of various physical devices through the transmission media, that is, the way in which computers, smart terminals and printing devices in the network are connected. Topology diagrams include connections to devices such as firewalls, network servers, and smart terminals. The detailed network topology diagram of this system is shown in Fig.7 below, which includes the Intelligent distribution System client server, logistics information memory,

logistics cost settlement server and express information database. Customers through the mobile intelligent terminal can access the distribution system, the relevant change information operation, through the API interface to introduce third-party payment tools, to achieve real-time settlement of logistics costs. To protect the security of your data, firewalls are set up before you connect to the Internet.

6. Conclusion

This paper first expounds the basic concept of intelligent distribution system that responds to customer change instructions in real time, and clarifies the overall design process and design principles of the system based on market research and customer demand analysis. Finally, from three levels to build the framework structure of intelligent distribution system, from the overall grasp of the system design ideas, and finally achieve the "real-time response to customer flexible change directive" goal.

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