New Intelligent Logistics Mode Based on Intelligent Express Box

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Abstract. The Internet of things is the product of the information waving in the new era. It rapid development has been widely used in daily life. This paper introduces an automated, digital intelligent logistics model. It introduces intelligent equipment in the entire logistics chain, and utilizes big data analysis and integrated warehouse system management mode to reduce personnel costs to improve link efficiency resource scheduling. Under the invisible push of the market, whether the intelligent logistics can be popularized comprehensively has become the key that restricting the development of the logistics industry in the future.

1. Introduction
In the recent years, with the gradual maturity of e-commerce, in order to adapt to the new economic model, intelligent logistics and warehousing equipment has become the core intelligent manufacturing equipment in China, which has been highly valued by the government and favoured.by enterprises. Compared with other industry, logistics industry have the most requirements in the capacity of storage and it cannot be satisfied by the current level of intelligence, so it will become a development trend to apply intelligent equipment in all aspects of logistics. Mature RFID, big data-based cloud computing and precise positioning technology make it become a reality. The express cabinet becoming the infrastructure of large cities marks that the logistics industry has taken the first step to explore the intelligent logistics chain. And their ultimate goal is to build an intelligent logistics ecological platform.

2. Logistics model in transition
Under the condition that e-commerce gradually replaces the offline brick-and-mortar store model, logistical production value occupies the market total share is rising steadily with the gradual improvement of logistics equipment. By 2017, the total volume of social logistics has reached 245 trillion, with a growth rate of 7.81 percent. Increase of market demand makes industry competition become more and more intense. Continuous reduction of unit price has led to the major logistics enterprises in order to save costs and repeatedly lower the threshold of practitioners. Even so, the gap between demand and shortage for work force is widening. As a result, it is difficult to solve the situation of Last One Kilometer, and terminal distribution becomes the main problem. The improvement and popularity of hardware equipment can not keep up with customer’s requirements on service quality. Backwardness of informatization leads to customers’ inability to accurately chase and inquire the goods information, which is also one of the causes of high loss rate. On the other hand, in the internal supply chain, these is no effective connection between packing, sorting, transportation, warehousing and delivery in the whole logistical process, which cannot realize the logistical demand maximized by a single transport. Such a reduction in efficiency also wastes a lot of manpower and materials.
3. New logistics solutions - intelligent logistic

3.1. Conceptual explanation

Intelligent logistics is the ideal direction for the development of modern logistics, and it is a great reform of the logistics industry in the intelligent management of traditional logistics technology. Intelligent logistics applies IoT technology and uses integrated intelligence using barcodes, RFID, sensors and global positioning systems to build a central platform. The network management technology is utilized to virtualize the database of dynamic logistics informationization. It will make the data label clearer, the real-time processing more efficient in the transportation, storage, handling, packaging, distribution processing, distribution, information processing and other links (like fig1), and the allocation strategy more optimized. In general, intelligent logistics will greatly improve the level of logistics services - the output of distribution efficiency in the intelligent logistics chain will be able to be improved as never before, and the logistics cost will be reduced considerably - the cost of the intelligent logistics chain can be It is said that it only exists in the launch of pre-development, and it can play a role in protecting the environment - effectively reducing the loss of natural resources and social resources.

Fig1. Intelligent logistics process

3.2. Intelligent Logistics Based on Smart Courier Box

A key part of intelligent logistics - smart courier box. In order to design and improve the intelligent express delivery service system, we designed a new express box based on NB-IoT technology to provide users with higher quality intelligent services. This is a courier box with a variety of standard sizes, dynamic link database, real-time positioning, fault alarm and more. And one box corresponds to one package, one package corresponds to one user, and the geographical location and its own state are updated all the time, so that the information is highly transparent and truly connected with the user.

The express box is mainly composed of STM32 control chip, NB-IoT module, indication module, GPS positioning module, Bluetooth unlocking module, power management module and power supply(like fig2). The hardware side uses STM32L476RG Nuleo as the development board, which is mainly divided into NB-IoT module, indication module, alarm module and so on. The initial positioning of the GPS module and the small-range positioning of the NB-IoT module enable precise positioning, and the networking function of the NB-IoT module ensures the clearness of the position of the express box, and can also improve the query distance for the logistics personnel to operate the express box. Work efficiency. The indicator module control indicator gives the user an operation prompt. For example, when the indicator light is red, the user is informed that the courier box is being used, and when the indicator light is green, the user is notified that the operation can be normally used. The alarm module is composed of NB-IoT chip and buzzer. When the courier box is illegally misappropriated, the offset distance is judged by NB-IoT in real time. When it exceeds a certain range, the buzzer will alarm and send a prompt to the logistics personnel. Information, start anti-theft measures.

The combination of soft and hard forms, with software control hardware, joint control of items. The design concept of the intelligent courier box is to use the idea of network control items, laying positioning, automatic alarm of dangerous state, smart password lock and other functions.
Client, server, transmission network, NB-IoT communication base station, express box terminal. The client includes the logistics personnel management terminal and the user terminal. The logistics personnel management terminal is used to regulate the distribution of the idle boxes. The user orders and queries the express dynamics on the client side, and the transmission network is responsible for the data transmission. The server of the mainstream center is the processing core of the whole system, storing user data, express information and express box information: the user will be required to register the real name after registration, and can be used to purchase express insurance for the user. If the item is found to be illegal during security check. When the item can assist the relevant part to trace; through the communication with the courier box terminal, the user and the logistics manager can be informed of the location of the courier; the server can also query the courier box information at any time, if the courier box of a certain area is very dense or there is no courier box The logistics management personnel will be notified to dispatch in time. The NB-IoT communication base station is the hub between the server and the courier box terminal. The express box terminal is a service provided for the user. After the user places an order and obtains the permission to open the express box, the user can send the mail, and the user can obtain the permission to open the express after receiving the interval notice, and then the express can be obtained.

After being put into use, the project can alleviate or even solve the contradiction between the increasing domestic express delivery demand and the backward technology of the express delivery industry, and provide users with intelligent and convenient express delivery services. We use the intelligent technology based on "NB-IoT" technology to apply to the express box, and reduce the large amount of manpower consumed in the traditional logistics system with the concept of "easy to live with intelligence". The distance of the last 100 meters of the courier is no longer there, and it becomes more convenient and convenient.

Fig2. Smart express box structural components

4. Warehousing accounts for the main cost of the logistics industry: integrated management under big data

The warehouse takes on the transit role in the shipping process, and express delivery across the country needs to arrive at the transfer station to distribute to their respective destinations. Therefore, the location and storage capacity of the warehouse are critical to the cost and efficiency of the logistics company. The application of big data in warehouse location is to use the logistics data in recent years, according to the classification of logistics needs for different regions, combined with various constraints, computer learning and automatic optimization, thus giving a near optimal solution Location model. The second step is the pre-estimation of the demand. The big data era brings different labels to the business users: consumption level, consumption habits, etc., and these characterization data are handed over to the computer for analysis, so as to realize the pre-aware storage demand, under great pressure. Pre-storage before coming. In addition, the warehousing department can reduce many human resources with the
help of the management system. The advantage of the smart courier box applied to intelligent logistics lies in its high degree of informationization. Its configured radio frequency identification (RFID) technology makes each box have unique RFID electronic tags, receiving, warehousing, picking, and matching. Loading, inventory, delivery, positioning, scheduling, these tasks are assigned to the warehousing management system (like fig3) to arrange, can greatly shorten the storage time, save costs, achieve operational and management integration, give play to the overall advantages, to make up for the shortcomings of traditional express management loose.

Fig3. System overall design process

5. Highly intelligent in all aspects of logistics
Based on the intelligent logistics of Internet of Things technology, all aspects of logistics activities can be completely intelligent. The idealized intelligent logistics factory is completely based on computer software. This system monitors the position and status of all courier boxes. It widely uses weighing and scanning code to quickly and accurately measure the size of the goods in the box and automatically input the data. Quickly identify bar code information, and generate orders for customers to query; use automatic guided transport vehicles and sorting robots in the factory, and all kinds of sensors equipped with them can quickly transport and sort goods under the control of the management system. In addition to the daily maintenance personnel of the equipment, the entire plant has reduced most of the personnel resources, which not only reduces personnel costs, but also improves the reliability of each link and improves logistics efficiency. When the courier box reaches the major collection points, the recipient can be notified to arrange the time to pick up the pieces. The new express box is light in weight, high in surface hardness, wrinkle resistant and flexible, and the cost of use is lower than that of traditional cartons. And the intelligent express box is equipped with GPS positioning system for precise positioning and real-time viewing.

6. Introduction of intelligent logistics scheduling
In the logistics process, in order to get the best solution. Logistics companies need to arrange and dispatch their vehicles and personnel reasonably based on cargo specifications, specifications, shipping locations, and whether they are expedited. After the introduction of the concept of intelligent logistics scheduling, it is not only the external logistics chain that is affected, but also the internal integration. The intelligent logistics chain can analyze the data of goods, vehicles and personnel, including inventory information, vehicle transportation status, freight, execution efficiency, etc., and make the transition of each node more harmonious. Intelligent logistics scheduling can effectively improve distribution efficiency, reduce costs and increase work flexibility.
Prospect

The grassroots level of the logistics industry has always been difficult to recruit and has a high turnover rate. The current intelligent logistics can be completely artificialized. It will give most of the work to the automation machinery and replace the traditional paper packaging with the smart express box. Integration of links. Undoubtedly, the efficiency of the machine is much greater than that of labor, and the efficiency of the entire logistics process is gradually increasing in the process of de-artification. Many companies now have invested a lot of money to start the first step of manual labor. For example, the global unmanned intelligent distribution station independently developed by Jingdong has been built and put into use in the Xi’an National Civil Aerospace Industry Base in Shaanxi Province; It can realize services such as self-raising, returning, sending and receiving parts. In the near future, the intelligent logistics of these fixed-point trial operations will gain widespread attention after obtaining large-scale affirmation from users, and the logistics cost will be paid attention to after large-scale use. At the Global Smart Logistics Summit in 2018, Ma Yun announced that Alibaba and rookie will build a nationwide intelligent logistics backbone network and invest hundreds of billions of yuan. Create greater profit margins for the manufacturing industry through intelligence and synergy. Only by striving for the largest scale of intelligent logistics, strengthening logistics infrastructure, upgrading intelligent technology, logistics costs can be fundamentally resolved. In the face of customers, the reduction of logistics costs will inevitably mean more favorable and efficient express delivery services. One of the advantages of the new express box used in our intelligent logistics is convenience. The user does not need to communicate with the manual. The whole process of selecting the time and the app to query the express information in real time will be convenient and humanized. A major direction for the development of intelligent logistics in the future.

Conclusion

Today, when smart applications are strongly advocated, we should focus on the benefits of bringing intelligence to life. In the era of e-commerce e-commerce, there is no doubt that who can take the lead in building an irreplaceable intelligent logistics industry chain, who can occupy an almost unshakable advantage in the industry. Therefore, the application of intelligent logistics seems so unacceptable. Looking forward to the new changes in the e-commerce era that intelligent logistics is fully applied!

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