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Research Article

Intelligent Logistics Enterprise Management Based on the Internet of Things

Fang Li [1] and Tao Li [2]

[1]School of Economics and Management, Jiaozuo University, Jiaozuo 454000, China
[2]School of Electrical Engineering and Automation, Henan Polytechnic University, Jiaozuo 454000, China

Correspondence should be addressed to Tao Li; litao_hpu@163.com

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At this stage, many large domestic logistics companies have problems such as complex processes, low efficiency, and chaotic vehicle management. This usually leads to vehicle failure, material loss, or improper installation of the company's factory, which affects the company's interests and damages the company's reputation. In response to the above problems, this article proposes, designs, and implements an intelligent logistics management system based on the Internet of Things technology through the research of the Internet of Things technology at home and abroad. The specific content is as follows: one is to study the origin and current situation of the Internet of Things technology at home and abroad, to understand related theories and cutting-edge technologies of the Internet of Things; the other is to imitate intelligent logistics companies, study the processes and existing problems of the logistics link, and integrate the management concepts of the Internet of Things. A model of intelligent logistics enterprise management is established with enterprise intelligent technology; the third is to conduct an experiment on the management of an intelligent logistics enterprise and do an experimental data analysis of the management of an intelligent logistics enterprise. Experimental research shows that the data of factors affecting logistics operations in smart logistics companies are low, and smart logistics companies are operating in good condition, and the established data model is suitable for smart logistics enterprise management. The Internet of Things and intelligent logistics management are both emerging concepts, while the intelligent logistics management based on the Internet of Things is still in its infancy, and relevant scholars have little research on the intelligent logistics management based on the Internet of Things. It plays a guiding role for the intelligent logistics management of enterprises and promotes the management of intelligent logistics enterprises.

1. Introduction

With the development of social economy, the operation and operation of social capital must be included in the allocation of logistics assurance knowledge and efficiency, which is why logistics management methods play an important role in maintaining and operating performance. For logistics companies, the management of road logistics companies will directly affect the call and control requirements of various branches and departments in the company's operations [1]. Under the background of intelligent development, enterprises may not be able to deviate from the correct logistics operation and management methods and must adapt to the changes of the times to help enterprises improve the logistics management level of logistics enterprises. Optimizing and developing logistics companies are some important aspects that can play a role in improving the logistics level of the logistics community. It promotes the development of the logistics community under new conditions. Under the new growth trend, logistics enterprises are turning to the status quo in order to increase the market competition of industry, technology, and intelligence. Under the new growth trend, logistics enterprises have put forward new requirements for logistics management [2].

In the development process of the existing logistics projects, the intelligent management mode has problems such as inert information collection and loose treasury management. The advanced intelligent logistics project model on the Internet of Things has improved the distribution rate of logistics to a certain extent in terms of business. Logistics enterprises and business activities are interconnected, and the development of logistics provides rapid growth of merchants and enterprises. The application of intelligence in the field of logistics is mainly to apply the Internet of Things technology and intelligent algorithms to the logistics information management system. At present, IoT devices such as RFID, electronic tags, and sensors have long been used in logistics and transportation. Combining network technology, automation technology, cloud computing technology, GPS, GIS, and other technologies, many large domestic enterprises have formed a full coverage, visual real-time monitoring, network synchronization, and efficient and intelligent logistics system [3]. At the same time, over the years, the intelligent loading and vehicle allocation algorithm, intelligent scheduling algorithm, and optimal path design have been deeply studied at home and abroad. At present, the mainstream intelligent algorithms of logistics scheduling include genetic algorithm, ant colony algorithm, simulated annealing algorithm and particle swarm optimization algorithm. Moreover, the division of labor in the logistics business is becoming more and more detailed, the understanding of the algorithm is more and more profound, and the research is also more and more in-depth [4]. They often use a combination of algorithms to solve different business models. Therefore, intelligent logistics has brought great changes to the entire logistics industry. It is applied to each key link of the logistics business, which greatly improves the efficiency of logistics transportation, reduces the cost of logistics transportation, and improves the satisfaction of logistics services. This will be the future development direction of the logistics industry [5].

With the continuous penetration of the Internet of Things, e-commerce is a logistics product and a guide for the evolution of the Internet of Things. Faced with the growing demand for logistics under the evolution of e-commerce, logistics has spawned a variety of service types for logistics companies, from initial efforts to solving needs, to development efforts to meet the needs of many users. In the field of IoT intelligent business logistics management, many experts and researchers in the field of intelligent logistics have done a lot of research and have achieved good results in the research of IoT enterprise intelligent logistics management. For example, Tiranan and Nuchakorn believe that the EPC model has become an important engineering model for domestic enterprises to sign labor contracts abroad [6]. Through on-the-spot investigation and questionnaire survey, Nie identifies and analyzes the different intelligences of the power supply chain in the supply chain and establishes a corresponding supply chain evaluation index system [7].

Intelligent management is an important part of logistics enterprise management. Logistics enterprises will continue to promote the rapid economic growth of China's logistics enterprises and the development of the national economy by creating real and well-known industrial conditions and reducing economic losses. Through extensive literature and experimental research, this paper provides a detailed overview of the importance of intelligent logistics business management, data mining technology, and intelligent business logistics management, as well as logistics operations and warehousing logistics evolutionary algorithm technology logistics costs. Carry out intelligent logistics business management experiments, and establish data warehouse star model and data warehouse snowflake model. The purpose of this paper is to study the intelligent logistics management in my country in order to effectively improve the existing management system of intelligent logistics companies [8, 9].

2. Intelligent Logistics Enterprise Management

2.1. Alternate Profit and Loss of Logistics Cost. The alternation law of logistics cost and profit and loss is also called cost-benefit contradictory law. The logistics system is effective in terms of logistics cost, service efficiency, and logistics function:

(1) Alternate profit and loss of logistics cost and service level. Logistics cost is the opposite of service level and efficiency, which means that high-level logistics services will inevitably lead to an increase in business volume and income and also increase the logistics cost of enterprises, thereby reducing the efficiency of enterprises.

(2) The benefits between the functions of logistics are contradictory. The advantages of different logistics functions mean that the logistics of functional activities are in a unified, contradictory system, and under the same conditions as the total logistics demand, a reduction in the cost of a function may lead to an increase in the cost of another function. Since the different costs are interrelated, the optimal cost must be considered.

These phenomena show that in order to reduce logistics costs, it is necessary not only to pay attention to the control of individual logistics costs, but also to manage them from the perspective of system costs and to study the daily relationship between logistics elements. In other words, the management and control of logistics must be global. The logistics system is cost-based. It integrates the logistics system according to the requirements of the lowest cost, and emphasizes the need to adjust the contradiction between the elements through organic combination, so that the logistics becomes the logistics with the lowest total cost.

2.2. Changes in the External Environment of Logistics Companies

(1) Due to the physical integration of the Internet of Things and logistics, the application of the Internet of Things in logistics is self-evident [10, 11]. With the rapid development of the Internet of Things and increasingly fierce market competition, traditional logistics can no longer meet the needs of customers or adapt to the market environment, requiring companies to use Internet of Things technology and methods to change business processes to adapt to today's society. The Internet of Things is a major advance in the history of modern information technology. After the transformation of business processes, the Internet of Things can be fully realized,

securely transmitted, and intelligently processed [12, 13].

(2) With the development of economic internationalization, international trade has increased. When Chinese logistics companies provide products and services to the market, they must not only compete with domestic companies in the same industry, but also with foreign products and services imported into China. On the one hand, foreign companies have a good organizational structure, advanced management system, and extremely advanced information technology through reorganization of business processes, so that they can provide products and services with lower costs and better quality. Logistics enterprises will continue to participate in market competition with better services and lower costs and will change the management model through process transformation to improve the competitiveness of logistics enterprises [14–18].

(3) Chinese logistics companies are facing new challenges and opportunities. Companies must monitor their market environment at any time to adapt to the environment, such as adapting to environmental changes by reorganizing business processes and improving core competitiveness. Because the prices of products and services are quite favorable, market competition is no longer as easy as it used to be. Due to the development of society, the development of information technology and the internationalization of market competition, customer channels are becoming more and more diversified; information about products and services. Logistics companies need to maximize real customer needs, redefine production strategies and policies to meet different and diversified customer needs, guide customer-centric business process transformation processes, and improve customer satisfaction [19, 20].

2.3. The Function of Logistics Warehousing Distribution Center

(1) The logistics distribution center is responsible for the distribution of goods to many supermarkets and completes the purchase of goods with upstream suppliers. It plays an important role in the operation of chain supermarkets [21, 22]. Its main tasks are as follows: receiving and dispatching, loading and unloading, transportation processing, warehousing, goods distribution, inventory management, and completion of transportation and distribution work.

(2) Loading, unloading, and handling functions: loading, unloading, and handling runs through the entire logistics process, and other functions are combined with loading, unloading, and handling. The loading, unloading, and handling functions select appropriate means and methods, and after receiving the goods, move the goods to the spatial location, put the goods on the shelf, move, process, sort, and prepare for delivery.

(3) Goods warehousing function: the goods warehousing function creates value through the inevitable time and space differences between the production and consumption of goods and is the most important function of the logistics warehousing distribution center. Flow processing function: the logistics warehousing distribution center realizes the whole process of freight transportation by introducing a paperless operation information system.

(4) Inventory function: inventory function refers to the regular inspection of the quantity of goods actually stored in the logistics warehouse distribution center. Inventory also includes checks on the shelf life of the goods, including quality checks and package integrity checks.

3. Enterprise Intelligent Technology

3.1. Experimental Background. Business intelligence performs its functions through three main information technologies: data warehouse, electronic analysis and data processing, and mining. Warehousing technology: the deployment of enterprise intelligence must first have sufficient data support. Inside and outside the company, it means different data sources [23–25]. The data warehouse is part of the company's intelligence, which extracts, transforms, and stores data. The information collected from multiple intelligent logistics management data sources inside and outside the intelligent logistics management company is converted and stored through a single storage method, and the data set formed is the intelligent logistics management data warehouse. The process of building a data warehouse is also a process of data processing [26–31]. Smart logistics data must go through the process of sequential input, export, conversion, integration, and loading when entering the data warehouse [32–34].

3.2. Experimental Method. The star logistics model of intelligent logistics management is expressed as follows.

Figure 1 shows the star model of the intelligent logistics management data warehouse. The data in the intelligent logistics management data warehouse are organized according to defined subject areas. The method of dividing the subject area is to compile a data model for each different subject area. The basic intelligent logistics management data model is the snowflake model and the intelligent logistics management data star model; intelligent logistics management mode, intuitive data management, and high execution efficiency. The snowflake model of intelligent logistics management is based on the star model.

4. Analysis of Experimental Data for Management of an Intelligent Logistics Enterprise

4.1. Factor Analysis of Smart Logistics Enterprise Management. In order to deeply study the management of intelligent logistics enterprises based on the Internet of Things, this paper uses the Delphi method to establish a logistics

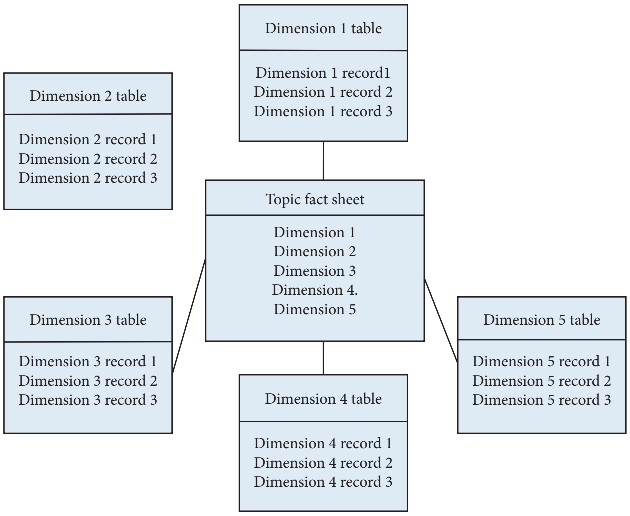

Figure 1: Data warehouse star model.

enterprise factor evaluation index system. The formula for calculating the index weight is as follows:

$$\xi_N = \frac{1}{\alpha} \sum_{p=1}^{\alpha} \frac{\beta_{op}}{\sum_{k=1}^{\alpha} \beta_{kp}}, \quad (1)$$

$$\delta_{\max} = \frac{1}{\alpha} \sum_{0=1}^{\alpha} \frac{\sum_{p=1}^{\alpha} \beta_{op} \xi_p}{\xi_o}. \quad (2)$$

Aiming at the establishment of an index system for factor evaluation of intelligent logistics enterprise management, the AHP analytic method is used to construct a factor weight matrix for comparing and judging intelligent logistics enterprise management, and a hierarchical structure is constructed. This paper uses the 10/10~18/2 scale for assignment. The experimental data are shown in Tables 1–4.

Tables 1 to 4 are examples of factor evaluation of smart logistics enterprises based on the application of the Internet of Things. According to the factor evaluation method adopted in this article, a comprehensive evaluation of the factors affecting the logistics operations of a smart logistics company is carried out from financial factors, technical factors, and operational factors. And the four aspects of natural environmental factors use the DAGF evaluation model to carry out the case analysis of factor evaluation. Among them, the total weight of fund recovery factors in the financial factors of intelligent logistics companies based on the Internet of Things is 0.0065, the total weight of solvency factors is 0.0113, the total weight of cash flow factors is 0.0118, and the total weight of income distribution factors is 0.0049; the total weight of the logistics cost factor in the technical factors of the intelligent logistics enterprise based on the application of the Internet of things is 0.0183, the total weight of the equipment quality factor is 0.0531, and the total weight of the information transmission factor is 0.0308; based on the application of the Internet of things The total weight of warehousing factors in the operation factors of smart logistics companies is 0.0752, the total weight of distribution factors is 0.1623, the total weight of loading and unloading factors is 0.0711, and the total weight of safety accident factors is 0.0459; based on IoT applications, the total weight of meteorological disaster factors in the natural factors of smart logistics enterprises is 0.1928, the total weight of marine disaster factors is 0.0946, and the total weight of geological disaster factors is 0.0411.

Table 1: Financial factor index weight value.

Subindicator	A/N	Total weight
Capital recovery factor	A/1	0.0065
Solvency factor		0.0113
Cash flow factor		0.0118
Income distribution factor		0.0049

Table 2: Technical factor index weight value.

Subindicator	A/N	Total weight
Logistics cost factor	A/2	0.0183
Equipment quality factor		0.0531
Letter to the total factor		0.0308

Table 3: Natural factor index weight value.

Subindicator	A/N	Total weight
Warehousing factor	A/3	0.0752
Distribution factor		0.1623
Loading and unloading		0.0711
Safety incident		0.0459

Table 4: Natural factor index weight value.

Subindicator	A/N	Total weight
Meteorological disaster factor	A/4	0.1928
Marine disaster factor		0.0946
Geological hazard factor		0.0411

4.2. Evaluation Grade of Comprehensive Factors of an Intelligent Logistics Company. As shown in Figure 2, the following is a comprehensive evaluation of the four aspects of comprehensive factors (financial factors, technical factors, operational factors, and natural environmental factors) affecting logistics operations of an intelligent logistics company in the past three years.

Figure 2 shows a comprehensive evaluation of the four aspects of comprehensive factors (financial factors, technical factors, operational factors, and natural environmental factors) affecting logistics operations of an intelligent logistics company in the past three years. It can be seen from the figure that an intelligent logistics company has a comprehensive evaluation level of financial factors, technical factors, operational factors, and natural environmental factors that have affected logistics operations in the past three years. It shows that the number of factors affecting logistics operations of the logistics company is low, and the smart logistics company is operating in good condition.

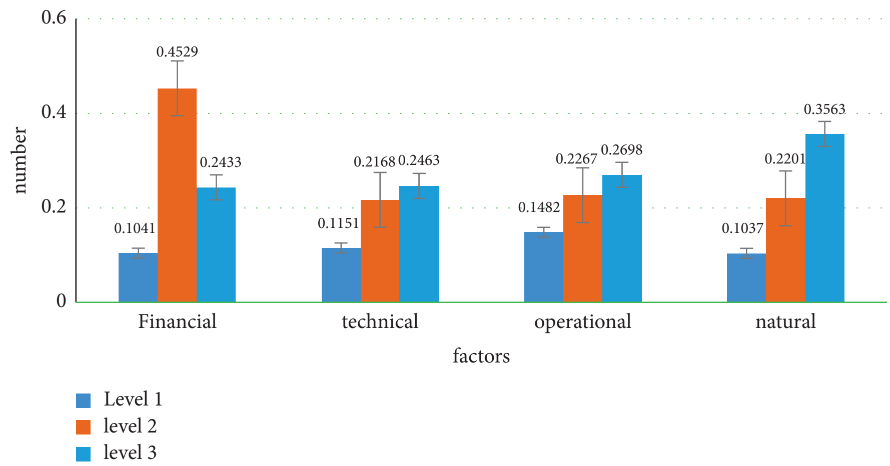

Figure 2: Evaluation grade of logistics enterprise factors.

4.3. Measures for the Construction of Intelligent Logistics System

(1) Visualized intelligent logistics management system, research through GPS, RFID, and other technologies. The determination of the vehicle's position and the control and control of the cargo are made simpler. At present, some advanced logistics companies or large enterprises have basically established and equipped a set of visual intelligent logistics management system, which can identify and control some specific commodities.

(2) System tracking of intelligent products. Technologies and guidelines based on technologies such as RFID are being implemented across the board, which offers smart potential for products tracked through networked systems. These systems are widely used in medicine, agricultural products, food, tobacco, and other fields, especially, when it comes to tracking, identification, search, information collection, and management.

(3) Fully automatic management of logistics supply. In the process of establishing a fully automated logistics management and distribution center, with the help of advanced transmission technology, we can not only realize an automated network, but also establish an intelligent distribution management center, so as to realize the full integration of logistics, business flow, information flow, and capital flow. Orientation management: currently, many distribution centers use robotic stackers, laser or electromagnetic automatic loaders to transport materials, pump sorting lines, operate warehouse exits, and automated stackers during the unpacking and unloading process. The entire logistics distribution operation system has basically achieved automation and intelligence.

(4) Enterprise intelligent supply chain. In the context of globalization, the competition between enterprises will shift from product competition to supply chain competition, which puts forward higher requirements for the logistics system, production system, purchasing system, and sales system within the enterprise. In order to meet the individual needs of customers, enterprises are often faced with the problem of accurately predicting customer needs, which needs to be maintained through intelligent logistics and intelligent logistics networks. The application of physical network in the logistics sector can promote the integration of smart manufacturing and smart supply chain. In this integration, participants of each logistics chain can work independently using preset permissions and processes. Integrating intelligent technology into traditional enterprise logistics and infiltrating it into business processes enable seamless connection of information flow.

5. Conclusions

This article combines the development status of intelligent management projects in China's logistics management and examines the intelligent management of domestic and foreign logistics projects, as well as the logistics cost management, data mining technology, and intelligent visualization technology of intelligent logistics projects. We carried out the development of the logistics company's intelligent management algorithm and the summary of the logistics function. Accumulate experience in managing smart logistics projects, including data warehouse, film modeling, and film modeling. In the intelligent response system applied to logistics projects, the two modes work together to form an organically integrated intelligent system. The control and transmission of various internal and external factors affect the logistics system at multiple levels and steps and minimize the impact of various factors on the normal operation of logistics projects. Good value and importance. This paper studies intelligent logistics management, from the aspects of intelligent logistics enterprise management, enterprise intelligent technology, and experimental data analysis of an intelligent logistics enterprise management. Finally, the measures for the construction of enterprise intelligent logistics system are put forward, making full use of the Internet of Things technology, and closely combining the characteristics and processes of logistics work, to create a comprehensive, overall, and scientific intelligent management system for logistics enterprises, which provides the sustainable development of intelligent logistics enterprises. Because the Internet of Things and intelligent logistics management are both emerging concepts and the intelligent logistics management based on the Internet of Things is still in its infancy, relevant scholars have little research on the intelligent logistics management based on the Internet of Things. Therefore, this research lacks certain theoretical support, but the author will continue to improve it in the follow-up research to provide theoretical support for the management of intelligent logistics enterprises.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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