


Research Article

Traffic State Detection Based on Multidimensional Data Fusion System of Internet of Things

Jinxi Zhang ¹, Wenyong Zhu,¹ Xueying Wu,² and Tianshan Ma²

¹College of Transportation Engineering, Chang'an University, Xi'an, Shaanxi 710064, China

²School of Economics and Management, Chang'an University, Xi'an, Shaanxi, China

Correspondence should be addressed to Jinxi Zhang; 2018023008@chd.edu.cn

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In recent years, the rapid development of cloud computing, mobile Internet, Internet of Things, and other technologies has accelerated the explosive growth of the number and types of data in various industries. As one of the current hot research fields, the multidimensional data fusion system has received widespread attention all over the world. Road traffic and traffic management involve a wide range of participants; a variety of traffic behavior and traffic management means have produced a huge volume of traffic management data and have a very high application value. Therefore, it is of great significance to study the application mode of the traffic management multidimensional data fusion system and realize the asset value transformation of the multidimensional data fusion system. Starting from the safety supervision service of operating vehicles, this paper elaborates the traffic management multidimensional data fusion system platform for the safety supervision service of operating vehicles around the application requirements and architecture of the traffic management multidimensional data fusion system and the results of this research team. Paper with city comprehensive transport hub as the research object uses the Internet of Things technology; establishes a set of BIM model-based intelligent Internet operation management platform, multidimensional collection personnel, and vehicles, such as traffic, equipment, and business data information; realizes the integration of data, correlation, and instructions issued by ability, to support the building intelligence operation management needs of the business; and realizes traffic and transportation status detection.

1. Introduction

With the development of cloud computing technology, Internet of Things technology, and mobile communication technology, the operation and maintenance platform of the intelligent Internet of Things is more and more closely combined with people, and the communication between people and things and between things becomes more and more important. Therefore, the operation and maintenance platform of the intelligent Internet of Things emerges as The Times demand. Intelligent Internet of Things operation and maintenance platform, namely, the intelligent operation and maintenance management based on the Internet of Things, take various application service systems as the carrier and fully integrate management and scientific information technology [1].

In recent years, with the rapid development of urban modernization, TOD (Transit Oriented Development) urban integrated transportation hub projects, which are oriented by public transportation and integrate work, business and residence, etc., have emerged continuously. This paper takes TOD urban comprehensive transportation hub as the research object. Based on the Internet of Things technology, modern information technology means are adopted to build a set of intelligent Internet of Things operation and maintenance management platform based on building BIM model. The establishment of the operation and maintenance management platform of the intelligent Internet of Things realizes the purpose of combining the intelligent operation and maintenance management with customer experience. It collects the data information of personnel, vehicles, traffic, equipment, and business in a multidimensional way and realizes the ability

of data integration, correlation, and command issuing, so as to support the needs of the intelligent operation and maintenance management business of buildings [2–4].

Chen et al. [5] claim that traffic condition detection refers to the data generated during the detection and management of traffic elements such as traffic facilities, transportation equipment, and service objects by public security and road traffic management departments through the Internet of Things and information technology. According to its categories, it can be divided into traffic management government data, operation data, and perception data of the Internet of Things.

Due to the influence of the management system between the traffic and transportation management departments and the public security traffic management departments and between the traffic and transportation management departments and the traffic and transportation enterprises, Soysal et al. [6] claim that the traffic state data has the characteristics of mixed, numerous, and scattered data. At present, the application of big data of traffic condition detection is mainly for the management of their respective functions, the operation of their own enterprises, and the provision of social services to the public, and the data does not form an effective sharing and mining application.

At present, many scholars at home and abroad are looking for more efficient and appropriate research methods on the optimization of logistics transport nodes of supply chain, especially the application of information technology such as intelligent perception in the Internet of Things. Many scholars have applied the technology to the supply chain of manufacturing, logistics, food processing, and other industries. In terms of comparative research in this field abroad, the Internet of Things and intelligent communication technology are applied to the data fusion system; the early domestic research in this field is less; the specific case and application methods are too traditional; so in the Internet of Things multidimensional data fusion system of logistics transport research and research in the Internet of Things technology and logistics transportation control model architecture research, domestic and foreign researches on these two aspects are shown as follows:

(1) *Research on Component Logistics Related Aspects.*

Some scholars in this field summarized a lot of relevant research materials from logistics transport nodes. The purpose of the technical research on the application of Internet of Things technology in the component logistics management of data fusion system is to optimize the distribution of resources in the logistics stage and maximize the overall benefit. The current logistics network information technology helps to determine the important factors in the supply chain to optimize and improve the operation performance, improve the operation management process, establish a rapid response mechanism, and gain competitive advantages [7]. The information operation of supply chain management needs the support of modern Internet of Things technology and mobile Internet, especially in the aspect of logistics management, which helps to integrate the information

data of upstream and downstream enterprises, establish the logistics information platform, establish effective links between enterprises, and further reduce the management cost [8]. Research on enterprise management and enterprise management mode reform in the supply chain, strengthen the communication between enterprises on the main nodes of the supply chain, realize information sharing, improve the precision of supply chain operation, and give relevant opinions on performance [9]. In the optimization of supply chain management, the most important thing is to reduce the enterprise's own risks by realizing the information technology of the Internet of Things based on the management performance and the enterprise's core competitiveness. In the process of enterprise demand analysis, the functional structure design scheme of the agile supply chain management system is given, and the information technology of Internet of Things is applied to the agile supply chain management [10]. The construction of enterprise intelligent supply chain management framework can realize the optimization of production management, procurement management, logistics management, information management, after-sales service, etc. Based on the understanding of the operation characteristics of supply chain, it is considered that it is a need for the integration of various resources; internal is dynamic and complex, so it is necessary for enterprises or projects to establish a seamless information integration management framework in the process of operation [11]. The material monitoring system based on BIM-GIS can be constructed to track the whole material supply chain in real time and analyze the relationship among logistics supply, resource status, and internal supply [12]. Through the data fusion system on the basis of information sharing platform based on BIM, the establishment of the actual model, the integration management of the two parties can increase the profit. Based on the supply chain management model, this paper analyzes the benefit and cost of housing industrialization and explores the good operation effect of housing industrialization mechanism under the supply chain based on the integration path. Refer to the above literature found that scholars both at home and abroad, the efficient operation of the main logistics nodes in each stage, various information data transmission and access to timely, with Internet information technology as a logistics support, constantly explore the Internet of Things technology based on data fusion system IoT multidimensional data fusion system in logistics stage provides a new solution [13]

- (2) *The Internet of Things Plays an Important Role in Practical Project Applications.* Many scholars in the field of the Internet of Things are studying the combination of the Internet of Things and related fields and constructing theoretical models to predict and manage the upstream and downstream of the whole

supply chain and optimize the performance of projects [14–16]. Analyze the supply chain process and establish the quality information management model based on the Internet of Things technology and SOA architecture, so as to realize the dynamic monitoring and management of quality [17]. In order to realize the dynamic monitoring of the data information at each stage of the supply chain, the RFID technology is proposed to provide technical support, and the existing technology is used to improve the inventory management of enterprises [18]. In order to optimize the route of the product logistics stage, the traceability system based on the Internet of Things technology and the Internet of Things network is designed to monitor and manage the products in real time and improve the route problem in the logistics nodes [19]. RFID technology has some defects, for fast moving objects can not be effectively and quickly identified and read, developed an automatic positioning sensor system, using a robot with a reader, combined with Wifi network to carry out regular space scanning, to achieve real-time monitoring and positioning of objects [20]. It is difficult to achieve the desired effect in the operation of industrial projects due to the various specifications of accessories. The pipeline traceability system based on the Internet of Things technology is designed, and the technical optimization system is established for effective application in actual projects, so as to provide the basis for the management and decision-making of enterprises. In order to enable retailers and manufacturers to obtain the maximum benefits in the upstream and downstream process of the supply chain, a set of information platform based on two-way design is conceived, based on the Internet of Things technology, and the feasibility of platform establishment is analyzed [21–23]. Enterprises and their assets are faced with the development and application of relevant business software in the supply chain management of this life cycle, and it is suggested to establish an IoT traceability system based on actual projects. In order to prove the feasibility of product real-time monitoring and tracking system, product coding and Internet of Things information technology are managed with the combination of the Internet of Things (electronic coding technology). At the same time, the operation mode and workshop equipment layout method of the system are given, and the demonstration experiment is carried out [24]

2. Architecture of the Multidimensional Data Fusion System of the Internet of Things

2.1. Overview of the Internet of Things and Related Technologies

- (1) *RFID and Internet of Things Technology*. Radio Frequency Identification (RFID) technology, also known

as Radio Frequency Identification, is a short-range communication technology. Its working principle is as follows: firstly, after the label is put into the magnetic field, it receives the radio frequency signal sent by the reader and sends the product information stored in the chip, or the label initiatively sends the signal of a certain frequency. After the card reader reads the information and decodes it, it is sent to the traceability system server for relevant data processing. Internet of Things is the English abbreviation of the Product Identification Code, which is the global unique and unique identification for all objects in the supply chain. The Internet of Things is usually stored on an RFID electronic tag, which includes an antenna and a silicon chip. When identifying the label, through the communication data connection, we can know the origin information, workmanship process and production date information, etc.

- (2) *Sensor Network and Embedded Technology*. Wireless sensor network can be considered to be composed of three parts: data acquisition network, data distribution network, and control management center [25–28]. The main components are sensors, data processing unit, and communication module integrated node. Each node individually forms a distributed network, which is optimized to send the collected data via radio waves to an information processing center, where it is processed by dedicated equipment. Embedded technology is a computer system, typically a firmware, that consists of a single program that performs logic programs
- (3) *Positioning System*. Positioning system (GPS) is an interdependent assembly, receiving equipment or positioning components to determine the position of the system, and has three parts: space components a GPS constellation, Ground Part-Ground Monitoring System, and user equipment part a GPS signal receiver. Various positioning systems greatly improve the working efficiency of the Internet of Things and provide interoperable communication for frequent activities of various industries through precise positioning information [29, 30]
- (4) *Cloud Computing Technology*. Cloud computing mainly takes the Internet as the center; establishes large capacity storage servers; provides safe, fast, and convenient network services on the basis of open standards and services; and makes the “cloud” of the Internet become the data center and computing center of all walks of life
- (5) *IPv6*. IPv6 is the abbreviation of Internet Protocol Version 6, mainly used for network address location, and is a new generation of network protocol, from the data protection process and data storage, with higher confidentiality and fast transmission. Figure 1 is the structure diagram of core technologies related to the Internet of Things

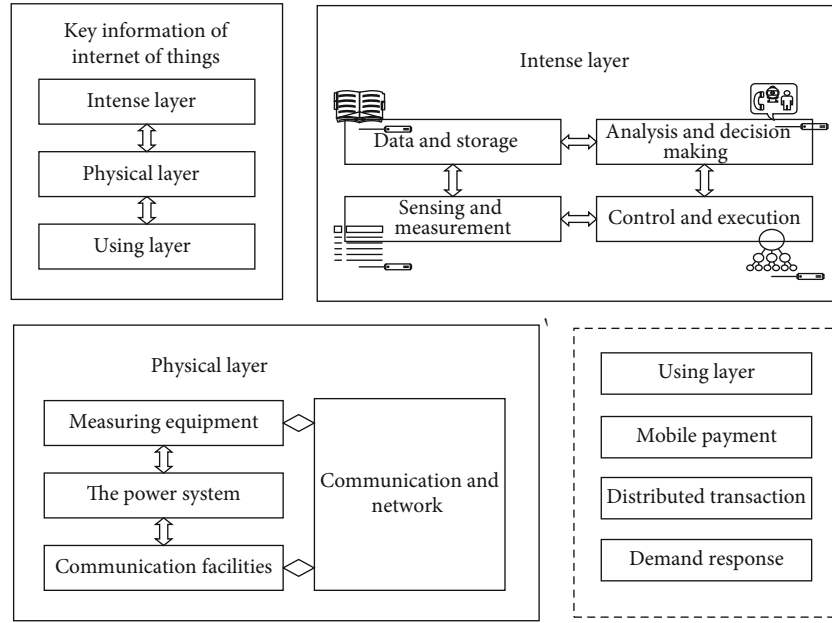


FIGURE 1: Structure diagram of core technologies related to the Internet of Things.

The application of IoT technology can be divided into several stages: feasibility study stage: (1) + Internet related technologies, plus one for radio frequency technology, E IoT coding techniques such as prefabricated in prefabrication composite beam, column, composite board, panel, prefabricated stair IoT application of multidimensional data fusion system, and design based on component traceability system platform, aiming at improving the efficiency of early pre-operation. The preliminary planning of the whole assembly project is systematically and comprehensively analyzed so as to achieve the expected effect in the feasibility study stage. (2) Production-construction stage: the management of the Internet of Things in the design stage is based on the production management of the information system platform, and the transportation, construction, and installation of the multidimensional data fusion system of the Internet of Things are the main stages of management. RFID chip embedded component to produce a construction whole process, the chip is used as the component identification code and the distribution of media, from the material supply, production orders, production, storage, transportation, storage, and construction loading process, such as by collecting and analyzing information as well as the component plus state and properties, and the development of BIM interface in order to realize data integration, to facilitate the overall efficiency analysis, and monitor the entire construction cycle of the data fusion system to ensure overall control of the construction process. (3) Operation and maintenance stage: the subsequent operation and maintenance can be traced during the manufacturing process, and the relevant information of each component can be traced back. Therefore, if a failure occurs during subsequent installation and debugging, it can be found in the management system and recorded. In the later stage, it can also collect user feedback and accept user complaints and maintenance information. Traceability

of quality defects can be achieved throughout the full cycle, and a database of IoT components and other products can be established.

The Internet of Things technology is mainly applied in several aspects of logistics node work: (1) order management: the field system automatically calculates the ID number of the multidimensional data fusion system of the Internet of Things labeled with RFID tags and uses MRP (Material Requirement Planning) to query demand information and generate orders intelligently. And according to the materials, suppliers and other information to carry out the actual adjustment of procurement requirements and to meet different enterprises for different business procurement demand management requirements. The production and logistics stage information of the product is stored in the system, which facilitates the visualization of the whole process and reduces the management cost. Table 1 is the structure of the information storage system of the Internet of Things:

(2) Device operation: IPv6 can assign IP addresses to all electromechanical devices in smart buildings. In component traceability system, general users can use terminal devices or web pages to inquire, and terminal managers can make decisions according to the actual situation. The query information includes component name, corresponding company name, component history information, distribution center, supply chain sale distribution information data, and output data statistics as well as third-party monitoring backup data, which helps to pay close attention to whether the transportation work equipment is in normal condition and can ensure that the corresponding type of fault is solved. (3) Monitoring the working state: for the equipment types such as the multidimensional data fusion system of the Internet of Things (IoT), the IoT embedded technology and cloud computing can be used to automatically record the production and transportation time of components. In addition, aggregated

TABLE 1: Internet of Things information storage system.

System structure	The name of the annotation
Electronic product code	The coding system
The Internet of Things coding standard	Identify target setting code
Radio frequency identification system	The Internet of Things tags
Information network system	The Internet of Things middleware
Read/write device	Entity markup language
Object name resolution service	Enter the ID number of the Internet of Things multidimensional data fusion system
Identify the Internet of Things tags	The Internet of Things system software
Locate the corresponding information of the multidimensional data fusion system of the Internet of Things	Describes the information language of the multidimensional data fusion system of the Internet of Things

GPS data and GSM can be used to track the near and far positions of vehicles, helping to accurately locate and measure on the terrain and providing automatic instructions for location modification for logistics transportation through the use of virtual maps. Figure 2 is the schematic diagram of the positioning module.

(4) Save energy consumption: by using cloud computing and embedded technology, the electricity used can be calculated, which can help the factory of multidimensional data fusion system of the Internet of Things to take energy-saving measures. In logistics transportation, according to the technology, the machine can also record and send back the idle time information of energy consumption, so as to adjust the vacancy rate of transport vehicles without having a direct impact on production and transportation, further reducing the consumption cost. (5) Equipment and data operation and maintenance: sensors in machinery and equipment transmit information about vehicle logistics and transportation status and its service or maintenance needs, which helps to repair machinery and equipment, save time and improve the efficiency of the machine and reduce the occurrence of failures.

2.2. Organization Structure Analysis of Multidimensional Data Fusion System. The operation and maintenance platform of the intelligent Internet of Things studied in this paper is based on building BIM model and adopts the management strategy of “platform + ecology” to collect data information of personnel, vehicles, traffic, equipment, and business in multiple dimensions, so as to realize positioning, navigation, and data interactive management of people, vehicles, and things in the building of TOD urban comprehensive transportation hub. And realize the public personalized information push and emergency linkage command and dispatch function, so as to realize the intelligent management of the whole building. The intelligent IoT operation and maintenance platform include the IoT perception layer, the network layer, and the platform application layer. The platform architecture is shown in Figure 3.

(1) Comprehensive perception: building networking is comprehensively arranged. Various sensors, such as temper-

ature and humidity sensors, two-dimensional code tags, RFID tags, readers, cameras, detectors, and other sensing terminals, are used to comprehensively perceive the running situation of buildings in TOD urban integrated transportation hub, so as to establish a full connection between people, vehicles, objects, environment, and services. (2) Real-time communication: the network layer is composed of wide area network, local area network, and 2G/3G/4G/WLAN network. It is the backbone of the whole Internet of Things and is responsible for transmitting and processing the data information acquired by the sensing layer. (3) Deep integration: through connection management platform, multidimensional data fusion system platform, and integrated communication platform, the application layer of the platform fuses various data and communication information in TOD urban comprehensive transportation hub buildings to support multidimensional intelligent analysis and processing of building business of TOD urban comprehensive transportation hub, so as to realize whole-system communication collaboration.

According to the characteristics and actual status of component logistics and transportation, in order to improve the actual efficiency, the Internet of Things application platform on the market is included in the logistics and transportation nodes, as shown in Figure 4. The system platform is beneficial to the operation and maintenance of data information and management information. For logistics nodes, they can take more coordinated measures to solve the problems caused by the cross of component information and have more visualization and low-cost information operation. The system is mainly an auxiliary transportation node.

Based on the production standards of the data fusion system, the new wireless sensor network technology, Baidu Geographic API, 4G and ZigBee network, and other technical supports were adopted to build the model organization framework and get familiar with the specific information of each participant. Ensure supply chain interactivity, reliability, and security throughout the system. The database adopts main information storage and data processing, which is mainly based on raw material information, production and processing log information, sales and distribution information, and

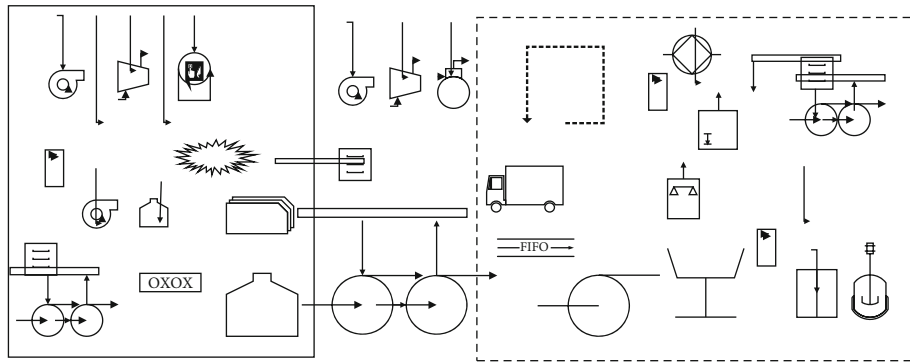


FIGURE 2: Schematic diagram of positioning module.

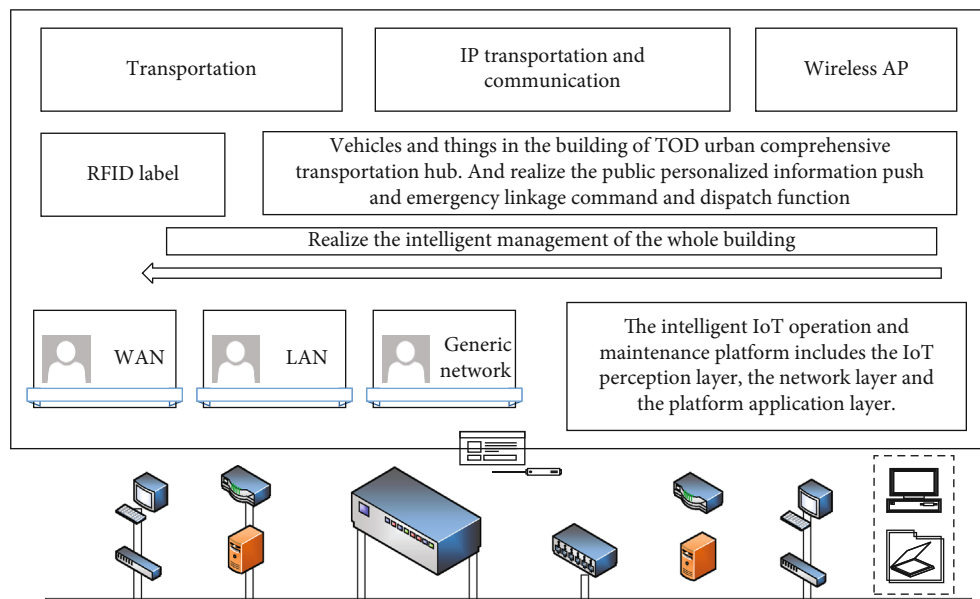


FIGURE 3: Network platform architecture.

logistics process information of the multidimensional data fusion system of the Internet of Things. Combined with the enterprise management system (ERP), the statistical table of traceability information will be created. The statistical table is mainly the component data information. The statistical table will be connected to the background management and can be modified and updated by the main management organization. RFID technology is optimized and combined with BIM database, and the upgraded RFID technology associated with BIM database can perform receiving, transmission, and feedback functions, so as to establish an intelligent monitoring and traceability system for component supply chain. With the support of RFID&E Internet of Things as the main technical means, the supply chain traceability system of the multidimensional data fusion system of the Internet of Things is built. The traceability of the system is based on the complete processing of RFID information and the standard of the Internet of Things code. The system has three main code formats: E IoT -64/E IoT -96/E IoT -256. According to the size and characteristics of the component system, the project adopts the Internet of Things coding format, as shown in Table 2.

3. Construction of Transportation State Detection Model Based on the Internet of Things

3.1. Research on the Transportation State Detection Model Based on the Internet of Things. According to the internal factors and external factors of the multidimensional data fusion system of the Internet of Things, combined with the feasibility of index data and the actual situation, the index of component logistics transport node model is selected. The main indicators include input index and output index. Data are provided in many aspects, including production data, personnel data, transportation data, and other index data. Based on the above data, a comprehensive and systematic study is carried out on logistics transportation nodes of the multidimensional data fusion system of the Internet of Things. Since the data envelopment method is a quantitative method that is not determined by the weight of each index, there is no need to do the corresponding index definition and other explanations in determining the definition of the index. The index selection is mainly based on the characteristics of components

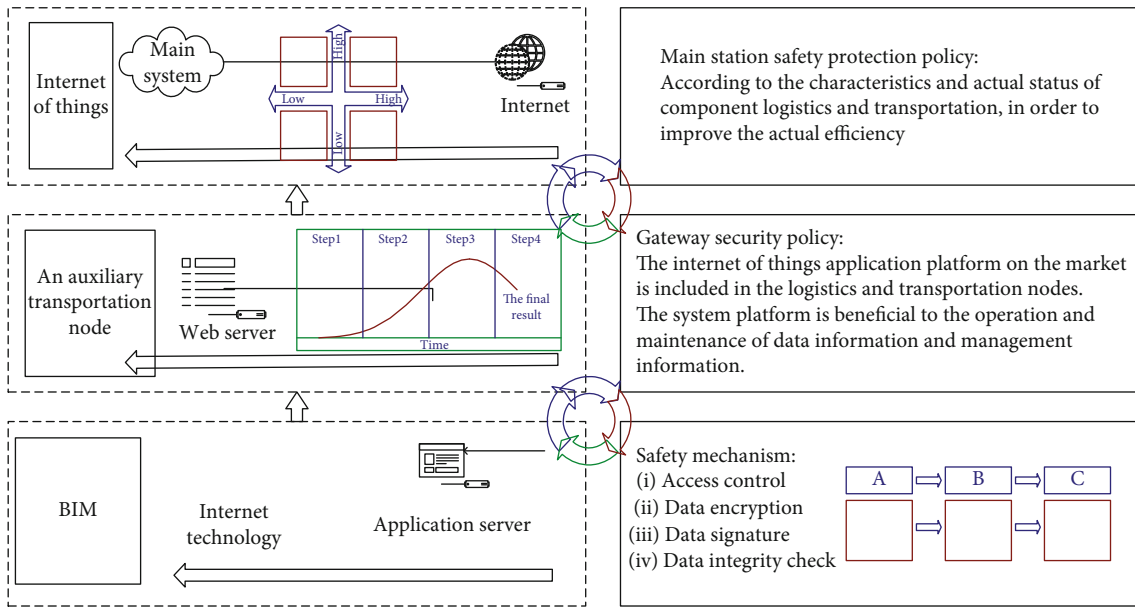


FIGURE 4: Platform architecture of logistics transport data system.

TABLE 2: Coding principle.

Project	Management process	Member management
Basis of logistics system construction model	Production on the basis of	Wuhan City assembly Wuhan People's Government into the Hubei province assembly
Process information	Regulation implementation measures "notice of building" whole supervision points	The manufacturer has complete components
Technical basis	Type building construction pipe steps on accelerating the development of building construction quality safety installation	Wireless sensor network, etc.
Transformation	XXX (header) Management	XXX (regulation) XXXXX (text) Content The serial number
Specific information	Baidu geographic API, GPS positioning	Specific information of government test data participants
Meaning	8 and 24 to 36	The header
The technical level	Storage level	The management level
ERP	RFID + BIM	Raw material information
Plant manager	Production processing log information sale distribution information logistics process information	Logistics enterprises

themselves, the survey of professionals and the data available for collection, etc.

The node model is mainly used to analyze the transport node control research of the multidimensional data fusion system of the Internet of Things, and the data envelopment analysis method can be used to evaluate the overall efficiency of logistics transportation. This is a relatively effective efficiency evaluation method, which can subdivide and effectively evaluate the efficiency of decision-making units with multiple inputs and outputs (F641). Component supply chain logistics transport node is a typical complex case of multiple inputs and outputs. This method can analyze the effects between different factors through variable returns to scale. Based on this paper,

the DEA method is used to evaluate the research on the control of logistics and transportation nodes.

BBC model is mainly used to measure pure technology and scale efficiency in the case of variable remuneration for decision-making units. Generally, it is applied in the analysis cases of variable remuneration for scale with multiple inputs and multiple outputs. However, from the research focus direction of this paper, component production is a product with variable scale and large input and output. Therefore, the BBC model with variable returns of scale should be considered first in the application model.

In this case, a number of DEA models were selected, and BBC model was selected after comprehensive consideration.

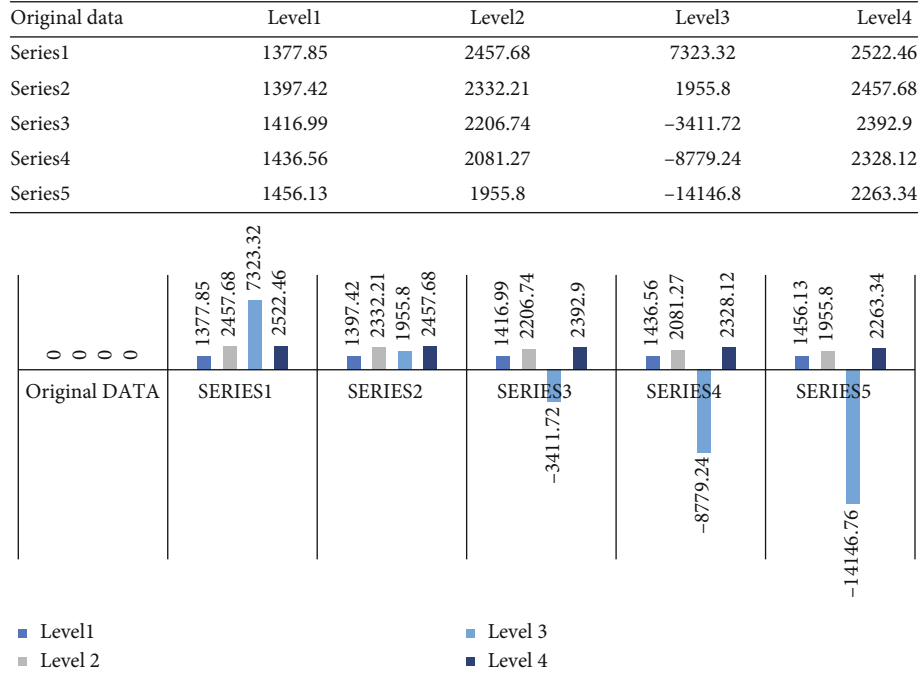


FIGURE 5: The original data set.

The output-oriented BCC model is the main one with several decision-making units (denoted as N). Each decision-making unit DMU is divided into M inputs, P outputs, and M inputs. Therefore, the output input ratio of DMU should be measured and expressed as:

$$i_l = \frac{\lim_{q \rightarrow \infty} \sum_{i=1}^q v_i \cdot y_{il}}{\int \sum_{i=1}^q w_i \cdot z_{il}}. \quad (1)$$

The efficiency value obtained by all DMU using the above weight is limited within the interval $[0,1]$, that is:

$$i_l = \frac{\oint v_q \cdot y_{ql}}{\oint w_q \cdot z_{ql}} \mapsto 1. \quad (2)$$

The efficiency evaluation index represents the empirical efficiency obtained from the multi-index input and multi-index output of the decision-making unit, so the model can be established and optimized according to this principle. Formulas (3) and (4) are the basis of the BBC model:

$$\min \frac{\overrightarrow{\oint v_q \cdot y_{ql}} \Rightarrow 1}{\overrightarrow{\oint w_q \cdot z_{ql}} \rightarrow v_q y_{ql} \oplus w_q z_{ql}} \rightarrow \infty, \quad (3)$$

$$\frac{\overrightarrow{\oint v_q \cdot y_{ql}} \Rightarrow 1}{\overrightarrow{\oint w_q \cdot z_{ql}} \rightarrow z_{ql}} \xleftrightarrow{y_{ql}} \xleftrightarrow{z_{ql}} 1. \quad (4)$$

Dual model of formula is:

$$\max e \ni E, \quad (5)$$

$$\text{s.t. } e = \oint v_q \cdot y_{ql}, \quad (6)$$

$$\lim_{q \rightarrow \infty} \sum_{i=1}^q v_i \cdot y_{il} = \frac{w_q \cdot z_{ql}}{\sqrt{v_q \cdot y_{ql}}}, \quad (7)$$

$$\lim_{q \rightarrow \infty} \sum_{i=1}^q w_i \cdot z_{il} = \frac{w_q \cdot z_{ql}}{\sqrt{v_q \cdot y_{ql}}}. \quad (8)$$

The judgment of BCC evaluation model can be divided into the following three situations: when $E = 1$ and each optimal solution satisfies the condition that the slack variable is 0 and DMU is effective, then the optimal decision unit of comprehensive efficiency has reached the optimal combination, and the maximum DEA is effective. When $E = 1$ and the slack variable is not equal to 0, the DMU is valid, and then, the DMU is not the best technical efficiency and the best scale at the same time. When $E < 1$, it indicates that the comprehensive efficiency is invalid, and the technical efficiency and scale efficiency have not reached the optimal scale, so it can be adjusted through projection analysis to achieve DEA effectiveness. After the establishment of the model, the index data are selected. In the process of data processing, the index data of the model should be analyzed with the help of the DEAP2.1 software, mainly to obtain the comprehensive efficiency, pure technical efficiency, and scale efficiency as well as their average value.

3.2. Optimization of Traffic State Detection Model and Analysis of Relevant Data. The experimental analysis method of this paper applies the data envelope model for quantitative analysis and obtains the practical and feasible node control method through the quantitative control of the problems existing in the logistics and transportation nodes in the

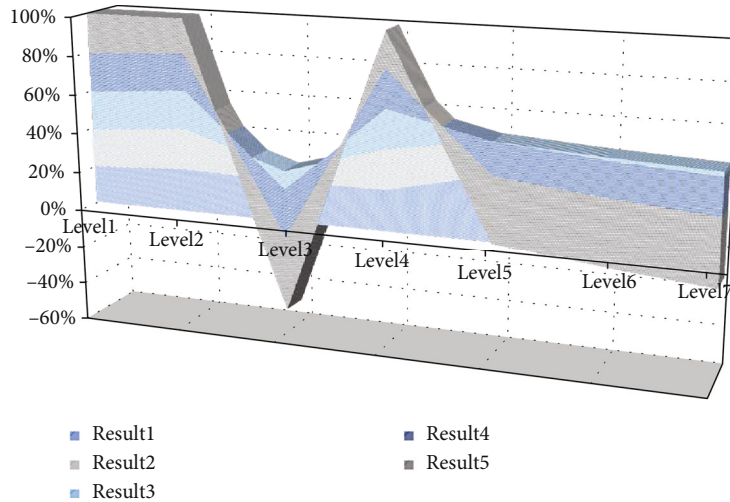


FIGURE 6: The overall return to scale.

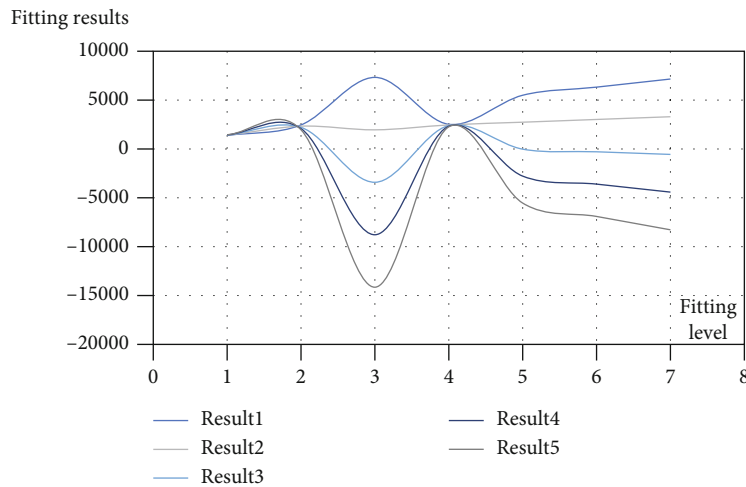


FIGURE 7: Route planning and vehicle configuration 1.

component supply chain of a component factory. The model data calculation and projection analysis of the three projects draw the following conclusions. This paper analyzes the overall efficiency of the input and output of the multidimensional data fusion system of the Internet of Things in three data fusion system projects of a component factory in three years from 2019 to 2020 from two aspects of efficiency and projection analysis. The original data are shown in Figure 5.

Through the above three projects with a total of nine samples, this paper analyzes their comprehensive efficiency, pure technical efficiency, and scale efficiency and explains their input and output.

- (1) *Start with the Comprehensive Efficiency.* As can be seen from the table, the comprehensive efficiency of samples 1, 2, and 3 is 1

In addition, the input and output redundancy rate shows that the 1, 2, and 3 samples are completely effective. The effective scale efficiency of DEA shows a trend of gradual scale rewards. The overall operation control of the project is

effective, and no additional supervision is required. But judging from the overall data, the profit of output value is low, and the product plan has been completed more. It can be seen from the table that the comprehensive efficiency of samples 4, 5, and 6 shows an increasing trend. The scale efficiency DEA of samples 4 and 5 is invalid, while the scale efficiency DEA of sample 6 is effective. In sample 4, input factor 1 has redundancy of 750061.00, output factor 2 increases by 6.458, output factor 3 increases by $438.926 + 4243.966 = 4682.89$, and output factor 4 increases by $369.851 + 4801.271 = 5171.12$. In sample 5, the output of output factor 1 increased by 1127767.44, the output of output factor 2 increased by 8.136, the output of output factor 3 increased by $551.076 + 6331.126 = 6882.20$, the output of output factor 4 increased by $557.343 + 4824.242 = 5381.59$, and the input of input factor 2 was redundant. Sample 6 has no redundancy in input-output. On the whole, the return to scale of samples 4, 5, and 6 shows an increasing trend. It can be seen from the profit that the actual profit is low, and the overall corresponding return for the multidimensional data fusion system

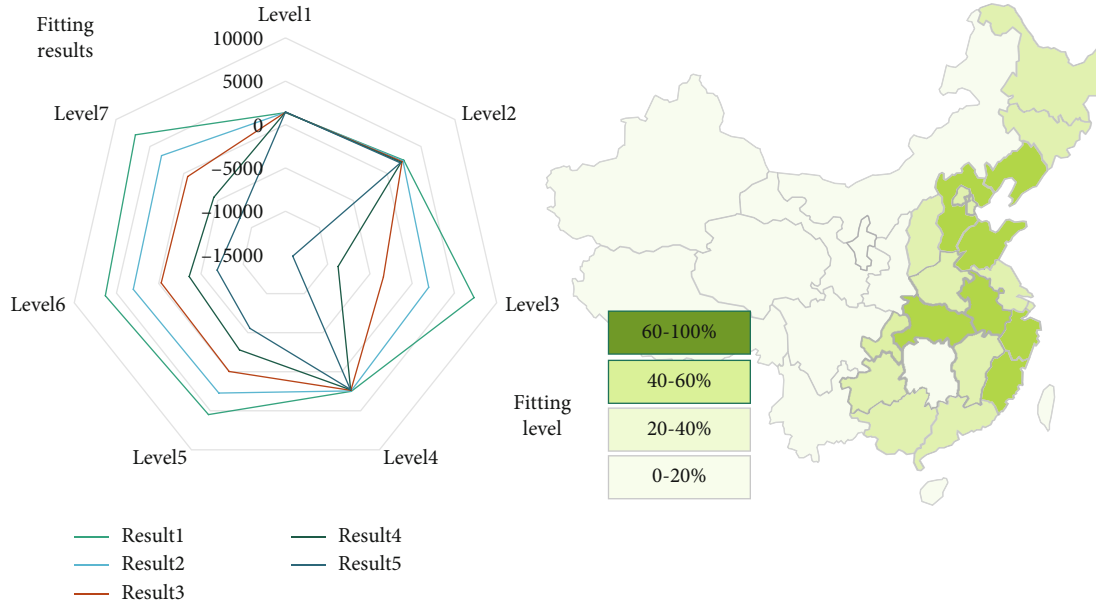


FIGURE 8: Route planning and vehicle configuration 2.

of the Internet of Things logistics supply chain is low. The project is mainly in loss, mostly with government subsidies. In samples 8 and 9, there is no redundancy in input and output, and the sample value is fully valid. In sample 7, the input redundancy value is 364530, and the overall return to scale shows a gentle trend, as shown in Figure 6.

As is shown in Figure 6, results 1 to 5 correspond to valid samples (1, 2, 3, 5, 7) and their overall return to scale. Among them, result 3 is the most stable with a higher average value, followed by result 2. Results 5 have a high upper limit and a low lower limit, which may obtain the best predicted value but is the most unstable. Results 1 are similar. Result 4 has no analytical advantage.

- (2) From the perspective of pure technical efficiency, the pure technical efficiency of samples 1, 2, and 3 remained stable for three years. Therefore, input and output are the effective use of resources, and the Internet multidimensional data fusion system factory has promoted production efficiency in production management and technological innovation, thereby optimizing the project. The pure technical efficiency of samples 4, 5, and 6 shows an increasing trend year by year. In 2018 and 2019, the pure technical efficiency is lower than 1, indicating that there are problems in the management and technology of input and output in the production process of the factory. In 2018, the output profit is in deficit, indicating that the management fails to follow-up with the market, and the component factory fails to keep up with the update of information technology. Most of the staff are workers who have just received simple training. Problems such as poor communication and unclear understanding occur during the management process with managers. Due to the increase of factory

output in 2019, input-output resources are not properly used in the process of technical follow-up. Samples 7, 8, and 9 pure technical efficiency except in 2018, the factory is still preparing for the project, so the output is 0, and a small amount of capital is invested, so the pure technical efficiency is 0. Irrational situation occurs in the calculation of input-output resources, which belongs to the sunk cost in the actual process. In both 2019 and 2020, the pure technical efficiency is 1, indicating that resources have been reasonably utilized in the process of input and output of the project, and there has been a great improvement in management and technology. The associated multidimensional data of traffic condition detection will be used for fusion, so as to play a greater role

- (3) From the perspective of scale efficiency, the scale efficiency of samples 1, 2, and 3 is 1, indicating that the industrial structure planning of the IoT multidimensional data fusion system factory project is reasonable. By optimizing various configurations, the output unit meets actual production needs. File information update, production route optimization, and internal storage space layout meet actual requirements. The supply chain of component factories is perfect, and the scale effect shows the improvement of scale efficiency, but the return to scale does not actually increase under the condition of the same input. The scale efficiency of samples 4, 5, and 6 showed an increasing trend in three years. In 2018 and 2019, the scale efficiency was not effective by DEA, indicating that in the process of actual production and component configuration, through improved management, personnel training, and technical

optimization, there was a positive trend in data continuously, and the return to scale was also increasing. The scale efficiency of samples 7, 8, and 9 shows an increasing trend year by year. In 2018 and 2019, the scale efficiency is not effective by DEA. In the component supply chain of the multidimensional data fusion system of the Internet of Things, there are some problems in the process of logistics and transportation, such as route planning and vehicle configuration, as shown in Figures 7 and 8

Compared to other literature analysis method, this article through to overall comprehensive analysis of logistics node, PC components from the data, on the basis of quantitative analysis to the actual situation to adjust the direction, through the SWOT matrix analysis of the whole node external quality and internal opportunities and threats, clearly understands the advantages and deficiencies, to the problem put forward the deficiency of the modifications of optimization. As for the integration of the scheme, we adjusted the component logistics and transportation nodes from four aspects of logistics cost, warehouse management, route planning, and Internet of Things technology, so as to achieve the completion of the planned goals. In terms of implementation strategy, from a macropoint of view, the overall node control strategy is constructed, and then, the control process framework is constructed in the control analysis before, during, and after the event, and the steady and continuous follow-up is carried out to ensure that the work is within the reasonable operation range, and the work efficiency of the logistics and transportation nodes is effectively improved.

4. Conclusion

In this paper, the research on logistics transportation nodes of the multidimensional data fusion system of the Internet of Things starts from the micropoint of view, combines the macrooverall planning, innovatively combines qualitative analysis and quantitative data analysis, establishes a system platform and two reasonable models, and makes an in-depth study on the component logistics transportation node control. Component transport node control mainly has many problems in transport node management, logistics cost, warehouse management, route planning, Internet of Things technology application, and so on. In view of this, in the research of component supply chain logistics transportation node control, logistics node management should be familiar with the application field of the Internet of Things. According to the characteristics of the logistics node process, combined with Internet technology, a logistics tracking system is established. A comprehensive analysis of the entire life cycle from production to construction of logistics nodes can be used to establish a traceability system platform. This paper discusses the function, process steps of the system, and how to assist the logistics and transportation node control of the multidimensional data fusion system of the Internet of Things and provides a theoretical basis for the logistics and transportation node control. Establish the component logistics transport node control model. Based on the data envelopment method, the BBC

output-oriented model is built. By analyzing the output and input index data, it is concluded that the average comprehensive efficiency of the three projects is 0.932, 0.832, and 0.985. It can be seen that the overall efficiency is not effective by DEA. The overall input and output resources that have not been effectively used include unrealistic planned level profits, less redundant fixed investment, parts distribution batches, low production levels, and storage efficiency. Predictive analysis adjusts the effective indicators of DEA to achieve theoretical rationality and provides corresponding change measures to provide model data support for improvement. The analysis explains the data node control model, plans specific improvements, and optimizes the logistics nodes of the IoT multidimensional data fusion system. Strengths and weaknesses list external and internal opportunities and threats through the SWOT matrix and comprehensively integrate solutions. Decisions are made from four aspects: logistics cost, warehousing management, route planning, and Internet of Things technology. Make adjustment to the component logistics transport node and realize the completion of the planned goal. In the implementation of the strategy, the overall node component control strategy is analyzed from a macroperspective, and the before and after control analysis is performed. Through the control process framework and continuous and steady follow-up, the work is ensured to operate in a reasonable manner, and the work efficiency of the logistics node is improved. From the macro- and microlevel, the node control strategy has been improved in an all-round and multilevel manner.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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