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Analysis of Factors for High-Quality Development of Intelligent Logistics Parks under the Internet of Things

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Abstract

Driven by the Internet of Things (IoT) technology, intelligent logistics parks, as the front line of the logistics industry, are increasingly accelerating the pace of their high-quality development. IoT technology provides a brand new development opportunity for intelligent logistics parks, which promotes the intelligence, automation and efficiency of logistics parks through real-time monitoring, automated management, data analysis and other functions. The article uses hierarchical analysis and gray correlation method to deeply analyze the key factors for the high-quality development of intelligent logistics parks. These factors include the level of intelligence, logistics efficiency, logistics service quality, infrastructure, Internet of Things (IoT) technology and other aspects, which are interrelated and interact with each other, and together constitute a complete system for the high-quality development of intelligent logistics parks. Through in-depth study of these key factors, it can provide strong theoretical support for policy makers and help them formulate more scientific and reasonable policies to promote the high-quality development of smart logistics parks in the context of IoT. At the same time, these research results can also provide specific guidance for practical operation, help enterprises better utilize IoT technology in practice, and promote the innovation and development of smart logistics parks.

Keywords: Internet of Things; Smart Logistics Park; Hierarchical Analysis; Gray Correlation

1. Introduction

Under the background of rapid development of Internet of Things (IoT) technology [1], intelligent logistics parks have ushered in unprecedented development opportunities. As an intelligent logistics park in the new era, we shoulder the important mission of promoting the green, intelligent and efficient development of the logistics industry. Therefore, we will actively embrace the Internet of Things (IoT) technology and seek a harmonious symbiosis between logistics and environmental protection. This is not only our solemn commitment to the environment, but also our firm commitment to the future. With science and technology innovation as the engine, we will continue to optimize the energy structure and improve the efficiency of energy use [2], while strengthening environmental management and promoting the implementation of sustainable development strategies. Only in this way can we contribute to the future of the earth and make intelligent logistics parks become the backbone of promoting green development.

2. The Intrinsic Connection between the Internet of Things and Intelligent Logistics Parks

The intrinsic connection between the Internet of Things (IoT) and intelligent logistics parks is reflected in many aspects, which together promote the intelligent, automated and efficient development of the logistics industry. IoT technology provides powerful data support for intelligent logistics parks. Through IoT devices, intelligent logistics parks can collect, transmit and process [3] a large amount of logistics information in real time, such as the location of goods, transportation status, inventory and so on. This information is crucial for the operation and management of the park, which can help the park realize more accurate and efficient logistics management and services.

Meanwhile, IoT technology promotes the sustainable development of intelligent logistics parks. Through IoT technology, the park can monitor energy consumption and emissions in real time, and in the process of planning and construction, the intelligent logistics park fully considers the issue of carbon emissions [4], adopts corresponding energy-saving measures and emission reduction measures, and reduces the impact on the environment. At the same time, the Internet of Things technology can also promote the development of green logistics, the use of new energy, clean energy and other environmentally friendly transportation methods to reduce carbon emissions and energy consumption.

Internet of things and intelligent logistics park promote each other and develop together. Internet of Things technology provides strong support for the intelligent, automated and efficient development of intelligent logistics parks [5]. With the continuous development and application of IoT technology, intelligent logistics parks will play a more important role in the logistics industry. In the future, the integration and development between the two should be deepened to jointly promote the green transformation and sustainable development of the logistics industry.

3. Analysis of the Current Situation of High-Quality Development of Intelligent Logistics Parks

Driven by both policy support and market demand, intelligent logistics parks have developed rapidly. Governments around the world have introduced relevant policies to increase support for intelligent logistics parks and promote their construction and development. At the same time, with the rapid development of e-commerce, manufacturing and other industries, the demand for intelligent logistics continues to grow, providing a broad market space for the development of intelligent logistics parks.

Secondly, through the introduction of advanced technologies such as the Internet of Things, big data and cloud computing [6], intelligent logistics parks realize the real-time collection, transmission and processing of logistics information, improving the efficiency and accuracy of logistics operations. Meanwhile, the wide application of intelligent logistics equipment such as unmanned vehicles, unmanned warehouses and drones [7] has further enhanced the automation and intelligence level of the park.

In addition, the intelligent logistics park has also achieved results in green and low-carbon development. By optimizing the energy structure, promoting energy-saving technologies and equipment, and establishing a green supply chain, the park has reduced carbon emissions and energy consumption and promoted the green transformation of the logistics industry.This not only helps to achieve the carbon neutrality goal, but also enhances the sustainable development capability of the parks.

However, although the construction of intelligent logistics parks in China has achieved remarkable results, it still faces a series of problems and challenges. Among them, problems such as low level of informatization, inefficient use of resources and weak awareness of environmental protection are particularly prominent, as well as blind expansion and duplicated construction in the planning and construction process of some of the parks, leading to waste of resources and low efficiency. At the same time, the shortage of talents and technological bottlenecks have also restricted the development speed and innovation ability of the park. These problems undoubtedly constrain the further development of intelligent logistics parks and the realization of their high-quality development[8]goals.Therefore, it is necessary for us to conduct in-depth research and analysis of these problems to find its most suitable countermeasures for the development of intelligent logistics parks in the low-carbon context.

4. Analysis of High-Quality Development Factors of Intelligent Logistics Park based on Hierarchical Analysis Method

Hierarchical analysis is a multi-objective decision analysis method, which decomposes a complex problem into several interrelated sub-problems by constructing a hierarchical structural model,so as to realize the systematic analysis and optimization of the problem[9].In the high-quality development path selection of intelligent logistics parks, the hierarchical analysis method can be applied to construct a comprehensive evaluation model from multiple dimensions such as economy,society, environment, etc.,to quantitatively analyze and compare different development factors, and select the optimal development factors.

4.1 Identification of evaluation indicators

Its evaluation indicators are determined through the present economic development as well as the support of relevant policies, as shown in Table 1:

Table 1 Evaluation indicators of smart logistics parks

Level 1 indicators	Level 2 indicators	note
Intelligent level	informatization level (A1)	Assess whether the park has adopted advanced logistics management systems, Internet of Things (IoT) technology, etc.
	Effectiveness of the platform system (A2)	Examine the operational stability and data processing capability of the platform system.
	Number of platform users (A3)	Reflects the popularity of information technology services in the park.
logistics efficiency	Cargo turnover (A4)	Measures the speed at which goods move through the park.
	Warehouse efficiency (A5)	Evaluate warehouse space utilization, speed of goods access, etc.
	Transportation limitation (A6)	Examine the punctuality and efficiency of cargo transportation.
Quality of logistics services	on-time delivery rate (A7)	Reflects the ability of the logistics park to deliver goods accurately at the agreed time.
	Order fulfillment rate (A8)	Reflects the park's service capabilities and customer satisfaction.
	Complaint handling rate (A9)	It demonstrates the park's service attitude and problem-solving ability.
infrastructure	transportation facilities (A10)	This includes the completeness and accessibility of transportation facilities such as roads, bridges and stations within the park.
	Electricity, water and gas supply (A11)	Reflects the reliability and stability of the logistics park in terms of the supply of basic resources.
Internet of Things (IoT) technology	technical performance (A12)	Assessing the state of the art and performance of IoT systems
	safety (A13)	Evaluate the security performance of IoT systems, including device security, data encryption, and access control.
	economic benefit (A14)	Evaluate the economic benefits of IoT technology applications, including return on investment, cost savings, and efficiency gains.

Table 2 AHP Assessment Scale

scale	clarification
1	Comparison of the two elements, which are of equal importance to each other
3	Comparison of two elements, one more important than the other
5	Comparing the two elements, one is clearly more important than the other
7	Comparing two elements, one is much more important than the other
9	Comparing the two elements, one is definitely more important than the other
2, 4, 6, 8	Quantitative scale when compromised between the two neighboring criteria above
The reciprocal of each of the above numbers	The reciprocal indicates the insignificance of two comparative elements

4.2 Creating a judgment matrix

In this paper, we invited 15 experts and professors from local universities and smart logistics parks and other fields to form a professional expert group. By distributing questionnaires to them, we collected ratings on the weights of the first-level indicators. After careful organization, We constructed the judgment matrix using a table of relative importance of elements, as shown in Table 2, and conducted consistency tests on the judgment matrix to ensure the accuracy and scientificity of the assessment results.

Based on the expert scoring results, the judgment matrix S=(uij)p×p is constructed for each level of indicators, as shown in Tables 3 to 8:

Table 3 Level 1 indicators

Quality Development of Intelligent Logistics Parks	Intelligent level	logistics efficiency	Quality of logistics services	infrastructure	Internet of Things (IoT) technology
Intelligent level	1.0000	5.0000	4.0000	3.0000	2.0000
logistics efficiency	0.2000	1.0000	0.3333	0.3333	0.2000
Quality of logistics services	0.2500	3.0000	1.0000	0.3333	0.2500
infrastructure	0.3333	3.0000	3.0000	1.0000	0.2500
Internet of Things (IoT) technology	0.5000	5.0000	4.0000	4.0000	1.0000

Table 4 Secondary Indicators (1) Level of Intelligence

Intelligent level	informatization level	Effectiveness of the platform system	Number of platform users
informatization level	1.0000	3.0000	3.0000
Effectiveness of the platform system	0.3333	1.0000	0.5000
Number of platform users	0.3333	2.0000	1.0000

Table 5 Secondary indicator (2) Logistics efficiency

logistics efficiency	Transportation limitation	Warehouse efficiency	Cargo turnover
Transportation limitation	1.0000	4.0000	3.0000
Warehouse efficiency	0.2500	1.0000	0.5000
Cargo turnover	0.3333	2.0000	1.0000

Table 6 Secondary Indicator (3) Quality of Logistics Services

Quality of logistics services	Complaint handling rate	on-time delivery rate	Order fulfillment rate
Complaint handling rate	1.0000	3.0000	0.5000
on-time delivery rate	0.3333	1.0000	0.3333
Order fulfillment rate	2.0000	3.0000	1.0000

Table 7 Secondary indicator (4) Infrastructure

infrastructure	transportation facilities	Electricity, water and gas supply
transportation facilities	1.0000	3.0000
Electricity, water and gas supply	0.3333	1.0000

Table 8 Secondary Indicators (5) IoT Technology

Internet of Things (IoT) technology	technical performance	security	economic benefit
technical performance	1.0000	4.0000	3.0000
security	0.2500	1.0000	0.5000
economic benefit	0.3333	2.0000	1.0000

4.3 Compute the eigenvectors

For each judgment matrix, we first calculate its largest eigenvalue and determine the eigenvectors corresponding to it. The values of these eigenvectors are the weights of the corresponding indicators. Subsequently, based on these weights, we further carry out consistency tests of the data to ensure the accuracy and reliability of the results, as shown in Table 9.

Table 9 Tier 1 indicator weights

Middle tier elements	weights
Intelligent level	0.3886
Internet of Things (IoT) technology	0.3138
infrastructure	0.1497
Quality of logistics services	0.0946
logistics efficiency	0.0532

4.4 Consistency Test

The purpose of the consistency test is to verify that the relative importance ratings of the elements in the judgment matrix are internally consistent, i.e., to avoid logical contradictions.

4.4.1 Calculation of Consistency Indicators (CI)

First, the maximum eigenvalue (λmax) of the judgment matrix needs to be calculated.

Then, using the formula

$$CI = \frac{\lambda max - n}{n-1} \quad (1)$$

Calculate the consistency metric, where n is the order (i.e., the number of elements) of the judgment matrix.

4.4.2 Calculation of Consistency Indicators (CI)

The random consistency index RI is derived from Table 10 based on the order of the matrix.

Table 10 Average Random Consistency Indicators

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.54	1.56	1.58	1.59

4.4.3 Calculation of Consistency Indicators (CI)

Consistency ratio CR through the formula

$$CR = \frac{CI}{RI} \quad (2)$$

Calculated.

If the CR is less than 0.1 (or a particular critical value, depending on the specific application and criteria), the judgment matrix is considered to be of acceptable consistency; otherwise, the judgment matrix needs to be corrected.

The consistency test was performed using yaahp software, as shown in Table 11:

Table 11 Data results of judgment matrix consistency test

judgment matrix	λmax	CR
First-level matrix	5.3207	0.0716
Level II matrix (level of intelligence)	3.0539	0.0518
Level II matrix (logistics efficiency)	3.0183	0.0176
Level II matrix (quality of logistics services)	3.0538	0.0517
Level II matrix (infrastructure)	2.0000	0.0000
Level II matrix (IoT technology)	3.0183	0.0176

Table 12 Ranking weights of level 1 indicators for decision-making objectives

Level 1 indicators	weights
Intelligent level	0.3886
Internet of Things (IoT) technology	0.3138
infrastructure	0.1497
Quality of logistics services	0.0946

logistics efficiency	0.0532

This shows that the CRs are all less than 0.1 and therefore pass the consistency test. The ranked weights of the first-level indicators can be obtained, as shown in Table 12.

Then the secondary indicator ranking weights were obtained, as shown in Table 13:

Table 13 Ranking weights of secondary indicators for decision-making objectives

Secondary indicators	weights
informatization level	0.2289
technical performance	0.1956
transportation facilities	0.1123
Number of platform users	0.0979
economic benefit	0.0752
Effectiveness of the platform system	0.0619
Order fulfillment rate	0.0496
security	0.0431
Electricity, water and gas supply	0.0374
Transportation limitation	0.0332
Complaint handling rate	0.0316
on-time delivery rate	0.0134
Cargo turnover	0.0127
Warehouse efficiency	0.0073

It can be seen that among the primary indicators, the level of intelligence and IoT technology occupy a central position, which coincides with the current booming development trend of the Internet of Things (IoT). Among the secondary indicators, the level of informatization and technical performance are particularly critical, which further highlights the importance of smart logistics parks to continuously improve the level of informatization and enhance the performance of IoT technology to achieve sustainable development of the park.

5. Analysis of Influential Factors for High-Quality Development of Intelligent Logistics Park Based on Gray Correlation Method

The degree of correlation is an important indicator of the strength of the correlation between two inter-system factors as they change over time or across different objects. In the process of system evolution, if the change trends of two factors are highly consistent, i.e., the synchronized changes are significant, the degree of association between them is high. On the contrary, if the change trend is not consistent, the degree of association is relatively low. Based on this consideration, the gray correlation method is proposed, which assesses the degree of correlation between factors based on the similarity or difference of development trends between factors, i.e., the "gray correlation degree" [10]. This method provides an effective means to measure the correlation between factors.

5.1 Gray Correlation Analysis

(1) Based on the selection of program-level indicators described above, a reference sequence for gray correlation analysis and a number of comparison sequences were identified, forming the following matrix:

Set up a reference sequence:

$$\mathrm{X}_0 = \{\mathrm{X}_0(1), \mathrm{X}_0(2) \ldots, \mathrm{X}_0(\mathrm{n})\} \tag{3}$$

Set up a reference sequence:

$$\mathrm{X}_i = \{\mathrm{X}_i(1), \mathrm{X}_i(2), \ldots, \mathrm{X}_i(\mathrm{n})\} \mathrm{i} = 1,2, \ldots, \mathrm{m} \tag{4}$$

$$Y = \begin{bmatrix} x_0(1) & \cdots & x_m(1) \\ \vdots & \ddots & \vdots \\ x_0(n) & \cdots & x_m(n) \end{bmatrix} \tag{5}$$

(2) Dimensionless processing

Due to the non-metricity between the indicators of each programmatic level, it is necessary to standardize each data series and convert them to dimensionless data before evaluation. In this paper, the initialization method is used, and the calculation formula is as follows:

$$x_i(K) = \frac{x_i'(K)}{x_i'(1)} \quad (6)$$

(3) Calculate the sequence difference

The absolute values corresponding to the reference and comparison series at each moment after the data were dimensionless, were calculated as follows:

$$\Delta_i(k) = |x_0(k) — x_i(k)| (k = 1,2,\dots,m; i = 1,2,\dots,n) \quad (7)$$

(4) Calculate the correlation coefficient

According to the steps of gray correlation calculation, calculate the correlation coefficient of X0 and Xi about the Kth indicator, the calculation formula is as follows:

$$\xi_i(k) = \frac{\min_i \min_k |x_0(k) - x_i(k)| + \rho \max_i \max_k |x_0(k) - x_i(k)|}{|x_0(k) - x_i(k)| + \rho \max_i \max_k |x_0(k) - x_i(k)|} \quad (8)$$

Where, ρ is the discrimination coefficient, ρ ∈(0,1),the smaller the value of ρ ,the greater the difference of correlation coefficient,the stronger the differentiation ability.Usually, ρ takes the value of 0.5,k=1,2,... ,m.

(5) Calculation of correlation

$$\delta(x_0, x_1) = \frac{1}{n}\sum_{i=1}^{n} \delta\big(x_0(i), x_1(i)\big) \quad (9)$$

(6) Determination of evaluation ratings

The optimal value of the degree of correlation is 1, but it is generally difficult to realize. By reviewing the literature and relevant information, the evaluation level and correlation degree criteria were initially formulated, and relevant experts were consulted for further determination, the detailed division of which is shown in Table 14 below:

Table 14 Evaluation Rating Criteria

relatedness value	rating
Z<0.30	discrepancy
0.30≤Z<0.50	mediocre
0.50≤Z<0.65	general
0.65≤Z<0.75	favorable
Z≥0.75	excellence

Table 15 Statistical data by park

quantitative standard	Park A	Park B	Park C	reference sequence
Informatization level (1-10 points)	6	9	8	10
Effectiveness of the Platform system (1-10 points)	7	8	6	10
Number of platform users (10,000)	2	3	3	5
Cargo turnover (number of turns (times))	22	23	21	25
Warehousing efficiency (%)	85	78	80	100
Transportation time limit (h)	75	43	56	24
On-time delivery rate (%)	91	96	90	100
Order fulfillment rate (%)	95	93	96	100
Complaint handling rate (%)	94	90	92	100
Transportation facilities (investment in construction transportation facilities ($ million))	230	300	260	300
Electricity, water and gas supply (investment (million dollars))	170	180	180	200

Technical performance (%)	97	98	96	100
Safety (invested technical funds (in millions of dollars))	700	900	860	1000
Economic benefits ($ million)	800	920	880	1000

5.2 Analysis of specific examples

Three smart logistics parks are now selected and compared horizontally using the gray correlation method in order to explore in depth the factors affecting their high-quality development. Through this method, we aim to gain a more comprehensive understanding of the development status of these parks in the field of intelligent logistics and reveal their potential optimization space, so as to provide a useful reference for promoting the high-quality development of intelligent logistics parks. We looked up data for the three parks, as shown in Table 15:

Calculations using spsspro can be obtained as shown in Table 16:

Table 16 Correlation coefficient results (1)

Correlation coefficient results	Park A	Park B	Park C
Informatization level (1-10 points)	1.000	1.000	1.000
Effectiveness of the Platform system (1-10 points)	0.980	0.987	0.971
Number of platform users (10,000)	0.980	0.980	0.985
Cargo turnover (number of turns (times))	0.877	0.993	0.985
Warehousing efficiency (%)	0.667	0.862	1.000
Transportation time limit (h)	0.452	0.778	0.644
On-time delivery rate (%)	0.617	0.926	0.870
Order fulfillment rate (%)	0.588	0.962	0.806
Complaint handling rate (%)	0.595	1.000	0.847
Transportation facilities (investment in construction transportation facilities ($ million))	0.500	0.714	0.769
Electricity, water and gas supply (investment (million dollars))	0.500	1.000	0.769
Technical performance (%)	0.575	0.904	0.806
Safety (invested technical funds (in millions of dollars))	0.333	1.000	0.526
Economic benefits ($ million)	0.758	0.949	0.870

Based on the correlation coefficient value, then the correlation value is calculated for evaluation judgment,as shown in Table 17:

Table 17 Composite correlation (1)

Relevance results		
evaluation unit	relatedness	rankings
Park B	0.933	1
Park C	0.846	2
Park A	0.673	3

As can be seen from Table 17, it can be seen that for the three evaluation items, Park B has the highest overall rating (correlation: 0.933), followed by Park C (correlation: 0.846), and the last one is Park A (correlation: 0.673), i.e., B>C>A. From the available data, it can be seen that the development of Park B is the most outstanding, followed by Park C, and the correlation between all the three parks exceeds 0.65, even though it is a little bit weaker. The correlation coefficients of the three parks are all over 0.65, which indicates that the overall development of the three parks is quite promising despite the nuances.

Next, we selected a particular park and compared it longitudinally, as shown in Table 18:

Table 18 Park statistics from 2021 to 2023

quantitative standard	2021	2022	2023	reference sequence
Informatization level (1-10 points)	7	8	9	10
Effectiveness of the Platform system (1-10 points)	7	8	9	10
Number of platform users (10,000)	2	3	4	5
Cargo turnover (number of turns (times))	22	23	25	30
Warehousing efficiency (%)	85	88	92	100
Transportation time limit (h)	75	58	44	24
On-time delivery rate (%)	90	92	96	100
Order fulfillment rate (%)	93	94	96	100
Complaint handling rate (%)	90	92	94	100
Transportation facilities (investment in construction transportation facilities ($ million))	230	300	400	500
Electricity, water and gas supply (investment (million dollars))	170	180	190	200
Technical performance (%)	97	97	98	100
Safety (invested technical funds (in millions of dollars))	700	850	900	1000
Economic benefits ($ million)	780	840	920	1000

Calculations using spsspro can be obtained as shown in Table 19:

Table 19 Correlation coefficient results (2)

quantitative standard	2021	2022	2023
Informatization level (1-10 points)	1.000	1.000	1.000
Effectiveness of the Platform system (1-10 points)	1.000	1.000	1.000
Number of platform users (10,000)	0.976	0.986	0.994
Cargo turnover (number of turns (times))	0.984	0.986	0.975
Warehousing efficiency (%)	0.800	0.896	0.975
Transportation time limit (h)	0.508	0.639	0.775
On-time delivery rate (%)	0.750	0.851	0.928
Order fulfillment rate (%)	0.723	0.830	0.928
Complaint handling rate (%)	0.750	0.851	0.951
Transportation facilities (investment in construction transportation facilities ($ million))	0.333	0.407	0.607
Electricity, water and gas supply (investment (million dollars))	0.667	0.774	0.885
Technical performance (%)	0.690	0.801	0.906
Safety (invested technical funds (in millions of dollars))	1.000	0.578	1.000
Economic benefits ($ million)	0.800	0.862	0.928

Then the composite correlations were obtained and ranked as shown in Table 20:

Table 20 Composite correlation (2)

Relevance results		
evaluation unit	relatedness	ranking
2023	0.918	1
2022	0.819	2

2021	0.784	3

Accordingly, the logistics park has shown steady development over the past three years, with its infrastructure continuously optimized and improved, and its level of intelligence gradually enhanced. At the same time, the park has made significant progress in Internet of Things (IoT) technology, and its management and planning have become more scientific and efficient, laying a solid foundation for sustainable development.

6. Implementation Strategies and Suggestions for High-Quality Development of Intelligent Logistics Parks

Based on the analysis results of hierarchical analysis and gray correlation method, the implementation strategies and recommendations for the high-quality development of intelligent logistics parks are proposed, which should focus on the two major cores of upgrading the level of intelligence and improving the IoT technology, as well as synchronously upgrading the infrastructure and the quality and efficiency of logistics services. The following are the specific strategies and suggestions:

6.1 Enhance the level of intelligence

1) Introducing modern information technology: actively adopting cutting-edge technologies such as big data, cloud computing and artificial intelligence [11], constructing an intelligent logistics information platform, and realizing real-time sharing, accurate analysis and efficient processing of logistics information.

2) Promote the application of intelligent equipment: Encourage enterprises in the park to widely use intelligent warehousing, automated sorting systems, driverless transportation vehicles [12], etc., to improve the degree of automation and intelligence of logistics operations, reduce manpower costs, and improve operational efficiency.

3) Strengthen the training of intelligent talents: pay attention to the introduction and cultivation of intelligent talents, and improve the intelligent literacy of enterprises and employees in the park through training and cooperative projects, so as to provide talent guarantee for the development of intelligent logistics.

6.2 Improving IoT technology

1) Research and development of new hardware devices: Invest in research and development of new sensors, chips and communication modules to improve the performance and energy efficiency of IoT devices. Focus on hardware security design and encryption technology to ensure the security and privacy protection of user data.

2) Enhance network security and privacy protection: Design and implement secure network architecture and protocols to ensure secure communication between IoT devices. Adopt technical means such as data encryption, authentication and access control to protect the security and privacy of user data [13]. Regular security vulnerability scanning and risk assessment of IoT systems are conducted to identify and repair potential security problems in a timely manner.

3) Implementation of intelligent automation and remote control: intelligent automation control of equipment is realized through IoT technology to improve the operational efficiency and reliability of equipment. The use of IoT technology to realize remote monitoring and management [14], reduce operating costs and improve work efficiency.

6.3 Improvement of infrastructure

1) Strengthen infrastructure construction: invest funds to improve park roads, bridges, warehousing and other facilities, raise the modernization level of logistics facilities, and ensure smooth logistics operations.

2) Enhance information technology infrastructure: improve communication networks, data centers and other facilities, enhance data transmission speed and processing capacity, and provide information technology support for the development of intelligent logistics.

6.4 Improve the quality of logistics services

1) Establishing a perfect customer service system: providing personalized and diversified logistics services oriented to customers' needs, establishing a rapid response mechanism, and improving customer satisfaction.

2) Strengthening the supervision of logistics services: formulating service quality standards, establishing a supervision mechanism, regularly evaluating and improving services, and ensuring the safety, efficiency and reliability of logistics.

6.5 Improve logistics efficiency

1) Optimize the logistics process: through process re-engineering, link streamlining [15] and other ways to reduce costs and improve efficiency. Utilize modern information technology to realize information sharing and collaborative operations to improve overall logistics efficiency.

2) Strengthen synergistic cooperation: Strengthen cooperation among enterprises in the park to realize resource sharing and complementary advantages, and enhance overall logistics efficiency. At the same time, cooperate with government departments, industry associations and other organizations to jointly promote the high-quality development of intelligent logistics parks.

In summary, the high-quality development of intelligent logistics parks requires strategic planning and implementation from multiple dimensions. The first task is to improve the level of intelligence, actively adopt cutting-edge technology, promote the application of intelligent equipment, and strengthen the training of intelligent personnel. At the same time, adhere to the principle of low-carbon environmental protection, optimize the energy structure, promote green logistics technology and reduce environmental pollution. In addition, it improves infrastructure construction, enhances the quality and efficiency of logistics services, and ensures the efficient and smooth operation of all logistics activities in the park. Through continuous innovation and optimization, it promotes the sustainable development of the intelligent logistics park and contributes more power to the economic and social development.

7. CONCLUSION

Intelligent logistics parks occupy a central position in logistics development, especially in the rapid development of Internet of Things technology, its importance is more and more prominent. In the face of the broad background of the Internet of Things, intelligent logistics parks should closely track the global development trend, continue to optimize energy-saving and emission reduction technologies, and continuously improve the level of intelligence, in order to actively adapt to and lead the logistics industry in the era of the Internet of Things, the new trend. Through these efforts, intelligent logistics parks will promote the development of the logistics industry in a more environmentally friendly, efficient and intelligent direction.

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