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Research on Cost Control of Logistics Supply Chain in E-Commerce Enterprises Take Jingdong Company as an Example[†]

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Abstract

With the continuous innovation of electronic information technology, information-based business transactions have emerged as the times require, and many e-commerce companies have gradually developed. The good operating efficiency of e-commerce enterprises has played a huge role in promoting China's economic development. China's e-commerce enterprises have become a very important part of China's economic structure. Good operating efficiency has attracted more competitors, more and more enterprises have invested in the e-commerce industry, and the profit margins in the industry have been compressed, making the business-to-individual user sales model. E-commerce began to study how to increase its own profits. The sales model of individual users The unique operation mode of e-commerce makes it difficult for enterprises to achieve profitability by adjusting the price and cost of the goods themselves. As the "third profit source," logistics costs have attracted the attention of managers. The importance of effective cost control. Logistics is an important part of connecting various nodes in the supply chain to make the transaction successful. Only by comprehensively analyzing and reasonably controlling the components of various logistics costs in the supply chain can the goal of reducing logistics costs be truly achieved.

JD.com is a self-operated e-commerce company in China. It also provides an electronic sales platform for manufacturers and suppliers. As of March 2022, JD.com's total market value has reached US$195 billion, ranking only after Alibaba among Chinese e-commerce companies. On the one hand, JD.com effectively integrates the internal supply chain and improves the efficiency of enterprise logistics cost control; on the other hand, it increases investment in research and development, makes full use of the advantages of big data, establishes an intelligent supply chain platform and information sharing platform, and comprehensively optimizes logistics costs.

Key words: E-commerce, Logistics cost control, Logistics cost, Supply chain

Introduction

With the continuous innovation of electronic information technology and the increase of the popularity of the Internet, the e-commerce industry came into being. E-commerce is not only a representative product of the electronization and informatization of trading activities, but also a great impetus to China's economic development. According to the monitoring data of e-commerce research center, China's online retail sales reached 13.1 trillion yuan in 2021. The emergence of e-commerce has not only brought changes to the economic field, but also affected consumers' consumption ideas and methods. Now it has become a very important part of the economic structure. By 2021, the number of online shopping users in China has reached 842 million. The continuous expansion of the industry market has also brought more competitors. More and more enterprises have invested in the e-commerce industry, and the profit space has been compressed, so that the sales model of enterprises to individual users, e-commerce began to study how to increase their own profits. Since the sales mode of enterprises to

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individual users is different from the online trading mode of traditional retailers, consumers can easily compare the quotation and quality of the same goods or services of various enterprises in parallel. Therefore, whether increasing the price or reducing the quality to reduce the cost will only weaken the core competitiveness of enterprises, but also because of the unique business mode of the sales mode of enterprises to individual users, Make its logistics cost account for a larger proportion of the total cost than other industries. At this time, strengthen the control of logistics links and make the way of profit growth rise. Logistics is an important link connecting all nodes in the supply chain to make the transaction successful. Only by comprehensively analyzing and reasonably controlling the cost composition of each node in the logistics supply chain can we really achieve the purpose of reducing logistics costs.

At present, there are mainly 2 types of logistics distribution modes in China, namely, the self-operated logistics mode represented by JD.com and Taobao and the third-party logistics distribution mode represented by e-commerce such as Suning and Vipshop. The distribution characteristics and distribution capacity of different logistics modes are also different, and they all have their own advantages and disadvantages. However, generally speaking, the logistics service quality of e-commerce in China is low, and there are some problems, such as high logistics cost, unstable distribution quality, generally low quality of logistics personnel, weak service awareness, restriction of third-party logistics management and so on. Due to the wide distribution of online shopping consumers and the large batch and small quantity of purchased products, it is difficult to form a scale due to the dispersion of logistics, which increases the difficulty of logistics distribution. In addition, consumers' personalized demand for logistics services is increasing, but the current logistics service level is difficult to meet the needs of consumers, resulting in low consumer satisfaction with e-commerce enterprises. If e-commerce enterprises want to achieve better development in the fierce competition, they must further improve the logistics service concept and service quality, find out the shortcomings in logistics services, and take corresponding optimization measures for the deficiencies. From the perspective of future development trend, self-built logistics is the key choice to ensure the logistics speed and distribution quality to break through the previous bottleneck, while JD is a typical e-commerce enterprise in the self-built logistics system so far.

At first, Jingdong company was responsible for the distribution business by the third-party logistics, but because it could not provide stable and efficient services, there were problems such as untimely delivery of logistics information, difficult management and unable to monitor the whole process of cargo transportation, which could not meet the needs of enterprise development. JD's managers are unwilling to let the lagging third-party logistics affect their business development. They began to build their own logistics in 2007, took the lead in adopting the self-operated logistics mode, gradually improved the national logistics distribution system, reduced intermediate links through the self-operated logistics mode, provided consumers with high-level logistics services and improved user experience. In 2017, the logistics sub group of JD.com was established to help partners improve logistics efficiency, reduce the cost of supply chain and jointly provide customers with high-quality and fast logistics services by using the professional ability of JD.com logistics.

At present, JD.com has become the largest self-operated e-commerce enterprise in China. The rapid development of JD.com is inseparable from its self-built logistics system. However, the rapid growth of business volume also increases the pressure on the enterprise's logistics service. The level of logistics cost is closely related to its own profits and the value of goods purchased by customers. The quality of logistics service directly affects the customer experience and then the image of the enterprise. With the growth of business scale, various problems in logistics services are also gradually emerging. If these problems are not improved in time, JD will be difficult to further develop. Therefore, this paper takes Jingdong company as the research object, analyzes the problems existing in the logistics service according to the existing logistics distribution mode, explores the key factors affecting its logistics service, and puts forward the corresponding improvement countermeasures, so as to provide reference for improving the logistics service efficiency of Jingdong company and promoting the development of enterprises.

Literature review

Theoretical framework

Basic theory

Logistics cost management is not an isolated subject. The analysis and research of the theory and practice of logistics cost management in domestic and foreign academic circles involve many related disciplines. Logistics cost management can be combined with the management theories of various enterprises. By learning from each other and integrating with practice, we can constantly explore better management solutions and create new value.

Supply chain theory

In the modern era of the rise of network technology and the global economy, global purchasing has developed rapidly, and competition among enterprises has become increasingly fierce. In this environment, the designation of enterprise logistics strategy and logistics cost management must be separated from the internal perspective of the enterprise, and focus on the composition and changes of the entire supply chain, and derive the logistics system within the enterprise to the entire supply chain, from the overall supply chain. From the point of view, seek breakthroughs in logistics cost management and enhance the overall competitiveness of the enterprise supply chain.

For "supply chain", there is no unified definition at home and abroad. The American Supply Chain Association defines "supply chain" as covering the process from raw material suppliers through development, processing, production, wholesale, retail and other processes to the end user. Every business activity that travels and delivers a product or service. In China's national standard "Logistics Terminology," "supply chain" refers to the network chain structure formed by upstream and downstream organizations involved in the activities of providing products or services to end users in the production and circulation process. Therefore, the supply chain is a wide-ranging enterprise structure model, which not only includes the processing, production and sales links within the enterprise, but also a complete link that extends to the upstream and downstream raw material supply of the enterprise to consumers.

The supply chain generally includes 4 processes: Material circulation, commercial circulation, information circulation, and capital circulation.

Material circulation is mainly the flow of goods from suppliers to consumers, and it is also the most concerned area of logistics cost management. Many logistics cost management theories focus on how to transport goods at the lowest cost in a short period of time in material circulation. Ship from supplier to consumer. Commercial circulation mainly refers to the business process of placing orders and accepting orders between suppliers and consumers. At present, there are various modes of transaction activities in the market, among which the form of B2C e-commerce has become an important part of the market that cannot be ignored. Information circulation refers to the flow of commodity and transaction information. With the rapid development of the internet today, information has become a key factor for enterprises to win in the market. At the same time, the circulation of information will also affect the cost of enterprises. Fund circulation mainly refers to currency circulation. The normal operation of an enterprise is inseparable from the flow of funds. Cash flow is the lifeline of an enterprise, and it is also indispensable for the normal operation of an enterprise.

Iceberg theory

In 1895, Freud's famous "iceberg theory" was published. He pointed out that people are like an iceberg, we can only see a small part of the behavior on the surface, while a larger part of the inner world is hidden below the deeper level, hidden from view. Combining the iceberg theory with logistics cost management can show another essential feature of logistics cost. Above the horizontal level represents the cost that the enterprise needs to spend in the process of product transportation, while the part below the horizontal level that is not easily found is the internal consumption of the enterprise. For business managers, they often see what they are paying for, rather than paying attention to their own losses.

For the current financial system, it is impossible to accurately reflect the actual cost of the logistics process, and it is difficult to scientifically control it under such circumstances. The actual performance is

the same as the iceberg theory. The internal consumption of logistics activities It also accounts for a huge proportion of the total logistics cost. Therefore, in the process of checking the logistics cost, we should also focus on the internal consumption of the enterprise, but the amount of calculation of these costs is relatively large, and neither the calculation object nor the elements included in the cost are very clear. There were great difficulties in the recording process.

Antinomy theory

Antinomy Theory was put forward by Kant, a classical German philosopher in the 18th century. It refers to 2 propositions that are both correct to each other. Although both propositions are correct, there will be mutual constraints after they are combined. For example, in logistics, the process of cost application, if only 1 cost reduction is considered, then the cost of another project is bound to increase. In the process of logistics and transportation, there are links such as packaging, storage, loading and unloading, and transportation. Although different links have their own scientific management plans, they are a whole for the entire logistics system. Only by ensuring the optimization of the overall link can it be truly reducing logistics costs. For example, if the packaging materials used during transportation are of poor quality, the packaging cost will be reduced, but these products may be damaged during transportation. Therefore, enterprises should focus on this phenomenon in the actual management process and design the optimal balance plan. Only in this way can the logistics cost be truly controlled.

Core competitiveness theory

Prahalad and Hamel were the first to put forward the theory of core competitiveness. In their article "Enterprise Core Competence", they pointed out that scientific and effective management level is a necessary condition to ensure the long-term development of an enterprise. This requires enterprises to ensure that they have core competitiveness, and create unique core businesses that can stand the test of time, are malleable, and are difficult for competitors to imitate. Ancillary businesses that lead to development, they believe can be outsourced to other companies, thereby using other companies' technology to improve their own economics. The so-called outsourcing is to hand over the business that you are not very good at to other units, so that you can have more time and energy to innovate and develop your own advantageous business, and create your own core competitiveness.

The core of creating core competitiveness lies in: Reducing costs in the process of operation, or being able to use a shorter time to achieve goals, only in this way can better development and higher benefits be obtained. Now the market competition is becoming more and more fierce, and the progress of science and technology also promotes the continuous updating and improvement of products, so for enterprises, improving the core competitiveness is the life support to ensure the survival of the enterprise. For the business-to-individual user sales model industry, large-scale self-operated platforms should focus on the management of self-built logistics systems to strengthen their core competitiveness, while small-scale enterprises should focus on strengthening their own logistics systems when they are not yet able to build their own logistics systems. Entrusting the logistics and distribution to a third-party company for cooperation is a better choice in line with the core competitiveness theory.

Jingdong mall logistics distribution mode improvement strategy

Overview of vague set theoretical models

1) Rationale

This paper uses the vague set theory to establish an evaluation index system to analyze the logistics mode selection of Jingdong mall. The theory is, in fact, the area of the method used by typical delphi experts to evaluate decisions. Wen Lung and Buehere put forward the sacrificial gueset theory in 1993, which emphasizes that decision-making factors are in a fuzzy concentration, and at the same time, different influencing factors have positive and negative influences on logistics mode decision-making, so the corresponding true membership degree is adopted. and false membership to define. Fuzzy set not only needs to consider the positive influencing factors of events, but also the negative influencing factors of

events. Vague set theory has practical significance for solving the decision-making problem of logistics mode.

2) Specific steps

First, the decision matrix is transformed into the target preference matrix by using the priority calculation method, and then the Vague estimates of the schemes that support the target set and oppose the target set are calculated, and finally use a scoring utility function to sort the schemes, so as to select best plan. Specifically, follow the steps below:

Determine the relationship of indicator set A. Generally, A is defined as a Vague set relationship, and the element X (I = l, 2, 3,…, n) in A is expressed as TA(Xi), l-FA(Xi). Among them, FA (&) is that the indicator i will not determine the logistics.

The degree to which the policy has an impact, Ta(&) is the degree to which the index i will affect the logistics decision; the specific formula is: TA(Xi) is equal to the number of people who think the i-th index is important/the total number of experts N; 1-Fa(Xi) is equal to the total number of 1 minus the total number of people/experts N who do not consider the i-th indicator as important.

It is calculated that the function SA(Xi)0 SA(^) is equal to the difference of Ta(x°) and Fa®, (where i is equal to 1, 2, 3,..., m). The function Sa(&) is used to measures the reliability of the metric that is considered to have an impact on logistics decisions. The larger Sa(x) is, the more reliable it is, and the smaller Sa(xJ), the less reliable it is.

Set the standard weight value a. of the importance index, where (OWaWl). The value of a is equal to the ratio of the total number of people who support the indicator as important to the total number of people who support the indicator as unimportant.

Compare the size of the function Sa(0) and the standard weight value a. When Sa(G) is in part, the indicator is considered to be an important indicator. The value of a is determined and adjusted by the enterprise according to its own situation.

3) The decision attribute values are further normalized.

The attribute value of decision is usually divided into 2 types: Benefit type and cost type. For most Chinese e-commerce companies, the lower the cost index attribute, the better, and the higher the benefit index attribute, the better. Therefore, the simple treatment of cost index is to consider the complex problem of multiple objectives into a single objective. This makes it easy to calculate accurate results.

Literature review

To sum up, it can be seen that most domestic and foreign scholars' research on e-commerce mostly focuses on the concept, trend and characteristics of development, and introduces the management and control of enterprise logistics cost in detail. In general, e-commerce companies pay more attention to sales, production and logistics. This targeted link on logistics cost control for e-commerce businesses doesn't mention much. The choice of logistics cost control mode is more conducive to the long-term development of e-commerce enterprises and helps to improve the management level of enterprises. This is a question that needs to be explored and standardized. This article will take the domestic popular and influential Jingdong Mall as the analysis object, explore the relevant problems of logistics cost control of this enterprise, and give countermeasures, aiming to provide a certain reference for the logistics cost control of similar e-commerce enterprises in my country. At the same time enrich the research from this perspective. Through the analysis of actual cases, this paper will discuss how to combine the supply chain ideas to give feasible suggestions to the logistics cost control of e-commerce enterprises, in order to provide some experience and inspiration for the good development of e-commerce enterprises.

Methodology

Research design and methods

Population and sampling

Jingdong logistics employees are mainly composed of customer service personnel, warehouse operators, transportation personnel, distribution personnel and management personnel. Among them, customer service personnel are mainly responsible for maintaining customer relationships, solving customer problems, and providing effective suggestions and solutions for different customers. At the same time, it is also necessary to coordinate the handling of customer complaints and the docking and delivery of goods with the warehouse; the warehouse operator is mainly responsible for the basic work of goods in and out, tally, scanning and packaging. The transport personnel are mainly responsible for the delivery of goods; responsible for express delivery, customer maintenance and after-sales pickup in the area; logistics management personnel are responsible for various daily management work. According to the data on JD.com's official website and interviews with JD.com's logistics managers, we can see the approximate proportion of JD.com's logistics personnel. At present, JD.com has more than 120,000 logistics personnel, most of whom are delivery personnel. The number of employees is as high as 60,000 accounting for about 50 %. The number of warehousing and customer service personnel is relatively large, accounting for roughly 20 %. Other positions of the logistics employees currently employed in JD.com, most of the logistics management personnel have a bachelor's degree or above, while the recruitment of distribution personnel is generally not limited to education, mainly with low education, and can be employed after a certain training. This is because the demand for delivery personnel is extremely high and the technical content of delivery work is relatively low. People with high education are generally reluctant to engage in express delivery work, and it is difficult to recruit delivery personnel with high education. Warehouse operators, transportation personnel and customer service personnel are also not limited to educational qualifications. They can be employed after simple training, and the entry threshold is relatively low. Therefore, the overall educational background of these personnel is not high, which reflects that the overall quality of JD Logistics employees is not very high. Logistics Talent is scarce. For warehousing and customer service personnel, although the proportion of highly educated personnel is relatively small, they have a certain room for development. Through appropriate grassroots training, those with strong ability can compete for management positions within the enterprise. They are better than those recruited from society. Better understand the operation of the enterprise and have a more competitive advantage.

JD.com's delivery staff, warehousing staff and customer service staff account for more than 70 % of the total number of logistics staff. Among them, the delivery staff has the highest proportion of working more than 12 h. The working hours are long and the workload is large, which makes this part of the staff more mobile. The work intensity of warehousing staff is close to that of distribution staff, while the working hours of customer service staff are relatively stable, basically within 8 h, and there is less overtime. However, during the promotion period, the working hours of the 3 positions are generally higher.

Based on the nature of the research question, the research methods adopted in this thesis mainly include literature research method, data collection method and telephone interview method. The research questions are from multiple angles and all-round, and a total of 2 questionnaires are completed. By entering the Beijing East and West companies on the spot, in-depth interviews were conducted with staff from the workplace, as well as logistics supply chain managers and distribution warehouse managers. There are 3 supervisors, 9 front-line distribution and warehouse management personnel in total, and 12 internal management personnel of JD.com to obtain the internal logistics cost data of JD. Survey data to understand the relevant situation of users to conduct research. In-depth understanding of JD.com's overall operation mode, commodity logistics supply chain management process, and direct access to JD.com's internal research materials. And through the internal supervisors to consult the internal journals of JD.com, the National Digital Library of China to find relevant journal articles and other means to collect second-hand information, and to conduct case analysis on the supply chain management of e-commerce enterprises, based on SCPR's supply chain performance evaluation model, using comparative analysis to

study the performance evaluation indicators in different periods. During the period, JD.com made corresponding countermeasures to improve the effectiveness of the implementation of supply chain management countermeasures from both qualitative and quantitative aspects. The effectiveness of supply chain management countermeasures in business environment.

Data collection

This paper collects and interviews data on various indicators in the SCPR model of JD.com, and clearly understands the basic situation of JD.com in the case and the logistics and supply chain management operations of JD.com's electronic mall through the internal data of JD.com. Weaknesses in innovation. The optimization of Jingdong's commodity logistics distribution system, the innovation of supply chain management concepts, the promotion strategy of mobile e-commerce supply chain integration, the planning and configuration of network nodes, and the optimization of business processes provide a data basis for empirical research and demonstrate the feasibility and effectiveness of the research results. Credibility.

Data collection method

1) Inquire face to face

Face-to-face survey methods are generally divided into census and sample surveys. Accurately record the investigation (including surveying and mapping, audio recording, video recording, photography, audio recording, etc.). It mainly includes 2 aspects: One is the observation of human behavior; the other is the observation of objective things. Pros: More flexible, not limited by time and place, information tends to be more truthful. Disadvantages: The cost of human, material and financial resources will be relatively large.

2) Telephone survey

Telephone surveys are divided into traditional telephone surveys and computer-assisted telephone surveys. Using telephone surveys, researchers can ask questions manually or have the questions automatically controlled by a computer. The manual telephone survey method requires many investigators, who take notes while asking questions. The data recording process is error-prone and was the method used in the early days of the market research industry.

3) Meeting investigations and inquiries

The method of meeting investigation and inquiry is to hold a meeting and accurately record the investigation (including surveying and mapping, audio recording, video recording, photographing, audio recording, etc.). In order to improve the reliability of the collected information, the conference survey query method is often combined with the query method and physical collection. Disadvantages: There is a herd mentality, which has a greater impact. The effect of the research conference has a lot to do with the organizational ability, professional level and work ability of the organizer of the conference.

4) Literature search (secondary data collection)

Literature search is the process of retrieving the desired information from a large amount of literature. Literature search is divided into manual search and computer search. JD Annual Report Internal Journals, Wind Database, Baidu Encyclopedia, Southwest University Library, Guizhou University Library, Guizhou Provincial Library, Chongqing Library, Zunyi Library.

5) Questionnaire survey method

Questionnaire surveys are usually achieved through network information collection. Network information collection refers to all kinds of information published, transmitted and stored through computer networks. The ultimate purpose of collecting network information is to provide users with network information resource services.

The whole process includes 4 steps of network information search, integration, preservation and service. Advantages: Moderate cost, high recovery rate and good effect.

Qualitative and quantitative methods

This paper uses a combination of qualitative and quantitative analysis methods, which not only analyzes the problems and causes of logistics cost control of e-commerce enterprises in the sales mode of enterprises to individual users, but also analyzes the logistics cost control measures of Jingdong company, which has more effective logistics cost control in e-commerce in the sales mode of enterprises to individual users, take this as the cornerstone and put forward improvement suggestions for the enterprise's sales model to individual users in the follow-up industry.

AHP is a method that comprehensively considers qualitative and quantitative analysis. It is mainly used to calculate the factor weight of systematic, multi criteria and multi factor complex problems. It was founded by Thomas L. Saaty in the 1970s. Due to its simple principle and effectiveness in solving complex decision-making problems, analytic hierarchy process has been favored since it was proposed and widely used in the fields of government performance, environmental assessment, talents and so on. When using AHP to calculate the weight of elements, we should first establish an orderly and hierarchical qualitative element system, and then quantitatively evaluate the advantages and disadvantages of each element in the system through pairwise comparison method, and then obtain the weight coefficients of all elements on this basis.

The basic steps are clarifying problems, and establishing hierarchy

When applying AHP method to analyze problems, we should first understand the center, target scope and the relationship between the contained elements of the problem, and construct an orderly and hierarchical element system, which is called hierarchical structure.

The general hierarchy can be divided into the following 3 levels:

1) Target layer: Represents the target of the whole level, usually only 1 element;

2) Criterion level: It refers to the intermediate links involved in achieving the objectives, which is generally composed of several independent implementation indicators;

3) Scheme level: It refers to independent measures or policies to solve problems. The dominant relationship between the element and the previous level is represented by a connection. The more connections, the more complex the dominant relationship. Generally, the tree view in the form of **Figure 1** is used to represent the hierarchical structure of the problem:

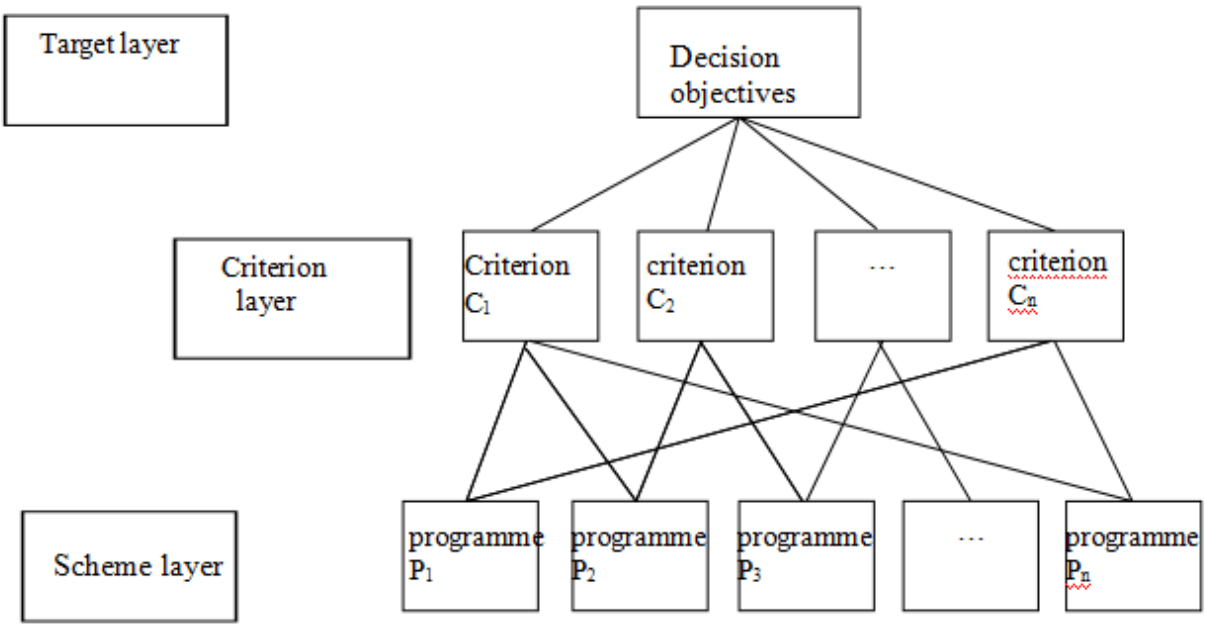

Figure 1 Analytic hierarchy process hierarchy model diagram.

Construct judgment matrix A

First, the hierarchical structure is established, so the subordinate relationship between the upper and lower levels is determined. At this time, it is necessary to set the subordinate elements P1, P2, the judgment matrix A (AIJ) n * n of PN relative to the previous level criterion CK, where AIJ represents the relative weight value of element I compared with element J. the larger the value, the more important element I is compared with element J relative to criterion CK. In order to overcome the theory of "people's ultimate ability to distinguish information levels" put forward by psychologists, the AHP method introduces the 9 scale method to judge the relative importance of the 2 elements, and thus determines the judgment matrix A (AIJ) n * n of this level relative to a certain index. The specific scale is shown in the following table.

Table 1 Comparative diagram of the importance of factor I to element j.

Scale a_{ij}	**1**	**3**	**5**	**7**	**9**	**2, 4, 6, 8**	**Reciprocal**
Meaning	Equal	Slightly stronger	Strong	Strong+	Extreme	Median	a_{ij} $1 / a_{ji}$

Calculate the weight of elements under a single criterion

Calculating the weight of elements under a single criterion is also called hierarchical single ranking. The purpose of this is to determine the importance order of all elements of this level to a related element in the upper level through the judgment matrix A (AIJ) n*.

Suppose the relative importance matrix A is n elements P1, P2, Judgment matrix of PN relative criterion CK. For elements P1, P2, the single ranking of PN level can be reduced to the problem of solving the maximum eigenvalue max of judgment matrix A and its corresponding eigenvector W. In this paper, the sum method is used.

Data analysis

Quantitative analysis is combined with qualitative analysis. By establishing the coordination model of the joint contract of the 3-level supply chain of e-commerce enterprises, suppliers and logistics service providers, the wholesale price contract decision-making model, the supply chain integration model and the revenue sharing contract model are analyzed respectively, and the effect of the joint contract is further analyzed. Effectiveness, combined with contract parameters to ensure the overall coordination of the supply chain in the e-commerce environment. Use the SCPR model - the reference model for enterprise supply chain management performance evaluation to conduct statistical analysis on the actual research case companies, and there are corresponding qualitative indicators according to the score ratio. calculation method. Through case analysis, the e-commerce supply chain performance evaluation system is embedded in the management of e-commerce supply chain for research, so as to provide perfect theoretical guidance for the management of e-commerce enterprises, especially case enterprises.

Cooperation mode between JD.com and suppliers

JD.com currently cooperates with suppliers in 4 modes: FBP, LBPs, SOP and soplo.

Table 2 Differentiation of cooperation modes between JD.com and suppliers.

Business cooperation mode	Jingdong store	Jingdong trading system	Jingdong storage	Jingdong distribution	Buyer's self delivery	JD cash on delivery	Third party cash on delivery
FBP	have	have	have	have	have	have	have
LBP	have	have	nothing	have	have	have	have
SOPL	have	have	nothing	have	have	have	have
SOP	have	have	nothing	nothing	nothing	nothing	nothing

Results

FBP: JD.com provides businesses with an independent operation background. Businesses store goods in 1 place and store goods in multiple places. JD.com operates from warehousing, distribution to customer service. Businesses can enjoy all the services that JD.com can enjoy for its own products (supporting self-delivery within a limited time, cash on delivery and POS card swiping). The customer experience value is the highest.

LBP: JD.com provides merchants with an independent operation background. Merchants do not need to put in storage. They are required to package and deliver the generated orders within 12 h after the order is generated, and deliver them to each transit center of JD.com, and to the front-end distribution center of JD.com mall within 36 h. JD.com will issue invoices to consumers.

SOPL: JD.com provides merchants with an independent operation background. Merchants do not need to store in the warehouse. They are required to package and deliver the generated orders within 12 h after the order is generated, and deliver them to each transit center of JD.com, and to the front-end distribution center of JD.com within 36 h. The merchants issue invoices to consumers.

SOP: JD.com provides merchants with an independent operation background, which is similar to the Taobao Mall model. It requires that goods be delivered within 12 h after the order is generated, and the merchants will undertake all services.

Table 3 Comparison of procurement cost and gross profit margin of e-commerce enterprises (%).

Particular year	Ratio of procurement cost to operating venue		Gross profit margin	
	Jingdong	Amazon	Jingdong	Amazon
2016	88.40 %	70.50 %	11.63 %	29.48 %
2017	87.80 %	67 %	12.20 %	33.04 %
2018	86.30 %	64.90 %	13.69 %	35.09 %
2019	86 %	62.90 %	11.02 %	37.07 %

Data source: Jingdong annual report, Amazon annual report

As can be seen from **Table 3**, the ratio of purchasing cost to revenue decreased from 88.4 to 86.0 % from 2016 to 2019. This shows that JD.com has taken a series of control measures on purchasing cost, especially those related measures, is the strict selection of suppliers, whether it is suppliers'distribution

qualifications or product quality and other aspects of detailed, detailed comparative assessment, to this end JD.com proposed: Through 6 general science and technology indicators, with the help of the eight digital platforms, 7 key hubs in the purchasing process were optimized comprehensively. The procedure of purchasing is optimized, the speed of logistics is improved, and the fine operation of related work is promoted, so the purchasing cost of related products is saved.

According to statistics, JD.com's purchasing cost is higher than Amazon's, about 20 % higher, which shows that the JD.com has a lower level of control over the purchasing process. In addition, compared to Amazon's gross margin, 360 buy's gross margin was 11.63 % in 2016 and 14.02 % in 2019, up from 2.39 % in four years. Look at Amazon: 29.48 % in 2016, its gross margin rose to 37.07 % in 2018, compared with Amazon's 7.59 % gain over the same 4 years period. In 2019, 360 buy's margin was 23.05 % lower than Amazon's. Therefore, JD.com has some defects in the management of procurement cost, and needs to further improve and perfect the related control mechanism to reduce the procurement cost.

The proportion of storage and logistics expenses of JD.com in the first 3 quarters from 2016 to 2020 is shown in.

Table 4 2016 - 2020 proportion of warehousing and logistics expenses of Jingdong companyunit: 100 million yuan.

Year	Warehousing and logistics fee	Business income	Proportion of storage expenses	Year on year growth
2016	41.1	693.4	5.92 %	-
2017	80.7	1150.0	7.01 %	1.09 %
2018	139.2	1812.9	7.68 %	0.67 %
2019	209.5	2601.2	8.05 %	0.37 %
2020	258.7	3623.3	7.14 %	−0.91 %

Data source: Jingdong annual report

From the proportion of warehousing and logistics expenses of JD.com in operating revenue in **Table 4**, there was a significant increase from 2016 to 2020, and it has been basically maintained at a stable level in the following years. The reason is that in 2020, with the continuous development of cold chain logistics, the requirements for storage environment and location are higher, and enterprises need to build many professional cold warehouses and high-tech storage equipment. Therefore, the proportion of storage fees in this year has increased. With this special equipment put into use, the growth rate of warehousing logistics in the proportion of operating revenue has also slowed down. Although the storage scale of JD.com is constantly expanding, and the proportion of storage expenses may fluctuate to a certain extent, under the influence of more and more perfect infrastructure construction, intelligent warehouse distribution - put into use and increasing revenue year by year, its proportion will be effectively reduced in future operation.

At present, JD.com's control of storage cost mainly focuses on improving the turnover rate of goods inventory and improving the efficiency of capital use. The inventory turnover days of JD and Amazon and Suning are shown in **Table 5** below:

Table 5 Comparison of inventory turnover days of JD.com, Suning Tesco and Amazon from 2015 to the first 3 quarters of 2018.

Inventory Turnover Days	2016	2017	2019	2020
Jingdong	37.52	40.33	40.80	39.26
Amazon	46.58	44.26	44.24	45.65
Su ning	46.63	40.17	36.73	35.48

Data source: Wind database

As can be seen from **Table 5**, Amazon's inventory turnover days are stable at around 45 days, which is far behind JD.com and Suning. In recent years, due to the opening of the platform and the sinking of channels, JD.com has established many large warehouses and supermarkets in many places across the country, resulting in an increase in its inventory turnover days, but JD.com still controls the inventory turnover days within 40 days. The low level also fully demonstrates the effectiveness of its inventory cost control. Suning's inventory turnover data from 2017 to 2020 can see that its inventory turnover efficiency has improved significantly, indicating that JD.com has made great progress in inventory cost management. In addition to warehousing and logistics costs, warehousing costs also include investment in fixed assets, warehouse management staff wages and warehouse maintenance costs. From the annual report, we can see that JD.com has collected warehouse management staff wages and warehouse maintenance costs into management costs, so it can be calculated through The data of management expenses understands the general situation of JD.com's warehousing cost control.

Table 6 Summary of JD.com's profits from 2016 to 2020 unit: RMB million.

	2016	2017	2018	2019	2020
Operating income	69340	15002	181287	260122	362332
Online sales revenue	67018	108549	167721	237702	331824
Gross profit	6844	13371	24279	39423	50815
Less: Operating expenses	7423	19173	27988	41568	51650
Warehousing and logistics costs	4109	8067	13921	20951	25865
Sales expense	1590	4010	7736	10573	14918
Technology and R&D spending	964	1836	3454	5381	6652
Management fees	760	5260	2877	4663	4215
Operating profit	−579	−5802	−6459	−2145	−835

Data source: JD.com annual report

Table 6 shows that although the gross profit of JD.com has been rising in recent years, its operating profit is still losing money, but the amount of loss in operating profit has been declining significantly, from a loss of 6.459 billion in 2018 to a loss of 835 million in 2019. This is because the opening of the logistics system to the outside world has brought new profit points for enterprises.

In addition, **Table 6** shows that JD.com's overall management expenses also show an increasing trend, and the sudden increase in 2020 and the past 2 years is closely related to JD.com's rapid expansion of storage area in 2018 and the past 2 years, especially in the past 2 years. Not only has the construction

speed of large warehouses been accelerated, but also technologies such as intelligent sorting systems, unmanned warehouses, and unmanned vehicles have been developed and put into use, which has caused a surge in warehouse maintenance costs in the short term. It must play a good role in the control of the follow-up logistics cost of the enterprise.

In terms of fixed asset construction, this has always been one of JD.com's main investment directions. **Table 6** below clearly lists the scale of JD.com's fixed asset construction from 2016 to 2020.

Table 7 Scale of Jingdong's fixed assets in 2015 - 2020 unit: 10,000 yuan.

	2015	**2016**	**2017**	**2018**	**2019**	**2020**
Fixed assets - warehousing, property and equipment	102443	240844	623311	739703	1257	1841289
Construction in progress	123764	192890	126688	199212	319	621067
Net value of fixed assets	226207	433734	750010	938915	1577	2462356

Data source: JD.com annual report

The investment in fixed assets of Jingdong mainly includes the construction of modern logistics centers and large warehouses, the production and use of intelligent automatic storage sorting and loading and unloading equipment, and the purchase of logistics service vehicles. In recent years, the scale of Jingdong's fixed asset investment has been increasing year by year, especially in the past 2 years, the fixed asset investment has reached 15.23 billion yuan, making the growth rate in 19 years and 20 years reach 68.0 and 56.1 %, respectively. The scale of the original fixed assets investment is extremely astonishing. Looking for the reason, it is found that this may be related to the development of Jingdong's warehouse leasing business and the sinking of channels. At present, Jingdong has built 550 large warehouses, with a storage area of 12 million square meters, more than 300,000 terminal service outlets, and more than 250,000 logistics service vehicles. The construction of these infrastructures provides a guarantee for the rapid development of Jingdong's logistics system in the future.

Shipping cost analysis

The cost incurred by JD.com in the distribution process is included in the operating expenses of the company. This article has sorted out the proportion of JD.com's operating costs to its operating income from 2016 to 2020, and obtained the percentage of cost that JD.com needs to pay to obtain unit revenue. Vertically compare the level of resource utilization of JD.com in logistics, sales, R&D and management over the past few years.

Table 8 The ratio of JD.com's various operating expenses to operating income.

	2016	**2017**	**2018**	**2019**	**2020**
Warehousing ration logistics costs	5.93 %	7.01 %	7.68 %	8.05 %	7.14 %
Sales expense ratio	2.29 %	3.49 %	4.37 %	4.06 %	4.12 %
Technology and R&D spending rate	1.39 %	1.60 %	1.91 %	2.07 %	1.84 %
Management expense ratio	1.10 %	4.57 %	1.59 %	1.79 %	1.16 %
Total operating expense ratio	10.71 %	16.67 %	15.44 %	15.9 %	14.25 %

Source: JD.com Annual Report

Table 8 shows that the proportion of JD.com's warehousing and logistics costs accounted for about 6 % in 2016, but this ratio increased to 7 % in 2017. In the following years, this ratio increased to a small extent, and fell back to 7 % in 2020 %. The main reason for the fluctuation of data after 2017 is that JD.com has increased its investment in warehouse construction in recent years. The increase in the number of warehouses has also led to the increase of operating lines and the expansion of the coverage of the transportation network, which has also increased the expenditure on logistics and distribution. 2017 The year-on-year decline was due to the separate establishment of a sub-group in the logistics system, which strengthened the control of logistics costs, and the intelligent supply system was put into use, resulting in more scientific planning for inventory allocation and transportation routes, which also made warehousing and logistics costs more efficient. usage of. The sales expense ratio of JD.com has also increased to a certain extent after 2017. This is because JD.com has increased its publicity efforts and increased the amount of advertising. The ratio of JD.com's technology R&D expenditure has grown at a rate of about 17 % every year from 2016 to 2020, and reached a peak in 2020. This is because JD.com has increased investment in the construction of intelligent logistics platforms in the past few years, and has already generated Some achievements have been achieved, such as the realization of the whole supply chain data collection, the development of intelligent sorting system, intelligent path planning system, unmanned aerial vehicle, unmanned vehicle distribution terminal, etc. The application of these scientific research results in the logistics distribution system further reduces the expenditure of JD.com's logistics costs and improves the profit margin of the enterprise.

Labor cost analysis

With the increase of JD.com's business categories and the increase of distribution network coverage, the number of its employees is also increasing, especially the number of terminal distribution employees accounts for a large proportion. The rapid growth of the number of personnel also brings challenges to JD.com's labor cost control. **Table 9** in the table below shows that by the end of 2020, the total number of Jingdong employees has reached more than 176,000, and each employee can receive at least 3,500 yuan per month. Based on the minimum wage level, Jingdong will spend at least annual labor costs 7.4 billion yuan.

Table 9 Construction of JD's logistics network (as of December 31, 2020).

Category	Quantity
Comprehensive service center city	7
Front-end distribution center city	28
Large distribution warehouse	550
Construction area	About 12 million square meters
Employee count	176,000

Data source: JD.com annual report

Based on such a huge investment, JD.com also has high requirements on the work efficiency of its employees, with a clear employee reward and punishment system and a mature management system. For example, the whole process of warehouse operation monitoring, although the main purpose is to grasp the inventory and commodity circulation situation, it also has the role of supervising the work of employees: The vehicle distribution path, the real-time feedback intelligent management of the cargo load, and the work details of the distribution personnel are also controlled together. Customer service staff record the whole process, customer scores and ratings, and big data statistics work efficiency. These measures are monitoring and motivating employees to efficiently complete their work tasks. In addition to improving the work efficiency of employees, JD.com also proposed that it will no longer unconditionally provide free shipping to "open source". For orders less than 99 yuan, a courier fee of 6 yuan will be charged, and the weight of the goods should be within 10 kilograms, otherwise an overweight fee will be charged. In terms of labor cost "savings", JD.com's fully intelligent warehousing system has been promoted and

used, reducing the demand for human resources in the warehousing process. However, it is still difficult to avoid a lot of labor costs in terminal distribution.

Analysis of non-financial indicators of logistics performance

In addition to being affected by cost, the operational performance of an enterprise logistics system is also affected by the number of orders, which is determined by the number of active users and the company's market influence.

Active users. Consumers are the source of JD's profits. All business management activities, including logistics, are aimed at meeting consumers' needs to increase profits. Therefore, the number of active users and the growth of active users have a huge impact on the logistics performance of the enterprise.

Table 10 2015 - 2020 Growth rate of active users of JD.com.

Year	2015	2016	2017	2018	2019	2020
Active users (millions)	29.3	47.4	90.6	153.6	226.6	292.5
Active user growth rate	134.40 %	63.80 %	91.10 %	59.50 %	46.19 %	29.08 %

Data source: Jingdong official website

The number of active users of JD.com has been growing at a relatively fast rate from 2015 to 2020, but the growth rate has slowed down in the past 2 years. This is mainly because the existing online shopping consumers have been divided up by various e-commerce companies. Under the background of serious quality, JD.com needs to find its own business characteristics to increase competitiveness, improve service level, and attract more consumers. The service level of JD.com can be reflected in **Table 10**. The ranking of the national comprehensive retail e-commerce consumption and purchase rating. It ranks third in the national e-commerce and first in the self-operated e-commerce. The platform feedback rate is 100 %. Good reviews recommended for ordering.

Table 11 2020 National comprehensive retail e-commerce consumption and purchase ratings.

Platform	Types	Platform feedback rate	Response timeliness	Purchase index	Rating	Ranking
Jingdong	Self-operated + platform e-commerce	100 %	0.953	0.863	Recommended to place an order	3
Suning	Self-operated + platform e-commerce	100 %	0.991	0.860	Recommended to place an order	4
Guo mei	Self-operated + platform e-commerce	67.74 %	1.600	0.639	Recommended to place an order	11

Data source: China Electronic Commerce Research Center

Conclusions and discussion

China's research on the combination of supply chain management and enterprise-to-individual user sales model enterprise logistics cost control is still in its infancy, and related research is relatively scarce. China's e-commerce market has become the largest market in the world, and has greatly reshaped and promoted the development of China's logistics service industry. In addition, the recent COVID-19 outbreak has accelerated the shift in consumption from offline to online. The demand for complex supply chain logistics services that simplify and speed up the process of moving goods is rapidly growing, and the market requires technology-enabled supply chain logistics service providers who can provide reliable, traceable, on-demand, integrated and end-to-end transportation, And a wide range of storage solutions and facilities. The thesis takes the enterprise-to-individual user sales model enterprise as the specific research object, analyzes the common problems in the logistics cost control of enterprises, and combines the actual case study of JD.com with suggestions for improvement, and draws the following conclusions:

Firstly, there are many problems in the logistics cost control of Chinese enterprises' sales mode to individual users. Through the analysis of the logistics cost composition of enterprises' sales mode to individual users, it can be found that enterprises have some problems in the logistics cost control of procurement, warehousing, distribution and reverse links, explore the causes of the problems, and find that enterprises should optimize the cost control of all links in the supply chain.

Secondly, this paper studies the logistics cost control of Jingdong, a case enterprise. According to the analysis and comparison of relevant data of Jingdong Logistics, it comes to the conclusion that Jingdong Logistics cost control is effective, and summarizes its advantageous measures in logistics cost control.

Finally, combined with the idea of supply chain management, this paper puts forward optimization suggestions for the sales mode of enterprises to individual users, e-commerce enterprise logistics cost control, such as optimizing the logistics cost control of each link, improving the overall control effect of the supply chain, integrating resources, paying attention to alliances, deepening the nodes of the collaborative supply chain, strengthening the construction of information platform, unifying logistics accounting standards and so on.

Practical recommendations

Combined with relevant theories, this paper analyzes the current situation of logistics cost control of e-commerce enterprise Jingdong company. On this basis, this paper analyzes the relevant problems existing in the enterprise logistics cost control, and puts forward some suggestions on the enterprise cost control based on the supply chain. Due to the limitation of my professional level and research ability, the collection of information cannot be comprehensive, the interpretation of data cannot be complete, and there are also deficiencies in the analysis of problems and causes. There may be problems such as imperfect theory, weak views, inaccurate expression and so on, but also in the future research work to constantly improve and improve their academic level. Secondly, because the cost data of most enterprises are relatively confidential, some cutting-edge data at home and abroad will be troublesome. In this paper, the maximum use of data disclosed by enterprises for cost control research has certain limitations in summary.

Limitations and suggestions for future research

In future research, I will strengthen field research and obtain more authentic and authoritative data and materials in the form of questionnaire survey. In the future study and life, I will maintain my attention to the teaching of Jingdong mall and other representative enterprises on the sales mode of individual users, e-commerce enterprises, conduct cost control research according to the latest data, and increase the research on enterprise cost prediction, planning, reporting, decision-making, performance evaluation and other cost control. I hope my research conclusions and results can bring help and suggestions to researchers in the same field, and attract more scholars to pay attention to the sales model of enterprises to individual users and the supply chain cost control of e-commerce enterprises.

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