

Research on Service Quality of Fresh Food Logistics based on TQM Concepts

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Abstract: In the era of big data of the rapid development of the Internet, fresh food e-commerce came into being and flourished, but due to the fresh products have the characteristics of perishable and deterioration, high risk of loss, many fresh food e-commerce enterprises in the quality of logistics services are still some defects, and the fresh food industry needs to pay attention to improve the quality of logistics services. This paper is based on the theory of Total Quality Management (TQM), combined with the current situation of China's fresh food logistics development to build a fresh food logistics service quality control system, including 4 aspects of a total of 10 dimensions, and the use of QFD theory and the PDCA cycle to improve the operation process of fresh food logistics to help improve the quality of logistics services.

Keywords: Total quality management; Fresh food logistics; Logistics service quality.

1. Introduction

In recent years, the rapid development of the economy and science and technology has led to more and more advanced technologies being used in the food and logistics industry to ensure the quality and freshness of food and other products, which has led to a general and obvious improvement in the quality of life of the people. China's fresh food market has been growing steadily and rapidly in recent years, which has been highly valued by governments at all levels and supported by national industrial policies. The State has successively issued a number of policies to encourage the development and innovation of the fresh food e-commerce industry, and industrial policies such as the "14th Five-Year Plan for the Development of Cold Chain Logistics" and the "Implementing Opinions on Further Optimizing the Development Environment to Promote the Circulation of Fresh Agricultural Products" in March 2022 have provided a clear and broad market prospect for the development of the fresh food industry, and provided a good production and business environment for the enterprises. enterprises have provided a favorable environment for production and operation.

At present, there are many scholars who have studied the service quality of fresh food logistics. Fan Arctic Ocean et al. on the current situation of fresh food e-commerce logistics, analyze the problems in its development, and put forward solution strategies [1]; Geng Xiu'e in the analysis of the current situation of cold chain logistics and distribution of fresh products, on the basis of the main study of the quality control of the cold chain logistics and distribution of fresh products and the optimization of the path of the two aspects [2]; Du Xuemei, et al. combined with the SERVQUAL, the classic model of the LSQ, the theory related to customer satisfaction, and the specific characteristics of the fresh food e-commerce Du Xuemei et al. combined SERVQUAL, LSQ classical model, customer satisfaction related theory and specific characteristics of logistics service to carry out detailed evaluation and analysis of its logistics service quality [3]; Han Shuguang et al. based on the national standard of "Cold Chain Service Requirements and Capability Evaluation Indicators for Logistics Enterprises", constructed the fresh

food e-commerce logistics service evaluation index system to provide fresh food e-commerce companies with corresponding management recommendations from the customer's perspective [4]; Ning Xiujun on how to utilize the concepts and methods of Total Quality Management (TQM) to improve the service of logistics enterprises. The quality of service is discussed [5].

In the above research content, there are few parts that combine the TQM concept with the improvement of fresh food logistics service quality. For this reason, this paper, based on the TQM theory of total quality management, combines the current situation of the development of fresh food logistics in China to construct a fresh food logistics service quality control system that includes 4 aspects and 10 dimensions, and utilizes the QFD theory and the PDCA cycle to improve the operation process of fresh food logistics in order to help improve the quality of logistics services.

2. Relevant Information and Concepts

2.1. Overview of the Development of Fresh Food Logistics in China

In 2005, the establishment of E-Go Fresh opened the curtain of the development of fresh food logistics within the scope of China. After more than a decade of groping forward, fresh food e-commerce transaction scale increases year by year, according to the China Business Industry Research Institute data show the 2021 China's fresh food e-commerce industry market transaction scale reached 465.81 billion yuan, an increase of 27.92%. With the gradual maturation of the fresh food e-commerce industry, as well as the gradual development of people's habits of online purchasing of fresh food, it is expected that the future scale of the fresh food e-commerce industry will continue to grow, and in 2022, China's fresh food e-commerce industry will exceed 600 billion yuan in total market transactions. The development of logistics technology has also greatly contributed to the development of the fresh food industry, coupled with strong support from the state, the overall view of China's fresh food logistics presents a thriving good development trend.

However, the fresh food industry, which is becoming more and more important to the daily life of urban residents, also

has some obvious problems, such as the high cost of cold chain transportation, long distribution time, and difficulty in meeting the immediate needs of fresh food consumption. For the problems embodied in fresh food logistics, this paper combines a large amount of literature and fieldwork to summarize the following points: first, the efficiency of the fresh food supply chain system is low. As fresh products have the characteristics of perishable deterioration and high risk of loss, fresh food enterprises usually lose sight of both sides in the logistics and transportation process. Too much attention to logistics costs tend to reduce product quality, so that the customer side cannot enjoy the best quality goods, affecting the user experience is also detrimental to the corporate image; but instant delivery in the existing technology and conditions is difficult to realize the supply of large quantities of products, it is likely to be just a white increase in logistics costs, so that the benefits of the enterprise greatly reduced. In addition, at present, China's fresh produce logistics packaging box types are mainly cardboard boxes, plastic boxes, foam boxes, crates, etc., the choice of the form of packaging box arbitrariness is very large. Combined with the very serious problem of over-packaging in logistics in recent years, many fresh produce enterprises or platforms have not properly considered the issue. Secondly, the regulation of each link is loose. Fresh food logistics contractors for the links and links between the supervision is not enough in place, especially in warehousing and transportation links in the product quality assurance and supervision. Third, fresh food logistics service quality evaluation system has not been fully formed. Although fresh food logistics emphasizes immediate delivery and quality assurance, on the surface it seems that the quality of service is very clear and enforceable, but the existing logistics service quality evaluation indicators are not clear, and there are indicators that are difficult to implement and enforce the situation, so that the quality of logistics services can not meet expectations. Fourth, the relevant laws and regulations need to be improved. Fresh food industry from the production of raw materials to the customer terminal involves more subjects, and involves food safety and circulation, the existing laws and regulations or loopholes, social security measures need to be improved.

2.2. Total Quality Management (TQM) Theory

Quality is a measure of the degree of satisfaction of the user of a product or a service, etc., is the fundamental product or service. The development of quality is affected by a variety of factors in production and management activities, and total

quality management is an important means to ensure and improve the quality of products or services. Total Quality Management (TQM): refers to the promotion of a comprehensive society, all departments, all organizations and all personnel in the enterprise take the product quality as the core, and put the professional technology, management technology and mathematical and statistical technology together to establish a set of scientific and strict quality management system [6]. TQM theory is put forward by American scholars such as Jura and Feigenbaum, which is based on the core concepts of "consumer satisfaction, full participation, continuous improvement of quality, and management based on facts", and is aimed at improving product quality, improving product design, speeding up production processes, enhancing quality awareness, and improving market acceptance through the establishment of a set of scientific, strict, and efficient quality system as the core, through the establishment of a set of scientific, rigorous and efficient quality system, to improve product quality, improve product design, accelerate the production process, enhance quality awareness, improve market acceptance, and ultimately provide users with products or services to meet the needs of the comprehensive, all-employee, preventive, service and scientific characteristics. After continuous practice and exploration, TQM theory has been more mature and is widely used in many fields such as university education management, real estate project management, production management, hospital management, logistics enterprise management and so on[7]. Based on the TQM concept, this study establishes a fresh food logistics service quality control system from four aspects: enterprise management, comprehensive supervision, comprehensive evaluation and social security, and at the same time combines the SERVQUAL model and the PDCA cycle working method to improve the efficiency of fresh food logistics service and guarantee the quality of fresh food products.

3. The Construction of Fresh Food Logistics Service Quality Control System under TQM Perspective

Based on the TQM theory, this study forms the fresh food logistics service quality control system by establishing four sub-systems: enterprise management system, comprehensive evaluation system, comprehensive supervision system and social security system, as shown in Figure 1 below.

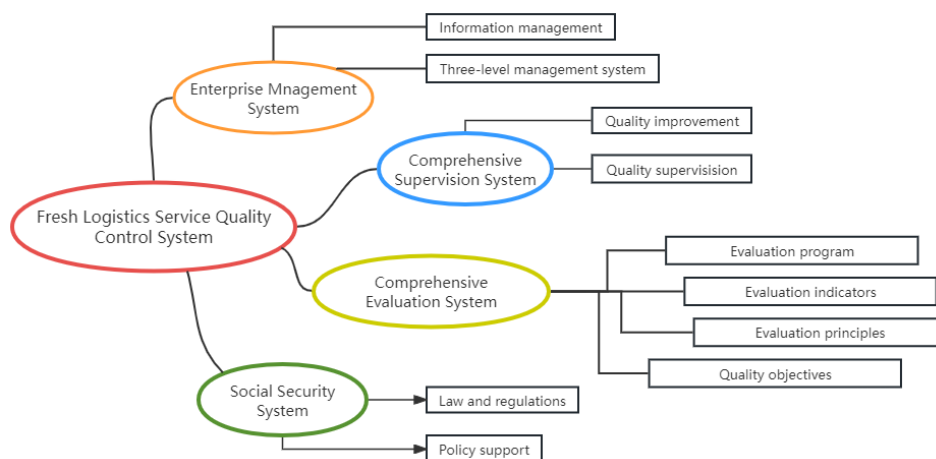


Figure 1. Fresh food logistics service quality control system

3.1. Enterprise Management System

Fresh food logistics service has the characteristics of participating in the main body, the complexity of the product circulation links, the establishment of a scientific and reasonable management organization system, the implementation of the service block management, unified coordination, can effectively protect the quality of logistics services. First of all, according to the fresh food logistics service content and development strategy orientation, establish a comprehensive hierarchical quality management system, the specific management department set up as follows: from the main body of each participant in the selection of personnel responsible for the quality management of fresh food logistics services as the highest level of management; based on the different categories of products and logistics

process links, under the establishment of a number of related functional departments; the functional departments based on the content of the quality management of the set-up of relevant implementation team; and ultimately To establish a three-level quality management system with unified coordination of the upper management department, mutual collaboration of the functional departments, and specific implementation of the working groups.

Secondly, for the fresh food logistics online and offline service process of the whole chain, the implementation of information management. For example, for the important links of fresh products into the warehouse, in the warehouse and out of the warehouse, you can establish a specialized information management system, the specific process is shown in Figure 2.

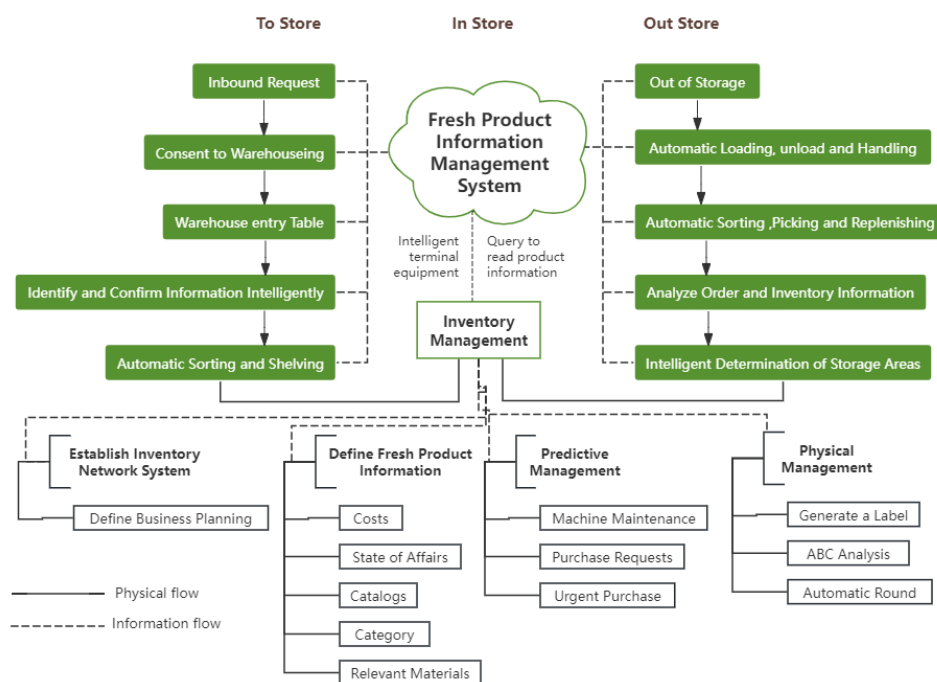


Figure 2. Fresh produce information management system

Finally, a management module is set up in the fresh food log cord real-time product sales and distribution information, etc., to realize real-time query and problem tracking of the relevant service transaction information, and at the same time, SPC method is adopted to summarize and analyze and evaluate the service information on the platform, so as to screen abnormal information in time, and take measures by the management department for optimization of the service process and improvement of the service quality.

3.2. Integrated Evaluation System

Based on the service process of fresh food logistics, establish a quality evaluation system and quality improvement mechanism.

3.2.1. Establishment of quality management objectives and evaluation principles

Fresh produce logistics services should be oriented to quality management objectives. The essence of fresh produce service is to safeguard people's daily life needs, the quality management objective of fresh produce logistics service should be established from the perspective of food quality and food safety, to form the general idea of quality management, to ensure that the quality of food or articles is qualified and safe for transportation and so on. The principles of quality

evaluation mainly include the scientific and holistic principles of the evaluation system, and the organizational structure of fresh food logistics services from the perspective of the starting from the structure, service process, service results and other aspects, a comprehensive and reasonable evaluation system is established by combining qualitative and quantitative, subjective and objective methods; the principle of intelligent evaluation process, unlike traditional offline services, fresh produce logistics services are mainly online services, and the service processes are all realized by informatization management and records, so big data, artificial intelligence and other methods can be used to realize online collection of information and intelligent evaluation of service quality. Intelligent evaluation of service quality; the principle of operability of evaluation, when formulating the evaluation system, it is necessary to combine the practice of major fresh food e-commerce platforms and consider the feasibility and comparability of the collection of indicator data to ensure that the evaluation is not only scientific and reasonable, but also highly operable.

3.2.2. Construction of service quality evaluation index system

In this paper, we refer to the five dimensions of the classic SERVQUAL service quality evaluation model, and at the

same time, we add new dimensions according to the situation of fresh food logistics services to determine the dimension framework of the evaluation index system in this paper[8]. After that, it is fully combined with Menzer's LSQ theoretical model to further define the evaluation index system. After that, the specific evaluation indexes under each dimension are further determined and improved by fully combining Menzer's LSQ theoretical model, and the evaluation indexes

of customer-oriented fresh food logistics service quality are initially formed[9]. The preliminary evaluation indexes of customer-oriented fresh food logistics service quality are formed. This is shown in Table 1 below. After the initial formation of the system, the screening of the indicators is carried out, and the weights of the indicators are determined to form the fresh food logistics service quality evaluation system.

Table 1. Fresh food logistics service quality evaluation indicators

Dimension	Acronyms	Specific indicators
Materiality A	A1	Have specialized cold chain logistics equipment (refrigerated trucks, refrigerated containers, bags)
	A2	Distribution personnel are neatly and hygienically dressed; formal and uniform, with clear organizational identification
	A3	Warm and courteous service and good attitude of the delivery staff
	A4	Distribution personnel are familiar with the cold chain distribution process, the operation specification
Dependability B	B1	Trustworthy enterprise with good reputation
	B2	Delivering goods on time and fast delivery
	B3	Item received matches order information
	B4	Delivered in a complete and clean package with the product in good condition
	B5	Goods received fresh and of consistent quality
	B6	After-sales responsibility is clearly identified, and service remedies are perfected
Responsiveness C	C1	Orders are responded to in a timely manner and shipped quickly
	C2	In-transit logistics information is up-to-date and accurate
	C3	Prompt after-sales processing, returns, exchanges, claims processing speedy
	C4	Customer service responds promptly and provides fast feedback on inquiries and complaints
Flexibility D	D1	Wide range of logistics services and high coverage of distribution outlets
	D2	Flexible collection time (weekdays, weekends, etc.)
	D3	Flexible distribution methods (self-managed, third-party, etc.)
	D4	Flexible pickup method (home delivery, store pickup, etc.)
Economy E	E1	Reasonable freight costs compared to logistics services
	E2	Reasonable logistics costs for returns and exchanges, supported by shipping insurance

3.2.3. Development of a quality evaluation implementation program

The implementation of fresh food logistics service quality evaluation should formulate a quality evaluation system, clarify the evaluation implementation cycle, implementation program, evaluation methods, etc. Meanwhile, the quality evaluation implementation team is established to regularly carry out quality evaluation surveys, collect relevant index information, make accurate measurements, and prepare evaluation reports to be fed back to the relevant departments for targeted service improvement.

3.3. Comprehensive Regulatory System

As shown in Figure 3 below, fresh produce enterprises need to establish a scientific, feasible and comprehensive fresh produce logistics service quality management system. First, fully understand the characteristics of logistics quality control is mainly summarized as systematic, process, comprehensive, dynamics, safety and timeliness. In every aspect of logistics requires the efforts of relevant personnel to cooperate, the need for sensitivity to fresh products, but also the need to pay attention to the dynamic management of the whole process of logistics. Secondly, the development of quality management system, clear relationship between the responsibilities and powers of various departments and staffing requirements, the establishment of a collaborative mechanism to ensure that all departments work together and efficient service. Finally, according to the specificity of different customer needs, the development of targeted quality control plans and operations,

the implementation of the whole process of quality supervision and evaluation and is committed to providing customers with optimized services. This is not only conducive to the better provision of logistics services to meet customer needs, but also to promote the realization of the business objectives of the enterprise.

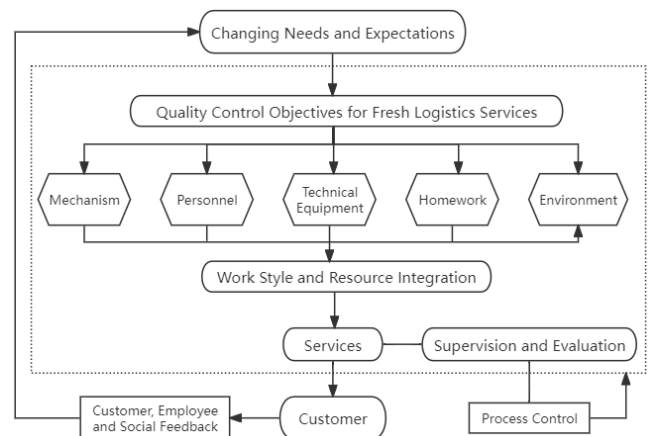


Figure 3. Quality management system for fresh food logistics services

3.4. Social Security System

Fresh food logistics cannot be separated from the support and abroad on between suppliers and e-commerce platforms, policy and financial support, and legal regulation. Suppliers are the main providers fresh products such as meat, vegetables,

flowers, dairy products and her products, fresh food e-commerce platform is the product for publicity and sales channels, the provision of fresh food product services is the result of mutual collaboration between the two on the Internet platform, so a good mechanism for collaboration and distribution of benefits should be set up to support the development of fresh food logistics services. In terms of policy and funding, government departments should introduce guiding policies to relax the market access standards for fresh food e-commerce and encourage the development of different service platforms in online, offline or combined online and offline modes. At the same time, establish a public financial support system and financial support system to support the development of fresh food e-commerce, and encourage social capital to participate in the development of fresh food e-commerce and logistics industry. In terms of legal regulation, because fresh food logistics involves many main players and involves food safety and food distribution, legal regulation should be improved to eliminate hidden food safety risks.

4. Quality Control and Improvement of Fresh Food Logistics Services Based on PDCA Cyclic Processes

The above has been briefly described in the TQM perspective for fresh food logistics service quality control system construction, but whether the system is scientifically effective or to be used in specific practice, and constantly on the system and the process of information feedback and correction. The current effective process is the PDCA cycle commonly used in the implementation of total quality management in enterprises process. The basic content of the process of "PDCA cycle" is to plan before doing something and then execute it according to the plan and check and adjust it in the process of execution and summarize and deal with it when the execution of the plan is completed. American Deming summarized this law as "PDCA cycle", PDCA on behalf of the English plan (Plan), implementation (Do), inspection (Check), processing (Action) four words, which reflects the quality management must follow the four stages[10]. P stage is the planning stage, aims to find adapt to the user's requirements, and to achieve the most economical results as the goal, through the investigation, design, trial production, the development of technical and economic indicators, quality objectives, management projects, as well as to achieve these objectives of the specific measures and methods. D stage is the implementation stage, is in accordance with the plans and measures developed to be put into practice. C stage is the stage of the inspection, against the plan, check the implementation of the situation and results, and timely detection of plans and measures. Stage C is the checking stage, which is to check the implementation of the plan against the situation and effect, and to find out the experience and problems in the process of implementing the plan in time. Finally, Stage A, which is the summarization and processing stage, is intended to take measures based on the results of the inspection, consolidate the achievements, lessons learned, in order to fight again. These four stages can be roughly divided into eight steps, as shown in Figure 4. The use of PDCA cycle method to optimize the quality of logistics services is a novel attempt, PDCA cycle method in the improvement of quality, especially in improving the quality of service has a significant role, it is very suitable for its

application to improve the quality of logistics services, logistics service quality is a never-ending process, the logic of its ideas and the basic principles of the PDCA cycle method is in the same vein. Due to the late start of China's logistics industry, many logistics enterprises have not yet used this method to improve the quality of logistics services, but with the continuous development of the economy and society, the customer's requirements for the quality of logistics services will inevitably become higher and higher, and continuously improve the quality of logistics services is the inevitable requirement of the development of the times.

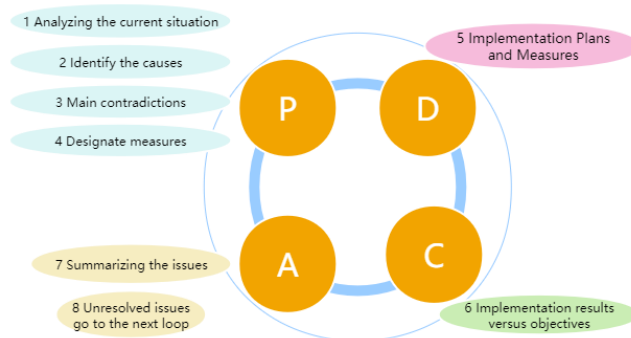


Figure 4. PDCA Cyclic Approach

PDCA cycle workflow to improve the quality of logistics service in fresh food logistics service can also be carried out according to these four key words. The first is phase P. Phase P utilizes QFD (Quality Function Deployment) to first define customer needs, convert customer needs into quality control elements in order of importance, i.e., define the elements that need to be focused on improvement, and then determine the improvement objectives and formulate control and improvement measures. There are three main stages. (1) Customer demand development. First determine the customer demand item. Utilizing the literature method, extract some customer demand indicators, and then conduct a survey visit to obtain customer demand information, and transform them into specific, hierarchical customer demand items. Then use the hierarchical analysis method to calculate the initial importance of customer demand items for quality control of fresh produce cold chain logistics and distribution. The customer's most important needs, it is possible that the enterprise has done a better job, not necessarily in urgent need of improvement, those customers pay attention to and the enterprise does not do enough, or not as good as the competing enterprise's customer needs is in urgent need of improvement, so it is necessary to determine customer the correction factor of the demand importance is used to correct the initial importance of the customer demand item. The last is to determine the final importance of the modified customer demand item. (2) Determine the quality control elements. Through the enterprise survey and expert consultation, combined with the enterprise's own overall resources, drawing on the "5MIE" idea (personnel, machinery, materials, methods, environment, measurement), to obtain the fresh enterprise logistics and distribution quality control elements. (3) Construct "customer demand - quality control elements" correlation matrix, fresh product logistics and distribution customer demand weight into quality control elements weight, find out the need to focus on controlling the quality control elements, determine the improvement goals, and develop improvement measures. The second D stage of the implementation of control and preventive measures. In accordance with the development of control and preventive

measures for fresh produce logistics activities, each employee has his or her own clear objectives, to achieve fresh produce logistics services to lay the foundation for high- quality activities. Once again, there is phase C, which is aimed at the quality control objectives of fresh food logistics services set in phase P and verifies the results of the implementation of control and preventive measures in phase D to check the quality of fresh food products and whether the quality control objectives of logistics services have been achieved. Finally, stage A will process the results of the inspection, affirm the success of the experience, set standards, and at the same time, for the existing problems, continue to optimize, enter the next cycle, and then conduct a satisfaction evaluation and competitive analysis, as the next round of targets for improvement, in order to ensure the normal operation of logistics activities [2]. The next cycle is to conduct another satisfaction evaluation and competitive analysis as the goal of improvement to ensure the normal operation of logistics activities.

5. Conclusion

This paper is based on the theory of Total Quality Management (TQM) and combines the current situation of the development of fresh food logistics in China to construct a fresh food logistics service quality control system that includes 4 aspects and 10 dimensions and improves the operation process of fresh food logistics based on the QFD and PDCA cycle to help improve the quality of service. However, the shortcoming is that it fails to combine with the actual enterprises to conduct field research, for example, it can be combined with the platforms such as Boxmart Fresh Life and Meituan Preferred to carry out the specific analysis of quality evaluation indexes, which may be able to obtain more intuitive conclusions.

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