Global Business and Management Research: An International Journal
Vol. 16, No. 4s (2024)

Research on the improvement of logistics service quality of fresh food e-commerce based on customer satisfaction

Sun Jie
School of Management, Universiti Sains Malaysia, 11800 Penang, Malaysia.
School of Cold-Chain Logistics and Supply Chain, Shandong Institute of Science and Technology, 250103 Jinan, China.
Email: sunjie@student.usm.my

Noorliza Karia*
School of Management, Universiti Sains Malaysia, 11800 Penang, Malaysia.
Email: noorliza@usm.my

** Corresponding Author*

Abstract
Purpose: This paper primarily studies the quality of logistics services in the fresh food e-commerce sector from the perspective of customer satisfaction and develops an evaluation model for this quality. The objective of the study is to offer fresh food e-commerce businesses a model for assessing the quality of their logistics services and provide certain strategies for improving logistics service quality level.
Design/methodology/approach: Based on literature review, this paper develops a logistics service quality index system specifically tailored for fresh food e-commerce companies, encompassing five key dimensions, including professionalism, freshness, immediacy, supportability, and convenience, along with 21 detailed indicators. This system is designed to be applicable for such enterprises to conduct self-assessments of their logistics service quality.
Findings: Based on the established index system, the paper puts forward three strategies for improving the logistics service quality of fresh food e-commerce enterprises.
Research limitations/implications: Limitations of evaluation dimension: Logistics cost is not considered in this study. Limitations of the applicable objects: The research object of this paper is only for fresh products.
Practical implications: The logistics service quality evaluation index system for fresh food e-commerce enterprises serves a dual purpose: it offers a foundational metric for the evaluation and optimization of logistics service standards within these enterprises, and concurrently, it fosters an increase in the commercial revenue generated by these enterprises in the fresh food e-commerce industry.
Originality/value: Previous research has seldom integrated the domains of fresh food e-commerce and logistics service quality holistically. The logistics service quality framework developed in this paper takes into account the unique attributes of perishable goods.

Keywords: Logistics service quality, Fresh food e-commerce, Customer satisfaction.

Introduction

Fresh food e-commerce enterprises refer to businesses that operate online platforms or marketplaces dedicated to the sale and distribution of fresh food products, such as fruits, vegetables, meat, seafood, dairy products, and other perishable items. With the intensification

of market competition, customer satisfaction has become one of the essential factors for the success of Fresh food e-commerce enterprises. It can be considered the ultimate goal of every enterprise in serving its customers and serves as an important indicator for measuring service quality (Lang, 2020). Only by providing customers with high-quality and efficient logistics services can fresh food e-commerce enterperises gain market in the competition (Jiang et al., 2021).As the core of logistics service management, Logistics Service Quality (LSQ) has gradually become the source for enterprises to improve their own competitiveness and continuously create value (Huma et al., 2019). And good LSQ is an important guarantee for the core competitiveness of enterprises (Akıl & Ungan, 2021).Therefore, it is necessary for fresh food e-commerce enterprises to carry out quality management through scientific management and control to reduce logistics costs and improve LSQ.

In light of the unique attributes of fresh food e-commerce logistics services, this research has identified the key performance indicators for assessing the quality of these services. It has developed a comprehensive index system for measuring LSQ and has proposed strategies for enhancing the quality of fresh food e-commerce logistics services. The aim is to offer valuable insights for the assessment and enhancement of the quality of logistics services in the fresh food e-commerce industry.

Literature Review

The theoretical foundation of this study rests on several key constructs, namely customer satisfaction and LSQ. The integration of these two concepts provides a comprehensive framework for understanding and improving the LSQ in fresh food e-commerce.

Customer satisfaction

As the central concept in customer satisfaction theory, customer satisfaction has garnered significant attention from experts and scholars over the years. With ongoing research, various definitions of customer satisfaction have emerged. Cardozo (1965) initially introduced the concept of customer satisfaction in the marketing field, positing that it influences consumer behavior. Satisfaction is generally defined as a measure of an organization's capability to meet, or exceed, customer expectations (Qureshi et al., 2008). Zia (2022) believes that the variables that affect customer satisfaction are service and product quality, price and convenience. Ikramuddin and Mariyudi (2021) believed that customer satisfaction is refered to the subjective evaluation generated by customers after using a product or service, including their satisfaction with the overall quality, performance, service, and other aspects of the product or service.

There are many factors affecting customer satisfaction, and scholars often establish customer satisfaction evaluation systems to determine these factors. Akinboade (2012) analyzed the impact on customer satisfaction by considering delivery service, delivery cycle, and communication ability as variables, finding that these factors indeed influence customer satisfaction. Sajjad Shokouhyar et al.(2020) proposed a framework for assessing the impact of after-sales service on customer satisfaction, and identified the influence of quality elements of after-sales service on customer satisfaction. The dimension of responsiveness in service quality should be given priority in strategies to enhance customer satisfaction. A significant correlation exists between the four key service quality dimensions of service quality and the satisfaction experienced by customers, which include reliability, responsiveness, speed, and value (Riitho, 2018). The efficiency, dependability, and superior service quality of logistics directly affect customer satisfaction and loyalty. Moreover, customer satisfaction acts as a pivotal intermediary in the relationship between service quality and customer retention (Arshad Khan & Alhumoudi, 2022).

Unique Characteristics of Fresh Food E-commerce Logistics

Fresh food e-commerce logistics poses unique challenges due to the perishable nature of the products, requiring strict temperature control and timely delivery. As such, traditional LSQ frameworks need to be adapted to account for these specific requirements. For instance, freshness and cold chain management emerge as crucial dimensions in evaluating LSQ for fresh food e-commerce (Mentzer et al., 2001). (Jedermann et al. 2014) highlighted the impact of LSQ on customer satisfaction in the B2C e-commerce environment. They believed that the food waste and decay were caused by improper logistics management and proposed the adoption of wireless sensors, communication systems, and gas sensors. Jiang et al. (2021) proposed that the sustainability management of fresh food e-commerce logistics services should comprehensively consider the sustainability of the supply chain, optimization of the logistics network, low carbon emissions, packaging and waste management, demand forecasting, and inventory management, as well as transparency and traceability. Prajapati et al. (2023) emphasized he point of view of timeliness, accuracy, reliability, traceability, customized services and cost-effectiveness of logistics services. This study, therefore, integrates these unique characteristics into the LSQ evaluation model, ensuring its relevance and applicability to the fresh food e-commerce context.

Logistics Service Quality

The quality of logistics service represents the degree to which logistics service meets the requirements of logistics customers, and is an important index to measure the level of logistics service (Zeng, 2023). In the e-commerce environment, the LSQ is an important factor in customer satisfaction (Uvet, 2020). Campos et al. (2009) defined LSQ as the difference between customers' expectations of logistics service prior to purchasing products and the perceived level of logistics service upon receiving the service. Hafez et al. (2021) believed that LSQ is the level of service customers experience in the process of purchasing and receiving e-commerce products. LSQ usually includes order accuracy, order fulfillment time, goods integrity, distribution accuracy, and other key aspects, and affects customer satisfaction and loyalty. Enhancing the logistics processes that influence customers' experience with the products they acquire requires a focus on refining certain facets of logistics services and effectively managing customer expectations (Gil-Saura & Ruiz-Molina,2011).

In addition, scholars have proposed various conjectures and hypotheses regarding LSQ and have conducted verification. British scholar PZB created the service quality gap model in 1985. The PZB service quality gap model provides clarity on how to specifically improve service quality and has become one of the most outstanding achievements in the field of service management, the model includes five dimensions: tangibility, reliability, reactivity, assurance, and empathy. Mentzer (2001) extensively applied the LSQ model in industries such as textiles and construction, drawing Logistics service providers should identify the key factors influencing customer satisfaction based on industry types and customer characteristics. Lin (2023) proposed that fresh e-commerce has broken the space and time limits of traditional fresh product trading, so that customers can easily buy characteristics, landmarks, and high-end fresh products through online shopping channels to meet their high-quality, diversified, and personalized purchase needs. According toLee et al. (2008), the quality of logistics services is predominantly influenced by factors such as the swiftness of delivery, the precision of the delivery process, the security of the delivery, the ease of delivery, and the demeanor of the delivery personnel. Yoon (2011)posited that the overall quality of logistics services is shaped by elements including the quality of the order, the quality of the delivery, the level of customer service, and the pricing of the delivery. His research delved into how these elements influence the perceived value of logistics services and the interplay between this perceived value and

customer satisfaction and loyalty. Ravindran et al. (2020) provided that punctuality, product excellence, and the efficacy of reverse logistics are significant aspects of LSQ. The research of these scholars has promoted theoretical and empirical research in the field of LSQ.

Based on a literature review, it was found that professionalism, freshness, immediacy, supportability, and convenience have the most significant impact on customer satisfaction. This provides theoretical and empirical support for selecting professionalism, freshness, immediacy, supportability, and convenience as LSQ factors in this article.

In order to ensure the scientific rationality and systematic of indicator selection, based on the theoretical underpinnings of LSQ, the research involved conducting in-depth focus group discussions with a sample of 20 consumers. These participants have been active on e-commerce platforms for a minimum of two years and have accumulated substantial experience in online purchasing. The consumers were divided into two groups, which primarily revolved around understanding the aspects of LSQthat they are most concerned with during the process of e-commerce transactions. The key words and main content obtained from the interviews were summarized and organized, as shown in the table below:

Table **Error! No text of specified style in document.** Summary of main interview results

Serial Number	Summary of Main Content
1	Can ensure the product remains fresh and maintains its shape stability during the delivery process.
2	Can timely update the processing information after receiving order.
3	Can provide high quality of cold chain operations and useful information.
4	Can provide high quality of logistics packaging recycling service with value-added.
5	Can make a timely and complete delivery.
6	Can complete the return service in time.
7	Can deliver the goods quickly after the order placed.
8	Can provide flexible delivery time and accurate positioning.
9	Can provide a variety of ways of logistics information query methods.
10	Can provide certain compensation for return or exchange.

From the main results of the above interviews, it can be seen that the LSQ factors mentioned the most are mainly related to the professionalism, speed, and freshness of the services provided. Therefore, based on comprehensive theory and research results, this article chooses professionalism, freshness, immediacy, supportability, and convenience as the LSQ for this article.

Hypothesis Development

Most scholars divided the LSQ into several sub-dimensions and focused on the mechanisms of each one. A summary of the literature findings is presented in Table 2.

Table 2. Summary of the literature findings

Reference	Existing research and key characteristics
PZB (1985)	Reliability, empathy,tangibility, assurance, responsiveness.
Mentzer et.al. (2001)	Information quality, order release quality, order process quality, communica tion quality; order accuracy, order integrity, goods quality, error handling quality, timeliness

LeeChoongBae et al. (2008)	Speed of delivery, accuracy of the delivery system, safety of delivery, ease of delivery, and personality of the delivery person.
Yoon. (2011)	Quality of the order, quality of delivery, customer service, and delivery price.
Revindran et al. (2020)	Timeliness, product availability, product condition and reverse logistics.
Lin. (2023)	Integrates operational quality, resource quality, information quality, personal contact quality, customization quality, and customer satisfaction

Methods

The methodology used in this study involves a rigorous and systematic approach to construct and validate the LSQ evaluation model for fresh food e-commerce enterprises.The research employs a hybrid methodology, integrating both qualitative and quantitative research methods. The qualitative component involves a comprehensive literature review to identify the key dimensions and indicators of LSQ in fresh food e-commerce. The quantitative part uses methods such as Likert scale, Expert opinion method, and Analytic hierarchy process to evaluate LSQ indicators.

After reviewing many research results related to service quality and logistics service quality, the study identifies certain constraints with current models when applied in practice. In constructing the assessment framework for the quality of logistics services in fresh food e-commerce, the paper draws upon the findings of experts from around the world. It refines the model's dimensions and metrics from the vantage point of customer satisfaction. The LSQ dimensions and metrics are described as follows:

Professionalism

Professionalism typically signifies the attribute of possessing a highly specialized field of expertise, necessitating extensive knowledge in a specific domain that is not readily available to the general public(Lynch et al., 2004). Professionalism typically denotes a set of standard ethical principles adhered to by individuals who possess a common professional affiliation(Evetts, 2003). Professionalism includes the professional competence, work attitude, behaviour, and service quality of after-sales service personnel (Shokouhyar et al., 2020). The term "professionalism" refers to the operating procedure, professional knowledge, and abilities of logistics service providers as well as the professionalism of cold chain transportation equipment and information systems (Mentzer et al., 2001).

In this study, professionalism is defined as key characteristics of fresh food e-commerce logistics service providers, including but not limited to advanced cold chain logistics facilities, professional customer service, efficient order processing and the use of specialized logistics packaging for transporting products. This dimension focuses on evaluating the quality of fresh food e-commerce logistics services from the perspective of tangible hardware facilities and fundamental service conditions that perceived by customers. Given that fresh products have more stringent requirements including temperature, humidity, and transportation conditions compared to general goods, and considering their susceptibility to damage and perishability, it is essential to employ specialized logistics packaging to ensure adequate protection during the transportation and distribution process.

Specific indicators are as follows:

(1) Specialty degree of cold chain facilities: Professional cold chain facilities are used in the process of logistics transportation, storage and distribution.

(2) Specialty degree of product packaging: The packaging of the products shall be executed according to national standards.

(3) Specialty degree of customer service: The attitude of customer service staff should be professional and good.
(4) Specialty degree of operation and logistics information: Enterprises can provide customers with high quality cold chain operation and logistics information.

Freshness

According to the LSQmodel, which has evolved with the dimensions of product accuracy, product integrity, and timeliness, the study delineates the freshness aspect of the quality of logistics services in fresh e-commerce from the standpoint of product excellence and the essential support mechanisms required to maintain product integrity. (Mentzer et al., 2001). Due to the nascent state of reverse logistics systems in China, there is a significant rate of spoilage for perishable goods. This has led to an increased consumer focus on the quality and freshness of fresh products, with heightened expectations for their preservation. Consequently, freshness has been identified as a distinct criterion for assessing the quality of logistics services within the fresh e-commerce sector. Specific indicators are as follows:
(1) Order accuracy: The goods delivered to customers are consistent with the order.
(2) Delivery accuracy: The goods is delivered to the right place at the specified time based on the customer's order.
(3) Packaging integrity: When customers receive the goods, the package maintains clean and complete.
(4) Product freshness: Ensure freshness and integrity of goods when customers receive them.

Immediacy

Immediacy refers to the ability of a service provider to deliver services within a specified time frame or within the time expected by the customer (Vivaldini, 2023). The immediate satisfaction of demand is very important, and on-demand access to goods is required (Taylor, 2018). Immediacy enhances both physical and psychological intimacy between people (Isotalus & Muukkonen, 2002). Immediacy of connection affects the sustained usage intention of medical information O2O platform users (Barusman, 2019). The research established an assessment framework that consolidates various aspects, including the swiftness of order processing, the promptness of information updates, the efficiency of returns and exchanges, the responsiveness of customer service, and the punctuality of logistics operations. Specific indicators are as follows:
(1) Order response speed: The reaction time after receiving orders.
(2) Timeliness of information: To update timely, accurate and latest information.
(3) Return and exchange speed: The response time of fresh food e-commerce enterprises after receiving customers' return and replacement applications.
(4) Customer service response timeliness: In the process of communication between customers and staffs, customer service response speed.
(5) Logistics timeliness: The overall time from the time the customer orders to the time the customer receives the product.

Supportability

Supportability denotes the capacity of a system, product or service to consistently execute its designated operations effectively and reliably under defined circumstances and within an allotted period (Da Vinci, 2000). This dimension examines the actual psychological experience brought by the enterprise's service to the customer. Product support is essential for achieving customer satisfaction in many industries (Goffin, 2000). Supportability will enhance customer loyalty to e-banking (Shankar & Jebarajakirthy, 2019). Supportability focuses on the

maintainability and sustainability of the system during its life cycle (Shokouhyar et al., 2020). In this research, the term 'supportability' encompasses a broad spectrum of attributes, including the expertise, courteousness, and trustworthiness that service personnel must exhibit to instill confidence in clients. Additionally, it takes into account the caliber of post-purchase support services. Specific indicators are as follows:
(1) Customer service communication quality: In the process of communication with customers, the customer service staff show good professional quality.
(2) Logistics personnel interaction service quality: Logistics staff embodies the skilled business ability and enthusiasm for service.
(3) After-sales service quality: Enterprises can provide proper service to customers when problems arise after sale.
(4) Logistics information query method: Enterprises can provide a variety of ways of logistics information query methods.

Convenience

Convenience refers to providing users with a simpler, faster, and more efficient experience (Kaswengi & Lambey-Checchin, 2020). Convenience means the time and effort required for customers to purchase and use services (Kim et al., 2021). Convenience enables customers to obtain the service with minimal overall effort and time (Kaura et al., 2015). The convenience of online shopping directly affects perceived value and repurchase intention (Pham et al., 2018). This study combines the consumption experience and suggestions of fresh food e-commerce customers to determine four indexes of convenience. Specific indicators are as follows:
(1)Adaptable scheduling options for collection: Companies are able to accommodate the unique delivery time preferences of their clients。
(2) Diverse collection options: For the final phase of delivery, businesses are capable of offering a range of adaptable collection strategies to their customers.
(3) Multifaceted payment options: Online platforms for fresh food retail can equip patrons with an array of user-friendly payment alternatives.
(4) Streamlined returns and exchanges: Companies can furnish clients with a hassle-free procedure for product returns and exchanges.

Construction of LSQ index system

In summary, the following LSQ index system is established as shown in Table 3.

Table 3. LSQ index system

Dimensions	**Indexes**
Professionalism	Specialty degree of cold chain facilities
	Specialty degree of product packaging
	Specialty degree of customer service
	Specialty degree of operation and logistics information
Freshness	Order accuracy
	Delivery accuracy
	Packaging integrity
	Product freshness
Immediacy	Order response rate
	Timeliness of information
	Return and exchange efficency
	Response timeliness
	Delivery timeliness

Supportability	Personnel reaction quality
	Logistics personnel service quality
	After-sales service quality
	Logistics information query method
Convenience	Flexibility in pick-up times
	Supportment of pick-up methods
	The diversity of payment methods
	Easy return and exchange process

Due to the existence of a large number of uncertain concepts in the above indicator system, such as "accuracy", "response speed", "communication quality", etc., we use fuzzy mathematical methods to convert the above evaluation indicators into standard scores K, which are divided into five levels according to the Likert scale, namely (best, good, average, poor, worst) corresponding to scores K=(100, 80, 60, 40, 20). Using the expert opinion method, the membership degree r_{ij} of each factor in the above indicator system is evaluated. The membership degree r_{ij} refers to the likelihood of multiple evaluation subjects making e_j evaluations on a certain evaluation object in terms of f_i (degree of likelihood), which is equal to the proportion of the number of people who make e_j evaluations on the ijth object in terms of f_i to the total number of people. We can obtain the membership vector $R_i = (r_{i1}, r_{i2}, ..., r_{im}), i = 1,2,...,n$, $\sum_{i=1}^{m} r_{ij} = 1$, The membership matrix is:

$$R = \begin{bmatrix} r_{11}, r_{12}, \cdots, r_{1m} \\ r_{21}, r_{22}, \cdots, r_{2m} \\ \cdots, \cdots, \cdots, \cdots \\ r_{i1}, r_{i2}, \cdots, r_{im} \end{bmatrix}$$

Due to the varying importance of each factor in the above evaluation indicators, based on the given evaluation indicator system, the Analytic Hierarchy Process (AHP) is used to compare and determine the weights of each factor in each level. Assuming that the weights of each element are $W_i (i = 1,2,...,n)$, a weight matrix $W = (W_1, W_2, ..., W_n)$ is formed。

By using the fuzzy matrix operation method, combined with the membership matrix R and weight matrix W, the comprehensive evaluation vector S and comprehensive evaluation value U can be calculated. Usually S=R × W, U=KST. The magnitude of the calculated value u reflects the overall level of LSQ.

Findings

The findings in this study were obtained by evaluating and analyzing LSQ indicators using methods such as the Likert scale, expert opinion method, and analytic hierarchy process. This section outlines the key insights gained from the data analysis process, which are based on the framework established during the methodology phase.

Optimize support services for convenience and responsiveness

As people's requirements for fresh food become more and more stringent, more attention should be paid of the fresh food e-commerce logistics service providers to improve the convenience and responsiveness.

(1) Enhance the flexibility of payment. Traditional e-commerce is mostly online payment in front of the offline logistics delivery, fresh food e-commerce logistics needs to combine the attributes of fresh, support the inspection and confirmation step after the payment, and greatly reduce the feedback and complaints due to product quality problems, so as to improve customers' perception of fresh food e-commerce LSQ.

(2) Optimize the returning and exchanging process. Fresh food e-commerce will inevitably encounter returns and exchanges, improving the convenience of the return process, e.g., reducing the user in the returning process of cumbersome procedures and longer waiting.

(3) Improve the user feedback mechanism. It is suggested that after each order is completed, customers should be guided to evaluate and give feedback on the order page, and customers' opinions should be collected regularly through APP, Wechat, Weibo and other channels to better understand customers' demands. An internal employee reward and punishment system can be established based on customer service feedback records to ensure that each employee is user-centered to meet and realize customers' needs.

Control product origins to improve reliability

With the upgrading of customer consumption level, more and more customers begin to pay more attention to product quality, so, the first step to improve the quality of fresh food e-commerce logistics service is to control the source of fresh products.

(1) Standardization of origin. Fresh food is difficult to be a standardized product, in order to ensure product quality, it is necessary to standardize the pre-cooling, grading, packaging and some other procedures.

(2) E-commerce needs to establish real-time quality monitoring system. The quality of fresh products directly affects the reputation and development of fresh food e-commerce, so fresh food e-commerce should establish a real-time monitoring system for fresh products as soon as possible, and improve the monitoring of fresh products by combining real-time remote monitoring and regular field inspection.

(3) Establish fresh product information traceability system for customers. In the process of sales, fresh food e-commerce can be labeled the safety report, procurement personnel information, origin, planting environment, growth records and other information on the surface of fresh products through the two-dimensional code, so that customers can understand product quality and safety information anytime and anywhere, and purchase with confidence.

Improve logistics process to improve professionalism and safety

The process of logistics should be paid more attention to the construction of fresh food LSQ.

(1) Strengthen cold chain infrastructure construction. Fresh on the temperature, maturity, quality requirements are quite high, so the stability of the equipment should be ensured during transportation, and the whole cold chain transport of fresh products. it is found that increasing investment in transport infrastructure and expanding the use of refrigerated trucks will avoid equipment problems that affect the quality of fresh products.

(2) Improve the construction of the cold chain transport branch network. At this stage, most of the cold chain logistics of fresh food e-commerce in China are Party A logistics, and they do not have their own hematopoietic function, so the construction of a cold chain transport branch network is imminent. So at this stage, China's fresh cold chain transport needs to be furthered to improve the cold chain network, reduce logistics costs, and improve logistics timeliness.

(3) Strengthen IT application. On the basis of strengthening cold chain infrastructure and network construction, the transportation process should be strictly managed, and it is necessary to improve the cold chain logistics information system, so as to monitor the quality of goods and relevant information of transportation and distribution in real time from the origin of procurement, and increase customers' perception of products and services.

It is also important to improve the quality of service during the distribution of fresh products.

(1) Improve distribution equipment. In the process of distribution, the packaging of goods that are easily damaged by impact should be strengthened. At the same time, with the change of local outdoor temperature, it is necessary to adjust and protect the temperature of distributed goods, and it is necessary to upgrade the distribution equipment, such as distribution handbags and foam boxes.

(2) Improve the work quality of distribution personnel. Direct contact with customers is the customer's first impression of the logistics experience. In addition to professional training on the dress etiquette and standard speech of distribution personnel, the most important thing is to ensure that the distribution personnel do a good job of protection measures to ensure that customers receive goods without risk.

(3) Increased flexibility of times and locations in the receiving process. Due to facet that the customer may have other temporary arrangements or inconvenient to receive goods within 1 to 2 hours of the delivery of goods, it is recommended to increase the self-pickup service or intelligent pickup container, so as to save distribution costs while allowing users to receive goods with greater flexibility to reduce the time loss of distribution personnel waiting for users to receive goods.

In summary, the findings of this study are based on a comprehensive dataset using rigorous analytical methods, providing insights into the key factors influencing customer satisfaction with the LSQ in fresh e-commerce.

Discussion and Conclusion

This study provides a comprehensive examination of LSQ in fresh food e-commerce from the perspective of customer satisfaction. The findings and their implications are discussed below, with critical justifications for both theoretical and practical contributions.

Theoretical Implications

Firstly, this research contributes to the theoretical understanding of LSQ in the context of fresh food e-commerce. By systematically reviewing existing literature and identifying five key dimensions (professionalism, freshness, immediacy, supportability, and convenience) this study enriches the discourse on service quality in this niche industry. Specifically, the inclusion of freshness as a standalone dimension underscores the unique challenges and requirements of transporting perishable goods, which is not thoroughly addressed in previous studies. This theoretical framework not only fills a gap in the literature but also provides a foundation for future research in this area.

Secondly, the study broadens the scope of customer satisfaction theory to include the domain of logistics services specifically tailored for the fresh food e-commerce sector. It achieves this by conducting empirical research to establish a correlation between various aspects of LSQ and the overall satisfaction of customers. this research contributes to the understanding of how these factors interact to influence customer perceptions.

Practical and Social Implications

Practically, this study offers actionable insights for fresh food e-commerce enterprises and logistics service providers. Firstly, the findings emphasize the importance of convenience and

responsiveness in logistics services. This implies that enterprises should prioritize flexibility in delivery times, diverse pickup methods, and streamlined return and exchange processes to enhance customer satisfaction.

Secondly, the study highlights the need for rigorous control over product origins to ensure freshness and reliability. This suggests that implementing real-time quality monitoring systems, standardization of pre-cooling and grading procedures, and traceability systems through QR codes can significantly improve product quality and customer trust.

Finally, the study underscores the significance of professionalism and safety in logistics processes. This includes investments in cold chain infrastructure, IT applications for real-time monitoring, and training for distribution personnel. By adopting these strategies, enterprises can not only improve the quality of their logistics services but also differentiate themselves in a highly competitive market.

The findings presented in this study align closely with the research objectives. Firstly, the study successfully constructs an evaluation model of LSQ for fresh food e-commerce enterprises, addressing the first objective. The proposed model incorporates the unique characteristics of fresh products and customer satisfaction factors, providing a comprehensive framework for assessing LSQ. Secondly, the study offers practical strategies for improving LSQ, thereby fulfilling the second objective. The identified key strategies, including optimizing support services, controlling product origins, and improving logistics processes, directly address the challenges faced by fresh food e-commerce enterprises in enhancing customer satisfaction and loyalty.

In conclusion, this study makes significant theoretical and practical contributions to the field of LSQ in fresh food e-commerce. The findings not only enrich the academic discourse but also provide actionable insights for enterprises seeking to improve their logistics operations and customer satisfaction levels.

Limitations and Suggestions for Future Research

(1) The limitations of evaluation dimension: Logistics cost is not considered in this study. It can be seen from the principle of "benefit reversal" that a high level of LSQ will inevitably bring high cost. Therefore, how to balance the logistics cost and service quality is the lack.

(2) The limitations of the applicable objects: The research object is fresh products. Compared with other products, fresh products have unique characteristics, so the evaluation index system constructed in this study lacks generalizability and may not be suitable for assessing the LSQ in other industries.

References

Akinloye Akinboade, O., Chanceline Kinfack, E., & Putuma Mokwena, M. (2012). An analysis of citizen satisfaction with public service delivery in the Sedibeng district municipality of South Africa. *International Journal of Social Economics*, *39*(3), 182–199. https://doi.org/10.1108/03068291211199350

Akıl, S., & Ungan, M. C. (2021). E-Commerce Logistics Service Quality: Customer Satisfaction and Loyalty. *Journal of Electronic Commerce in Organizations*, *20*(1), 1–19. https://doi.org/10.4018/JECO.292473

Arshad Khan, M., & Alhumoudi, H. A. (2022). Performance of E-Banking and the Mediating Effect of Customer Satisfaction: A Structural Equation Model Approach. *Sustainability*, *14*(12), 7224. https://doi.org/10.3390/su14127224

Barusman, A. R. P. (2019). The effect of security, service quality, operations and information management, reliability &trustworthiness on e-loyalty moderated by customer satisfaction

on the online shopping website. *International Journal of Supply Chain Management*, *8*(6), 586–594.

Campos, D. F., & Nóbrega, K. C. (2009). Importance and the Zone of Tolerance of Customer Expectations of Fast Food Services. *Journal of Operations and Supply Chain Management*, *2*(2), 56. https://doi.org/10.12660/joscmv2n2p56-71

Cardozo, R. N. (1965). An Experimental Study of Customer Effort, Expectation, and Satisfaction. *Journal of Marketing Research*, *2*(3), 244. https://doi.org/10.2307/3150182

Da Vinci, L. (2000). Supportability and Logistics. U. D. Kumar, J. Crocker, J. Knezevic, & M. El-Haram, *Reliability, Maintenance and Logistic Support* (249–279). Springer US. https://doi.org/10.1007/978-1-4615-4655-9_7

Evetts, J. (2003). The Sociological Analysis of Professionalism: Occupational Change in the Modern World. *International Sociology*, *18*(2), 395–415. https://doi.org/10.1177/0268580903018002005

Gil-Saura, I., & Ruiz-Molina, M. E. (2011). Logistics service quality and buyer–customer relationships: The moderating role of technology in B2B and B2C contexts. *The Service Industries Journal*, *31*(7), 1109–1123. https://doi.org/10.1080/02642060903100380

Goffin, K. (2000). Design for Supportability: Essential Component of New Product Development. *Research-Technology Management*, *43*(2), 40–47. https://doi.org/10.1080/08956308.2000.11671340

Hafez, L., Elakkad, E., & Gamil, M. (2021). A Study on the Impact of Logistics Service Quality on the Satisfaction and Loyalty of E-Shoppers in Egypt. *Open Journal of Business and Management*, *09*(05), 2464–2478. https://doi.org/10.4236/ojbm.2021.95133

Huma, S., Ahmed, W., Ikram, M., & Khawaja, M. I. (2019). The effect of logistics service quality on customer loyalty: Case of logistics service industry. *South Asian Journal of Business Studies*, *9*(1), 43–61. https://doi.org/10.1108/SAJBS-10-2018-0114

Isotalus, P., & Muukkonen, H. (2002). Animated agent immediacy and news services with handheld computers. *Communication Quarterly*, *50*(1), 78–92. https://doi.org/10.1080/01463370209385647

Jedermann, Reiner, Mike Nicometo, Ismail Uysal, and Walter Lang (2014). Reducing Food Losses by Intelligent Food Logistics. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences 372 (2017): 20130302. https://doi.org/10.1098/rsta.2013.0302.

Jiang, Y., Lai, P., Chang, C.-H., Yuen, K. F., Li, S., & Wang, X. (2021). Sustainable Management for Fresh Food E-Commerce Logistics Services. *Sustainability*, *13*(6), 3456. https://doi.org/10.3390/su13063456

Kaswengi, J., & Lambey-Checchin, C. (2020). How logistics service quality and product quality matter in the retailer–customer relationship of food drive-throughs. *International Journal of Physical Distribution & Logistics Management*, *50*(5), 535–555. https://doi.org/10.1108/IJPDLM-01-2019-0036

Kaura, V., Durga Prasad, C. S., & Sharma, S. (2015). Service quality, service convenience, price and fairness, customer loyalty, and the mediating role of customer satisfaction. *International journal of bank marketing*, *33*(4), 404–422.

Kim, Y., Wang, Q., & Roh, T. (2021). Do information and service quality affect perceived privacy protection, satisfaction, and loyalty? Evidence from a Chinese O2O-based mobile shopping application. *Telematics and Informatics*, *56*, 101483. https://doi.org/10.1016/j.tele.2020.101483

Lang, G. (2020). An Empirical Study on the Exploration of Factors Influencing Customer Satisfaction in Logistics Distribution Service. *IOP Conference Series: Earth and Environmental Science*, *546*(5), 052031. https://doi.org/10.1088/1755-1315/546/5/052031

LeeChoongBae, Na-Ri Park, & 박선영. (2008). A study on the Effects of Delivery Service Quality on Customer Satisfaction in Internet Apparel Shopping Mall. 전자무역연구, *6*(2), 23–44. https://doi.org/10.17255/ETR.6.2.200808.23

Lin, X., Mamun, A. A., Yang, Q., & Masukujjaman, M. (2023). Examining the effect of logistics service quality on customer satisfaction and re-use intention. *PLOS ONE*, *18*(5), e0286382. https://doi.org/10.1371/journal.pone.0286382

Lynch, D. C., Surdyk, P. M., & Eiser, A. R. (2004). Assessing professionalism: A review of the literature. *Medical Teacher*, *26*(4), 366–373. https://doi.org/10.1080/01421590410001696434

Mentzer, J. T., Flint, D. J., & Hult, G. T. M. (2001a). Logistics Service Quality as a Segment-Customized Process. *Journal of Marketing*, *65*(4), 82–104. https://doi.org/10.1509/jmkg.65.4.82.18390

Mentzer, J. T., Flint, D. J., & Hult, G. T. M. (2001). Logistics service quality as a segment-customized process. *Journal of Marketing*, *65*(4), 82–104.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). *A Conceptual Model of Service Quality and Its Implications for Future Research*. 10.

Pham, Q., Tran, X., Misra, S., Maskeliūnas, R., & Damaševičius, R. (2018). Relationship between Convenience, Perceived Value, and Repurchase Intention in Online Shopping in Vietnam. *Sustainability*, *10*(2), 156. https://doi.org/10.3390/su10010156

Prajapati, D., Harish, A. R., Daultani, Y., Singh, H., & Pratap, S. (2023). A Clustering Based Routing Heuristic for Last-Mile Logistics in Fresh Food E-Commerce. Global Business Review, 24(1), 7–20. https://doi.org/10.1177/0972150919889797

Qureshi, T. M., Zafar, M. K., & Khan, M. B. (2008). *Customer Acceptance of Online Banking in Developing Economies*. *13*(1).

Revindran, M., Ragen, P. N. K., & Mahmud, B. (2020). A study on Logistics Service Quality in E-Retailing Amongst Online Shoppers in Kuala Lumpur. *IOP Conference Series: Materials Science and Engineering*, *780*(6), 062016. https://doi.org/10.1088/1757-899X/780/6/062016

Riitho, V. K. (2018). *The influence of service quality on customer satisfaction: a study of container shipping lines in kenya from a freight forwarder perspective*.

Shankar, A., & Jebarajakirthy, C. (2019). The influence of e-banking service quality on customer loyalty: A moderated mediation approach. *International Journal of Bank Marketing*, *37*(5), 1119–1142. https://doi.org/10.1108/IJBM-03-2018-0063

Shokouhyar, S., Shokoohyar, S., & Safari, S. (2020). Research on the influence of after-sales service quality factors on customer satisfaction. *Journal of Retailing and Consumer Services*, *56*, 102139. https://doi.org/10.1016/j.jretconser.2020.102139

Taylor, T. A. (2018). On-Demand Service Platforms. *Manufacturing & Service Operations Management*, *20*(4), 704–720. https://doi.org/10.1287/msom.2017.0678

Uvet, H. (2020). Importance of logistics service quality in customer satisfaction: An empirical study. *Operations and Supply Chain Management: An International Journal*, *13*(1), 1–10.

Vivaldini, M. (2023). The effect of logistical immediacy on logistics service providers' (LSPs') business. *Benchmarking: An International Journal*, *30*(3), 899–923. https://doi.org/10.1108/BIJ-09-2021-0562

Yoon, S. H. (2011). The Influence of the Logistics Service Quality on Logistics Value, Customer Satisfaction, and Customer Loyalty of Internet Shopping Mall in China. *Journal of International Area Studies*, *15*(3), 125. https://doi.org/10.18327/jias.2011.10.15.3.125

Zeng, Z. (2023). Construction of Evaluation Indicators for Rural E-commerce Express Logistics Service Quality in Guangdong Province. *Academic Journal of Humanities & Social Sciences*, *6*(18). https://doi.org/10.25236/AJHSS.2023.061807

Zia, A. (2022). Discovering the linear relationship of service quality, satisfaction, attitude and loyalty for banks in Albaha, Saudi Arabia. *PSU Research Review*, *6*(2), 90–104. https://doi.org/10.1108/PRR-07-2020-0023