

**THE IMPACT OF LOGISTICS SERVICE
QUALITY ON CUSTOMER LOYALTY IN CHINA
FRESH FOOD LOGISTICS ENTERPRISES: THE
ROLE OF CUSTOMER SATISFACTION, TRUST
AND SWITCHING COST**

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UNIVERSITI SAINS MALAYSIA

2025

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AND SWITCHING COST**

by

SUN JIE

**Thesis submitted in fulfillment of the requirements
for the degree of
Doctor of Philosophy**

September 2025

ACKNOWLEDGEMENT

Throughout the journey to complete this thesis, I have found incredible experience of a lifetime. Strength and discipline are the most vital aspects for me and they have been fundamental in the completion of my thesis. The completion of this thesis is a miraculous defining moment that will surely not be forgotten in my life and it would not be made possible without the assistance of many amazing people whom I would like to sincerely express my deepest gratitude to, and I am profoundly indebted to. First and foremost, I would like to express my sincere gratitude to my supervisor Professor Nor Hasliza and Professor Noorliza Karia, who had given me continuous motivation and inspiration throughout my post graduate journey. It is indeed a great privilege to be under their supervision. Critical suggestions, ideas and thoughts have been provided throughout the journey and she has given me considerable support. My profound gratitude also goes to my examiners for their constructive criticism, comments, and suggestion that have helped me remedy the shortcomings in this study and thanks also goes to all the other lecturers and staffs of the School of Management for their selfless kindness, warmth, and helps during my study in the Universiti Sains Malaysia. Notably, I am fortunate to work and study with supportive colleagues like Wu Shasha, Feng Ce, Fan Yanling, Du Chen, Liu Na, Yuan Xia, Yin Liyuan and Hou Xianqiang. I am grateful for their genuine friendship and I wish them all the best. Last but not least, I must express my very profound gratitude to my parents and family for providing me with unfailing support and continuous encouragement throughout my years of studies and through the process and research and writing this thesis. This accomplishment would not have been possible without them. Thank you.

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LIST OF SYMBOLS

a	The mediating effect of mediating variables
b	The mediating effect of mediating variables
B	Unstandardized regression coefficients
c	The total utility of logistics service indicators on customer loyalty in the intermediary effect.
c'	The direct effect of logistics service quality indicators on customer loyalty in the intermediary effect.
Coef.	Regression coefficient
F	Group variance
H	Hypothetical symbols between logistics service quality, customer satisfaction, customer trust, and customer loyalty indicators.
M	Mean
N	Number of samples
P	Significance value
r	Correlation
R ²	Squared Multiple Correlations
S ²	Variance
Sig	Significant difference test value
t	Significance test values for regression parameters
z	The difference between the sample data and the population mean divided by the population standard deviation.
σ	The root of the square after averaging the sum of squared deviations from the mean.
β	Standardized regression coefficient.
χ^2	Chi square test to verify the degree of agreement between the actual distribution and the theoretical distribution.
H ₁	Logistics service quality affects positively on customer loyalty.
RQ1	Quality of professionalism affects positively on customer loyalty.
	Quality of reliability affects positively on customer loyalty.
H _{1a} -H _{1c} :	Quality of immediacy affects positively on customer loyalty.
	Quality of convenience affects positively on customer loyalty.

H ₂ RQ1	Quality of supportability affects positively on customer loyalty.
	Logistics service quality affects positively on customer satisfaction.
	Quality of professionalism affects positively on customer satisfaction.
	Quality of reliability affects positively on customer satisfaction.
H _{2a} -H _{2e}	Quality of immediacy affects positively on customer satisfaction.
	Quality of convenience affects positively on customer satisfaction.
	Quality of supportability affects positively on customer satisfaction.
H ₃ RQ1	Logistics service quality affects positively on customer trust.
	Quality of professionalism affects positively on customer trust.
	Quality of reliability affects positively on customer trust.
H _{3a} -H _{3e}	Quality of immediacy affects positively on customer trust.
	Quality of convenience service affects positively on customer trust.
	Quality of supportability affects positively on customer trust.
H ₄ RQ2	Customer satisfaction positively affects on customer loyalty.
H ₅ RQ2	Customer trust affects positively on customer loyalty.
H ₆ RQ3	Customer satisfaction positively affects on customer trust.
H ₇ RQ4	Customer satisfaction mediates the relationship between logistics service quality and customer loyalty.
	Customer satisfaction mediates the relationship between quality of professionalism and customer loyalty.
	Customer satisfaction mediates the relationship between quality of reliability and customer loyalty.
	Customer satisfaction mediates the relationship between quality of immediacy and customer loyalty.
H _{7a} -H _{7e}	Customer satisfaction mediates the relationship between quality of convenience and customer loyalty.
	Customer satisfaction mediates the relationship between quality of supportability and customer loyalty.
	Customer trust mediates the relationship between logistics service quality and customer loyalty.
	Customer trust mediates the relationship between quality of professionalism and customer loyalty.
H ₈ RQ4	Customer trust mediates the relationship between quality of reliability and customer loyalty.
	Customer trust mediates the relationship between quality of immediacy and customer loyalty.
	Customer trust mediates the relationship between quality of
H _{8a} -H _{8e}	

	convenience and customer loyalty.
	Customer trust mediates the relationship between quality of supportability and customer loyalty.
H ₉ RQ5	Customer satisfaction mediates the relationship between logistics service quality and customer trust
	Customer satisfaction mediates the relationship between quality of professionalism and customer trust.
	Customer satisfaction mediates the relationship between quality of reliability and customer trust.
H _{9a} -H _{9c}	Customer satisfaction mediates the relationship between quality of immediacy and customer trust.
	Customer satisfaction mediates the relationship between quality of convenience and customer trust.
	Customer satisfaction mediates the relationship between quality of supportability and customer trust.
H ₁₀ RQ6	Switching cost moderates the positive relationship between logistics service quality and customer loyalty, such that the higher the switching cost , the stronger the positive effect.
	Switching cost moderates the positive relationship between quality of professionalism and customer loyalty, such that the higher the switching cost , the stronger the positive effect.
	Switching cost moderates the positive relationship between quality of reliability and customer loyalty, such that the higher the switching cost, the stronger the positive effect.
H _{10a} -H _{10c}	Switching cost moderates the positive relationship between quality of immediacy and customer loyalty, such that the higher the switching cost , the stronger the positive effect.
	Switching cost moderates the positive relationship between quality of convenience and customer loyalty, such that the higher the switching cost , the stronger the positive effect.
	Switching cost moderates the positive relationship between quality of supportability and customer loyalty, such that the higher the switching cost , the stronger the positive effect.
H ₁₁ RQ6	Switching cost moderates the positive relationship between customer satisfaction and customer loyalty, such that the higher the switching cost , the stronger the positive effect.
H ₁₂ RQ6	Switching cost moderates the positive relationship between customer trust and customer loyalty, such that the higher the switching cost , the stronger the positive effect.

LIST OF ABBREVIATIONS

ACSI	American Customer Satisfaction Index
AGFI	Adjusted Goodness-of-Fit Index
AHP	Analytic Hierarchy Process
B2B	Business to Business
B2C	Business to Customer
C2C	Customer to Customer
CB-SEM	Covariance-Based-Structural Equation Modeling
CCSI	Chinese Customer Satisfaction Index
CFA	Confirmative Factor Analysis
CFI	Comparative Fit Index
CI	Confidence interval
CL	Customer Loyalty
CNNIC	China Internet Network Information Center
CS	Customer Satisfaction
CSI	Customer Satisfaction Index
CT	Customer Trust
CV	coefficient of variation
Df	degree of freedom
DW	Durbin-Watson, Indicators for testing auto-correlation in linear regression models
ECSI	European Customer Satisfaction Index
EFA	Exploratory Factor Analysis
GFI	Goodness-of-Fit Index
HRD	Human Resource Development
IFI	Incremental fit index
KMO	Kaiser-Meyer-Olkin
LSQ	Logistics Service Quality
NFI	Normed Fit Index
NNFI	Non-Normed Fit Index
O2O	Online To Offline
OLSQ	Operational Logistics Service Quality
PZB	Parasuraman, Zeithaml and Berry

PCFI	Comparative Fit Index
PDSQ	Physical Distribution Service Quality
PGFI	Parsimony Goodness of Fit Index
PLS-SEM	Partial Least Square Structural Equation Modeling
PNFI	Parsimony Normed Fit Index
RMR	Root of the Mean Square Residual
RMSEA	Root Mean Square Error of Approximation
SC	Switching Cost
SCOR	Supply-Chain Operations Reference-model
SCSB	Swedish Customer Satisfaction Barometer
SD	Standard Deviation
SE	Standard Error
SERVPERF	Service-performance
SERVQUAL	Service Quality
SEM	Structural Equation Modeling
SQ	Service Quality
VIF	Variance Inflation Factor

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**KESAN KUALITI PERKHIDMATAN LOGISTIK TERHADAP KESETIAAN
PELANGGAN DALAM PERUSAHAAN LOGISTIK MAKANAN SEGAR DI
CHINA: PERANAN KEPUASAN, KEPERCAYAAN PELANGGAN DAN
KOS PERTUKARAN**

ABSTRAK

Dengan perkembangan berterusan pasaran logistik barang segar China, fenomena kadar keciciran pelanggan yang tinggi dan keuntungan rendah setiap pelanggan telah menonjolkan krisis kesetiaan dalam industri. Kajian ini membina model kualiti perkhidmatan logistik barang segar yang merangkumi lima dimensi: profesionalisme, kebolehpercayaan, kesegeraan, kemudahan, dan keselamatan. Kepuasan dan kepercayaan pelanggan digunakan sebagai pemboleh ubah pengantara, manakala kos pertukaran digunakan sebagai pemboleh ubah penyederhana. Kerangka teori ini disahkan melalui PLS-SEM menggunakan data soal selidik daripada 890 syarikat. Kajian mendapati bahawa: (1) kualiti perkhidmatan logistik mempunyai kesan langsung yang signifikan terhadap kesetiaan pelanggan; (2) Kepuasan dan kepercayaan pelanggan memainkan peranan pengantara rantai antara kualiti perkhidmatan dan kesetiaan; (3) Kos pertukaran menyederhana secara positif kekuatan kesan kualiti perkhidmatan terhadap kepuasan/kepercayaan. Kajian mendedahkan mekanisme penghantaran "pengantaraan berganda+penyederhanaan" dan mengesahkan peranan kos pertukaran dalam meningkatkan kesan penyederhanaan. Sebagai tindak balas kepada titik kesakitan biasa dalam industri, seperti sambungan rantai sejuk yang lemah dan keperluan untuk mengoptimumkan pengalaman penghantaran, adalah disyorkan bahawa syarikat melaksanakan penambahbaikan multidimensi pada peringkat operasi: mewujudkan mekanisme

pampasan masa nyata untuk menangani penghantaran yang tertangguh, membangunkan fungsi penjejakan eksklusif untuk ahli, dan melatih perkhidmatan kakitangan penghantaran secara berkala.

**THE IMPACT OF LOGISTICS SERVICE QUALITY ON CUSTOMER
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ABSTRACT

With the continuous expansion of China's fresh logistics market, the phenomenon of high customer churn rate and low single customer profit highlights the loyalty crisis within the industry. This study constructed a fresh logistics service quality model that includes five dimensions: professionalism, reliability, immediacy, convenience, and safety. Customer satisfaction and trust are used as mediating variables, while switching costs are used as moderating variables. This theoretical framework was validated through PLS-SEM using questionnaire data from 890 companies. Research has found that: (1) logistics service quality has a significant direct impact on customer loyalty; (2) Customer satisfaction and trust play a chain intermediary role between service quality and loyalty; (3) The switching cost positively moderates the strength of the impact of service quality on satisfaction/trust. The study revealed the transmission mechanism of "dual mediation+regulation" and verified the role of switching costs in enhancing the regulatory effect. In response to common pain points in the industry, such as poor cold chain connectivity and the need to optimize delivery experience, it is recommended that companies implement multidimensional improvements at the operational level: establishing a real-time compensation mechanism to cope with delayed delivery, developing exclusive tracking functions for members, and regularly training delivery personnel services.

CHAPTER 1 INTRODUCTION

1.1 Introduction

In recent years, China's fresh food e-commerce market has rapidly expanded, with continuous growth in annual transaction volume (Fu, 2023). However, this growth is in stark contrast to the rise in customer dissatisfaction, mainly due to the continued failure of logistics services such as delayed delivery, improper temperature control of perishable goods, and poor packaging quality (Khan, 2023). Customer loyalty - defined as the commitment of customers to repeatedly purchase specific logistics provider services over the long term (Marques et al., 2021) - has become a key issue. The decline in loyalty is reflected in the increase in customer churn rate and the decrease in average profit per user, which directly threatens the sustainable development of logistics enterprises (Wenji, 2021).

The fresh food logistics industry is facing unique operational challenges, which have been magnified. Perishable products such as seafood, dairy products, and leafy vegetables require strict temperature control, precise delivery times to ensure freshness, and specialized packaging to minimize damage throughout the entire supply chain. Despite these requirements, common service failures include inconsistent cold chain maintenance (such as temperature fluctuations during transportation), delivery delays exceeding the promised time window, and a lack of sufficient compensation mechanisms for damaged goods. These shortcomings erode customer trust and satisfaction, ultimately weakening loyalty (Mentzer et al., 2001; Khan, 2023).

To address this issue, this study developed a five dimensional logistics service quality framework for fresh food logistics: professionalism (e.g. technical

expertise in cold chain management), reliability (consistency of on-time delivery), immediacy (quick response to order changes), convenience (user-friendly tracking system), and support (post delivery problem resolution). This framework is based on the logistics service quality theory proposed by Mentzer et al. (2001) and explores how these dimensions affect customer loyalty through two mediating variables - customer satisfaction and trust-while incorporating switching costs as a moderating variable. This approach is consistent with recent research emphasizing the dual role of satisfaction and trust in loyalty formation (Devi et al., 2020).

In terms of methodology, the study combines literature analysis and empirical verification. After reviewing the theories of service quality and customer loyalty, a conceptual model was constructed and tested using survey data from 890 fresh food logistics companies. Data analysis was conducted using SPSS for descriptive statistics and factor analysis, followed by structural equation modeling using SmartPLS (Gu et al., 2019). This dual methodology ensures robust validation of hypotheses regarding the relationship between service quality dimensions, mediating variables, and customer loyalty.

By elucidating how specific logistics service attributes, such as the professionalism of temperature control and the transparency of compensation agreements, affect customer loyalty through the satisfaction trust path, this study provides actionable insights for optimizing service design for enterprises. In addition, integrating switching costs as a moderating factor provides practical guidance for customer retention strategies in competitive markets.

1.2 Background of the study

1.2.1 Development of E-commerce in the world

Since the Internet entered human society, e-commerce has changed our business life in many ways. For example, the trading place changes, the trading time fastens, the trading speed picks up, the intermediate link simplifies (Vasić et al., 2021). As a means of commodity trading business activities, its essence can be understood as Internet technology (Belvedere et al., 2021), which subverts traditional business activities, almost eliminates the restrictions of time and space, and can connect any enterprise and customer. The scope of commercial activities has been greatly expanded (Wang et al., 2017; Pourhejazy, 2020). In the past decade (2015-2025), global e-commerce has experienced explosive growth. In 2015, the global e-commerce retail sales were only \$1.3 trillion, accounting for 7.4% of the total retail sales (Statista, 2015); As the world's largest e-commerce market, China's B2C e-commerce sales will reach \$2.2 trillion in 2023, the US e-commerce retail sales will be \$981 billion, and the European e-commerce retail sales will be \$631.9 billion (Statista, 2023). By 2024, the global retail scale has climbed to \$6.38 trillion, accounting for 21.8% of total retail sales, with an average annual compound growth rate of 10% (Statista, 2024). It is expected that by 2025, the market size will further increase to 6.86 trillion US dollars, an increase of over 400% compared to 2015.

However, according to Statista (2024) data, the growth rate of fresh food e-commerce has shown significant differentiation since 2022: although the global fresh food e-commerce market reached \$285 billion in 2023, its annual growth rate has fallen from a peak of 28% in 2020 to 12%, reflecting the industry's dilemma of

slowing customer growth. Meanwhile, the fresh food e-commerce supply chain is one of the newest branches of supply chain development, which is an effective way to promote the development of fresh food e-commerce business. Additionally, Merkuryev et al. (2009) also proposes the relationship between the development of fresh food e-commerce and supply chain management. He suggested that redesigning logistics networks could remove the constraints to developing fresh food e-commerce. The current industry practice has verified the limitations of this viewpoint: according to DHL's (2023) supply chain white paper, only 23% of the logistics network reconstruction investment of the world's top fresh e-commerce platforms can effectively reduce the cargo damage rate, indicating that pure network optimization is no longer sufficient to meet customers' dual demands for timeliness and quality. Therefore, to explore whether Melkuryev's views are sufficient and to better understand the challenges in the development of fresh food logistics, the first task of the research is to define and classify the constraints. On the other hand, although much literature has examined the role of customers in fresh food e-commerce in China, there is a gap in this field in the context of e-commerce (Zhang & Benyoucef, 2016). Due to the increasing emphasis on e-commerce in the economy, it has gradually changed the way people live (Akter & Wamba, 2016). Researchers must find out what are modern customers' preferences and what is reflected in consumer trends, and accordingly provide some suggestions for supplier management.

However, in addition to the increasing number of electronic customers, e-commerce is also more complex than traditional businesses. The complexity is particularly highlighted in the field of fresh e-commerce: Statista's (2023) special research points out that the average customer complaint rate of fresh e-commerce

worldwide (18.7%) is 3.2 times that of ordinary e-commerce products, with 63% of complaints involving logistics, including delivery delays (27%), packaging damage (19%), and temperature control (17%). Improving the quality of e-commerce services is one of the key factors determining the success or failure of the e-commerce supply chain. In the past two decades, the service quality of e-commerce has been defined as an effective way to acquire and maintain competitive advantage (Kang et al., 2022; Zeithaml et al., 2002), as a strategic issue for long-term success (Parasuraman et al., 2005; Lai et al., 2022), or key determinants of customer satisfaction and loyalty (Ribbink et al., 2004; Islam et al., 2021).

According to CNNIC (2013), the two most common problems in online purchasing are long shipping times and that the products received does not match online product specifications. This conclusion is further amplified in the fresh food e-commerce scene: Jungle Scout's (2023) consumer survey shows that 41% of fresh food shoppers give up repurchasing due to logistics uncertainty, while only 29% of customers can accept fresh food delivery cycles exceeding 24 hours. To promote e-commerce, certain conditions must be met, one of the most important of which is the development of logistics capabilities and services, providing logistics services is one of the most expensive businesses in e-commerce and plays a crucial role in promoting online shopping (Qin et al., 2020). For fresh food e-commerce, the proportion of logistics costs is particularly prominent. Statista (2024) estimates that the logistics cost of fresh e-commerce in China accounts for 25% -30% of sales revenue, while ordinary goods only account for 8% -12%. This structural difference forces companies to seek a balance between service quality and cost control.

Previous research has identified the major factors that determine the quality of logistics services related to online shopping: order quality, delivery quality,

customer service, and delivery price (Mentzer et al., 2001). McDougall and Levesque (2000) examined the quality of logistics services provided by cable television, confirming that the quality of staff, accuracy of delivery services, on-time delivery, customer service, and conditions of delivery of products had a significant impact on customer satisfaction and customer loyalty.

Park (2006) made an empirical analysis of the correlation between information quality and logistics quality and linked each factor influencing logistics service quality with customer satisfaction. In addition, his study also examined the impact of customer satisfaction with logistics services on customer loyalty. Lee et al. (2008) concluded that logistics service quality is mainly affected by delivery speed, the accuracy of the delivery system, the safety of delivery, the convenience of delivery, and the personality of the delivery man. Through the investigation of logistics service factors of online clothing stores, it is found that customer satisfaction is affected by delivery speed, delivery security, and the delivery man's personality.

Ho (2009) tested the impact of online communication on the quality of logistics services, as well as that of product quality and logistics services on customer satisfaction and online store credibility. Yoon (2011) believed that order quality, delivery quality, customer service, and delivery price are all factors affecting the overall quality of logistics service. His study explored the impact of these factors on logistics service quality and the relationship between logistics perceived value and customer satisfaction and loyalty.

On the basis of this theoretical background, scholars in this field generally believe that the factors affecting logistics service quality are as follows: order cycle,

product availability, order size limit, the convenience of the ordering process, order details, the condition of the delivered product, and return policy. The eight-stage model of Liang and Huang (1998) is restructured, and the early stages of order, payment, delivery, and after-sales service are changed into order quality, delivery quality, and customer service. Therefore, their study identified the determinants of logistics service quality by adding professionalism, immediacy, and convenience to the factors identified by academic research (Liang & Huang, 1998).

At present, there are relatively few studies on the segmentation field of fresh food logistics service quality in the academic circle, and fresh food logistics enterprises also lack effective standards to evaluate the quality of logistics service. Compared with ordinary industrial products, fresh food has a higher repeat purchase rate, and customer loyalty is more important for both fresh food e-commerce and logistics enterprises (Zhang & Liang, 2023). Deepening customer loyalty can bring a steady stream of customers and benefits to fresh food e-commerce and logistics enterprises (Prajapati et al., 2023). Therefore, the relationship between customer loyalty and logistics service quality is established, which is of great value to fresh food logistics enterprises.

From the above analysis, it can be seen that the development of the fresh food industry has slowed down due to issues such as the coverage of cold chain logistics, imbalance between delivery time and accuracy, safety and traceability defects. It helps fresh food logistics enterprises correctly understand their service level, and provides theoretical basis and reference suggestions for the improvement of customer loyalty in fresh food logistics enterprises (Han et al., 2021).

1.2.2 Development of fresh food logistics in China

1.2.2.1 E-commerce impact on the development of fresh food logistics industry

There should be no hesitation that it is imperative to develop e-commerce and China acts as no exception. The Chinese government has made great efforts to make the internet widely available on the premise of modernizing the national telecommunication infrastructure (Gu, 2022). The internet has entered millions of households, from the computer end to the mobile phone end, people can buy goods anytime and anywhere. Convenience has encouraged more and more customers who buy goods from physical stores to spend online, and online shopping has now become an indispensable part of people's daily lives. The overall transaction volume of e-commerce has been increasing year by year, and e-commerce platforms have become an important channel for customers (Gu, 2022). Easily purchase distinctive, landmark, and high-end fresh products through online shopping channels to meet their high-quality, diverse, and personalized consumption needs (Lin, 2023). It is worth noting that the logistics requirements for fresh products are much higher than those for ordinary goods - unlike 3C products or daily necessities transported at room temperature, fresh logistics require temperature control throughout the cold chain.

In recent years, more diversified consumer demand for fresh products is increasing, pushing the fresh electricity industry in our country gradually to transfer from the traditional pattern and make some breakthrough. The technological complexity and timeliness requirements of fresh logistics force the industry to upgrade, while ordinary logistics mainly relies on standardized processes, with cost structures concentrated in transportation and manpower. The industry scale expanded

unceasingly, breaking the limit of time and space and meeting the consumer demand for fresh product quality and variety (Giuffrida et al., 2019).

In the 2021 China Fresh Food E-commerce Industry Research Report released by I-Research, the market transaction scale of China's fresh food e-commerce industry in 2020 reached 404.73 billion yuan, an increase of 44.7% compared with 2019. It is expected that by 2023, the transaction scale of the fresh food e-commerce market will have exceeded 800 billion yuan (Yang & Lee, 2022), as shown in Figure 1.1.

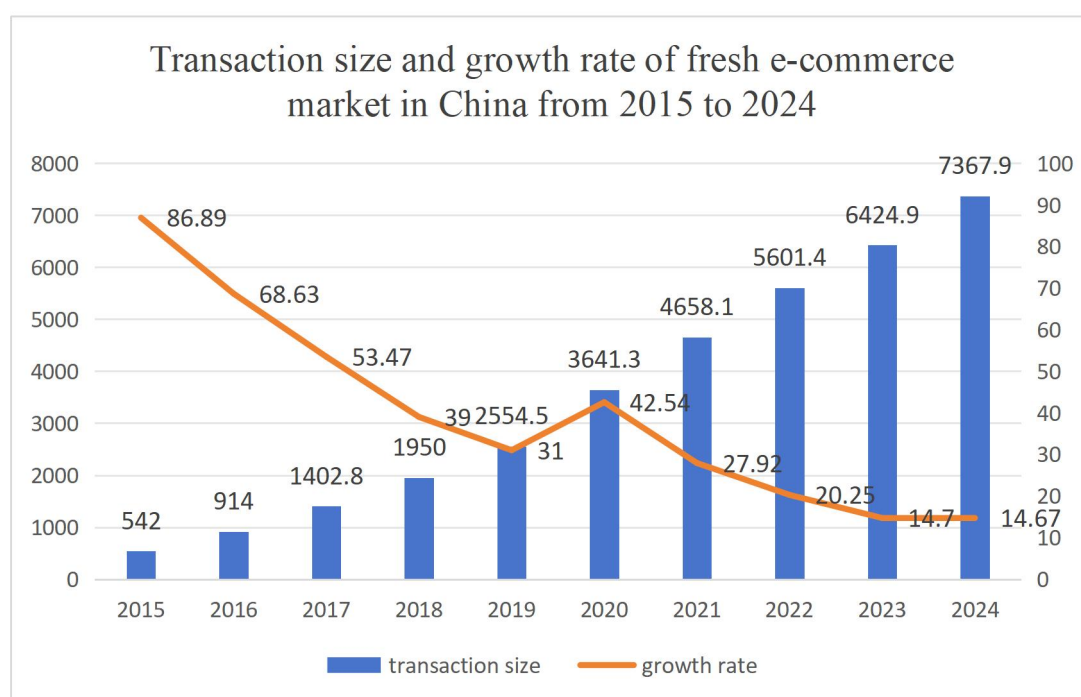


Figure 1.1 Transaction size and growth rate of fresh food e-commerce in China from 2015 to 2024

In recent years, more and more customers have begun to shop online for fresh food, therefore, as an emerging field of customer online shopping, fresh food e-commerce is the current research hotspot of China's e-commerce logistics industry (Gu, 2022). Fresh e-commerce has broken the space and time limit of traditional fresh products trading, so that customers can easily buy characteristic, landmark, and

high-end fresh products through online shopping channels, to meet their high-quality, diversified, and personalized purchase needs (Lin, 2023).

1.2.2.2 Development of the fresh food logistics industry

In fresh food logistics distribution, additional repeated distribution is required due to the emergence of ‘failed deliveries’ and other problems. This causes more traffic congestion, noise, pollution, and cost overruns of the logistics enterprises. The common solution is to use lockers or self-service pickup point systems. In related studies, scholars have found that security, location, and traceability are key factors when planning a picking point network (Alves et al., 2019; Buldeo et al., 2021; Yuen et al., 2018). This has impacted the habits and behavior of customers. The urban public environment, and residents’ health and quality of life have also been impacted (i.e., reducing the number of vehicles, noise, and pollution, lowering price costs, and improving the liability and efficiency of freight).

Some scholars have analyzed public sector initiatives that may be used to improve urban freight activities, such as infrastructure management, parking/loading area management, vehicle-related strategies, and traffic management (Holguín-Veras et al., 2020). Other scholars have proposed the implementation of a freight bicycle delivery system, or the use of public (subway) transportation’s excess capacity to deliver documents and parcels in order to reduce the negative externalities of the last-mile logistics (Arnold et al., 2018; Rudolph & Gruber, 2017; Zhao et al., 2018). Moreover, some scholars have proposed the use of crowd logistics to implement last-mile delivery services in the context of mass social transportation (Kafle et al., 2017; Wang et al., 2016; Zhao et al., 2018).

Fresh food is indispensable necessities in the daily life of Chinese residents. In recent years, with the continuous improvement of the living standards of Chinese residents and the deepening of their awareness of food safety, the safety and quality of fresh food have drawn great concern and attention (Puyue, 2021). China's cold chain logistics is imperfect in technology and norms, which leads to the "broken chain" of fresh food cold chain staying in a normal state, and the risk of cold chain interruption is gradually increasing. According to the data of China Statistical Yearbook in 2022, the total output of fruits, beets, eggs, meat and aquatic products in China was 595.091 million tons in 2021, an increase of 3.55% compared with 2012. However, according to the report on the development of cold chain logistics in China in 2021, the loss rate of fresh food in China is 27% for fruits and vegetables, 14% for meat and poultry and 19% for aquatic products (Yuqing & Xuelin, 2022).

In order to compete for the market, some small and medium-sized enterprises can only reduce their operating costs without government support, and it is inevitable that there will be irregular behavior in cold chain operation (Zhang, 2020). Considering the cost, many enterprises often choose to turn a blind eye to various problems in the transportation process. The city's large supermarket chains have a strong development momentum, and the establishment of various supporting cold storage facilities for retail terminals and the improvement of cold chain equipment technology have boosted the development of frozen food (Yang et al., 2022).

1.2.2.3 Fresh food logistics service quality level is low

With the continuous penetration of e-commerce, the logistics industry has made considerable development, but the performance of fresh food logistics is difficult to satisfy people, due to the quality of logistics service problems caused by

customer complaints and customer poor comments (Wang et al., 2023). Main reasons are as follows: China's logistics refrigeration and freezing technology is outdated, the level of information technology is low, cost control is difficult, infrastructure is backward, and transportation rot rate is high, which not only restrict the improvement of the service level of the logistics industry, but also bring serious obstacles to the development of fresh food logistics industry (Han et al., 2023).

China's fresh food industry chain mainly covers fresh food suppliers, intermediaries, e-commerce, logistics and customers. Here, all connections are interlinked until the food reaches society for daily living assistance, and logistics acts as an intermediary between producers and customers. In this regard, if producers and customers know about logistics, there will be more convenience due to the rise of mobile evolution (Devi et al., 2020). Among them, suppliers of fresh food mainly include agricultural products or farms, agricultural products processing enterprises, and direct procurement of origin. It is worth mention that middlemen include agricultural trading enterprises, food distributors, wholesalers, and importers.

Cold chain technology is widely used in the logistics and distribution of fresh products due to its high shelf life and freshness requirements. This breaks down geographical constraints and allows customers in different regions to buy better fresh products. At the same time, the last-mile delivery service is a key link for fresh food logistics enterprises to effectively manage and directly contact customers, so as to improve customer satisfaction and gain benefits for the enterprise (Arvidsson, 2014; Vasić et al., 2021). The last-mile delivery phase accounts for about 70% of logistics costs, and delivering packages to the door remains the most popular delivery method for customers (Brown & Guiffrida, 2014; Belvedere et al., 2021).

According to the latest scientific report, there are two problems with fresh food logistics in China. On the one hand, the common obstacle to the development of fresh food logistics is the difficulty in managing fresh food logistics (Wanget al., 2017; Khan, 2023). On the other hand, supply chain management is an important branch of effective management that can better control industrial processes, reduce costs, increase profits, and promote business development (Christopher, 2016; Luo & Paulino, 2023).

1.2.3 Overview of customer loyalty in fresh food logistics industry

1.2.3.1 Customer satisfaction and loyalty is low

The main factors affecting customer satisfaction are logistics services and commodity quality (Jones, 1996). Customers' concern about the quality of logistics services is one of the reasons for the low satisfaction of online shopping for fresh food. Because fresh food has the characteristics of being perishable and easy to damage, there are higher requirements for logistics distribution, not only to deliver accurately and timely, but also to keep the goods fresh, so the use of cold chain and other protection measures is a necessity (Man et al., 2017). However, according to data and statistics collated by the China Academy of Commerce Industry, in 2018, complaints about fresh food online shopping in China and complaints about logistics services accounted for 47.59%. Complaints include several situations, such as "slow logistics distribution speed", "poor cold chain protection", and "poor quality of distribution personnel" (Gu, 2022). In addition, according to data from the China Chamber of Commerce in 2024, the monthly average customer churn rate in the fresh e-commerce industry reached 6.8%, an increase of 2.3 percentage points from 2019. The proportion of customer churn caused by delivery delays increased from

19% to 27%. These data indicate that the current number of loyal customers in the industry is low and there is a risk of continuous decline.

At the same time, when investigating the reasons why customers are not sure or will not continue to buy fresh food online, nearly 60% of customers expressed concerns about the quality of logistics services, or even have some problems. According to the attribution theory, when something produces positive or negative results, people will naturally look for the cause. Individuals will determine the cause of the event by processing the event information through thinking, perception, and inference (Zhang & Ding, 2023). To improve customer satisfaction with cold chain logistics of fresh food enterprises and reduce the comprehensive distribution cost composed of fixed cost, transportation cost, cargo damage cost, refrigeration cost, and time penalty cost, a multi-objective path optimization model of fresh agricultural products distribution considering client satisfaction is constructed by Chen (Chen et al., 2022).

Although online shopping of fresh food has achieved great development with the injection of capital, the overall satisfaction level of customers on service of fresh food logistic enterprises is not high (Gu, 2022). The survey on the overall satisfaction of Chinese online fresh food users to the fresh food logistic enterprises in 2017 showed that under the 10-point scoring rule, the customers with a satisfaction score of 7 accounted for 34.40%, which was the largest number of customers among all the scores. Customers with a satisfaction rating of 6 accounted for 24.20% (Giuffrida et al., 2019). According to the final statistics, the average satisfaction score of online shopping users on the fresh food logistic enterprises is 6.65, which is only a passing score. Compared with the satisfaction level of other online shopping platforms, the

overall satisfaction level of customers for online shopping fresh food logistic enterprises is low (Prajapati et al., 2023).

Fresh food logistic industry has brought a variety of benefits to enterprises and customers, but there are still many problems and deficiencies in the development of fresh food logistic industry in the face of which, many scholars also actively study logistics mode, logistics system, supply chain management strategy, logistics development status, strategy (Prajapati et al., 2020), as well as customer purchasing intention and decision-making behavior (Lin et al., 2018). In addition, part of the research is about improving technology levels to meet customer service needs from the perspective of fresh food logistics enterprises (Huang & Liu, 2014).

Hong et al. (2019) argues that practicality, communication, reliability, and responsiveness of logistics service delivery are important predictors of customer satisfaction. Huang (2019) believes that efficient delivery is the key factor affecting customer satisfaction and loyalty. According to Choi et al. (2019), the greatest impact on customer satisfaction, and also the greatest impact on re-purchases, is attributed to LSQ, or quality of delivery. Similarly, the significant impact of LSQ on customer satisfaction and loyalty is highlighted in the study of Grant and Philip (2020).

Fresh food, compared with ordinary industrial products, has higher repeat purchase rate, customer loyalty is more important both for the fresh food e-commerce and for logistic enterprises, and deep customer loyalty can bring a steady stream of customers to fresh food enterprises and profits. Therefore, it is of important value for fresh food enterprises and customers to establish a loyal relationship (Gu, 2022).

Based on the above research background, this study will build a theoretical model, conduct empirical analysis using the model, discuss the fresh food logistics service quality, customer satisfaction, customer trust, switching cost and customer loyalty. on the basis of the above research background, this study will take the fresh food logistic enterprises as the research object, construct a theoretical model from the perspective of logistic enterprises, and conduct empirical analysis using the model method to explore the relationship between logistics service quality, customer satisfaction, customer trust, switching cost and customer loyalty (Adebayo, 2017). Making fresh food logistic enterprises from the perspective of managers correctly understand their service level, for targeted to improve customer loyalty of the fresh food logistic enterprises provide theoretical basis and reference advice (Han et al., 2021).

1.2.3.2 Customer can easily switch service providers

Switching costs refers to the cost of moving from one logistics enterprise to another, including re-establishing an account, re-adding credit card information, searching and selecting products again, etc. Higher switching costs can help e-enterprises retain existing customers, reduce customer churn rates, and increase customer loyalty (Chen et al., 2019).

Currently, fresh food logistic enterprises are fiercely competitive, and many have recognized the importance of switching cost and have adopted various strategies to lower customer switching cost, such as:

(1) Streamlining the registration process: Many enterprises have taken measures to simplify the registration process, such as using social media accounts to

register, automatically filling in forms, etc., to reduce the difficulty and complexity of the registration process (Fu & Wang, 2021).

(2) Optimizing payment options: Many fresh food logistic enterprises offer multiple payment options, such as credit cards, debit cards, Alipay, WeChat, etc., to meet the payment needs of different customers (Chen et al., 2019).

(3) Providing free services: Many fresh food logistic enterprises offer free services, such as free shipping, free returns, etc., to improve customer satisfaction and loyalty.

(4) Using personalized marketing: Many fresh food logistic enterprises use personalized marketing, such as recommending products based on customer interests and preferences, to improve customer satisfaction and loyalty (Guo et al., 2021).

(5) Overall, fresh food logistics enterprises are increasingly focusing on the improvement of customer loyalty and adopting various measures to reduce customer switching costs.

1.3 Problem statement

Over the past decades, China's fresh food logistics industry has experienced rapid growth and transformation. A significant advancement in this sector has been the development of cold chain logistics technology, driven by customers' demands for fresh food availability anytime and anywhere (Díaz, 2017; Rayana, 2018). Despite the growth, the industry faces intense competition, with operators vying for customer loyalty amidst a backdrop of high churn rates and inactive subscribers.

It's crucial to investigate customer loyalty, starting with managers who provide a positive experience, as this can enhance customer satisfaction, trust, and loyalty (Kotler & Keller, 2012, 2016; Molinillo et al., 2022). The increase in customers has been met with a decline in loyalty due to the similarity of services, leading to a price war and greater customer switching between enterprises. Customers will switch if they find the current service unsatisfactory and the switching cost is low. This has resulted in tough market conditions and a negative impact on enterprises due to a stagnant number of loyal customers. The decline in loyalty can also lead to decreased market share, increased costs, and company losses (Hermawati, 2013; Latif et al., 2020).

To gain a competitive advantage and retain customer loyalty, an enterprise must maintain customer satisfaction and trust, then enhance the perceived positive switching cost to achieve higher customer loyalty. The customer experience is vital in service businesses, as it can create satisfaction, become a source of competitive advantage, and affect a customer's switching cost, thereby increasing loyalty (Fitzsimmons & Fitzsimmons, 2011; Fernandes & Solimun, 2018).

Low switching costs are evident from the frequent customer changes or divisions among service providers, resulting in low loyalty despite efforts to reach the market and profit from customers. Fresh food logistics enterprises aim to create obstacles that foster customer loyalty and discourage movement to other providers (Hartatik & Othman, 2010; Latif et al., 2020).

This study aims to determine if customer loyalty in fresh food logistics enterprises is triggered by logistics service quality. It considers factors influencing loyalty, such as user experience and belief, including feature function, signal

function, trust, price, peers/social, and service quality in complaint handling. Consistently meeting customer needs over time can build loyalty (Cerejo, 2012; Oodan et al., 2009; Molinillo et al., 2022). Customer satisfaction, mediated by the logistics service received, is affirmed to mediate the relationship between logistics service and customer loyalty (Astutik & Sulihyantoro, 2016; Apriyanti & Setyowati, 2021; Boohene & Agyapong, 2010; Deng et al., 2010; Setyaningsih, 2014; Sugesti, 2012; You et al., 2023).

Maintaining service quality is crucial for fresh food logistics enterprises. Customers are retained not just by service quality but also by creating high switching costs that trigger recognition and reluctance to switch providers. Switching cost is considered a moderator between logistics service quality and customer loyalty (Sugesti, 2012; Luo & Paulino, 2023).

The purpose of this study is threefold: to examine the effect of logistics service quality on customer loyalty, the mediation effect of customer satisfaction and trust on this relationship, and the moderation effect of switching cost on the relationship among logistics service quality, satisfaction, trust, and loyalty. Customer loyalty is reflected by loyalty to intention, action, and willingness to recommend.

China's fresh food logistics enterprises face low customer loyalty due to low logistics service quality. Based on previous research results, this study will focus on the influence of logistics service quality of fresh food logistics enterprises with customer satisfaction, customer trust, switching cost, and customer loyalty.

Firstly, previous studies on logistics service quality and customer satisfaction mainly focused on logistics enterprises and traditional enterprises, while fresh food logistics enterprises are rarely studied (Adebayo, 2017). This study will choose fresh

food logistics enterprises as the research object to provide theoretical and practical guidance (Gu, 2022).

Secondly, combined with the existing research results on logistics service quality and customer loyalty, the model of the impact of logistics service quality on customer satisfaction of fresh food logistics enterprises will be established (Li & Lu, 2019). At the same time, several measurement indicators will be selected to improve the model, making the measurement more comprehensive and accurate (Kaya & Aydin, 2019).

Thirdly, logistics service quality as an independent variable, customer satisfaction and customer trust as mediating variables, switching cost as moderating variable, and customer loyalty as dependent variable, will be introduced into fresh food logistics enterprise impact on customer loyalty model (Han et al., 2021). Therefore, based on previous research experience, questionnaire surveys, and expert opinions, this article ultimately determines logistics service quality indicators, which mainly include the following five dimensions: professionalism 、 reliability 、 immediacy 、 convenience 、 supportability. Each dimension is supported by three to ten indicators.

1.4 Research questions

Logistics service quality (LSQ) boosts customer loyalty via mediators: satisfaction and trust. High LSQ increases satisfaction, fostering trust, both of which transmit LSQ's effect to loyalty (retention, recommendation). Switching cost acts as a key moderator, strengthening the positive links between LSQ, satisfaction, trust,

and loyalty. High switching costs amplify loyalty derived from good service, satisfaction, and trust, reducing defection. Several questions are raised in this study:

1. What impact do logistics service quality factors have on customer loyalty?
2. What impact do logistics service quality factors have on customer satisfaction?
3. What impact do logistics service quality factors have on customer trust?
4. What is the relationship between customer satisfaction and customer loyalty?
5. What is the relationship between customer trust and customer loyalty?
6. What is the relationship between customer satisfaction and customer trust?
7. Can customer satisfaction serve as a mediating variable between logistics service quality and customer loyalty?
8. Can customer trust serve as a mediating variable between logistics service quality and customer loyalty?
9. Can customer satisfaction serve as a mediating variable between logistics service quality and customer trust?
10. Can switching costs regulate the relationship between logistics service quality, customer satisfaction, customer trust, and customer loyalty?

1.5 Research objectives

The primary objective of this study is to examine the effect of logistics service quality on customer loyalty with the mediating role of customer satisfaction and customer trust, with the moderating role of switching cost. Hence, the objectives of this study are stated below:

1. Identify the impact of logistics service quality factors on customer loyalty.
2. Identify the impact of logistics service quality factors on customer satisfaction.
3. Identify the impact of logistics service quality factors on customer trust.
4. Study the relationship between customer satisfaction and customer loyalty
5. Study the relationship between customer trust and customer loyalty?
6. Study the relationship between customer satisfaction and customer trust
7. Study the mediating role of customer satisfaction in the relationship between logistics service quality and customer loyalty?
8. Research on the mediating role of customer trust in the relationship between logistics service quality and customer loyalty?
9. Research on the mediating role of customer satisfaction in the relationship between logistics service quality and customer trust?
10. Study the moderating effect of switching costs on the relationship between logistics service quality, customer satisfaction, customer trust, and customer loyalty.

1.6 Significance of the study

This study contributes to the theoretical and managerial development in Indonesia cellular operators. The conceptualization of the theoretical framework discussed in chapter two not only looks at the impact of the user experience of products and services towards loyalty, but also investigates the role of satisfaction and switching barriers as mediators, along with the moderating role of corporate image of cellular operators in Indonesia.

Fresh food logistics as a new form of logistics industry, due to the rapid development momentum, more and more customers are getting into it. Its rapid growth brings about many problems in which logistics is the top one. Inevitably, however, the pressure of logistics industry competition has been increasing day by day. Facing the increasing number of similar enterprises and increasingly critical customer demand, how to improve customer satisfaction and customer loyalty has become a shackle that hinders the further development of most fresh food logistics enterprises (Nurdani & Sandhyaduhita, 2016).

Through consulting and summarizing the related literature, however, there are few studies focusing on the logistics service of fresh food, most of which are on the logistics operation mode (Akter & Wamba, 2016). It is found that there are many researches on customer satisfaction of e-commerce enterprises, but there are few researches on the influence of logistics service quality on customer satisfaction, and even fewer researches on the relationship between logistics service quality and customer satisfaction of fresh food logistics enterprises with customer satisfaction and trust as mediating variables (Siddh et al., 2017). It is innovative to study the logistics service of fresh food logistics from the perspective of managers (Chen et al., 2021). Through the selection and determination of impacted factors, the fresh food

logistics suppliers are finally evaluated, which can provide managerial suggestions for suppliers to improve corresponding logistics services.

With the strong support of the country, China's fresh food logistics enterprises are booming, but inevitably, the industry competition pressure is increasing. In the face of the increasing number of similar enterprises and increasing customer demand, how to improve customer satisfaction has become a hindrance to the further development of most fresh food logistics enterprises (Luo & Paulino, 2023). Based on related literature and summaries, research on the customer satisfaction and loyalty is abundant, but the influence of logistics service quality on customer satisfaction, trust, and loyalty is inadequate.

Furthermore, customer satisfaction and customer trust as mediating variables in the analysis of the relationship between fresh food logistics service quality and customer loyalty research are rare (Mangiaracina et al., 2015; Luo & Paulino, 2023). Therefore, based on the two mediating variables of customer satisfaction and customer trust, and a moderating variable of switching cost, a questionnaire will be designed to collect and analyze the data, to analyze the influence of logistics service quality on customer loyalty of fresh food logistics enterprises.

1.6.1 Theoretical significance

The research on fresh food logistics mainly focuses on the macro level of supply chain, operation mode, cold chain logistics, problems, and status quo, and the research on the service quality of fresh food logistics in this subdivision field considering the needs of customers remains to be in-depth (Ayodeji et al., 2023).