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Customer satisfaction through service quality dimensions: A study on perishable products purchased through online mobile apps in Klang Valley, Malaysia

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CITATION

Hoo WC, Madhavedi S, Pandey RK, et al. (2024). Customer satisfaction through service quality dimensions: A study on perishable products purchased through online mobile apps in Klang Valley, Malaysia. *Journal of Infrastructure, Policy and Development*. 8(15): 8791. <https://doi.org/10.24294/jipd8791>

ARTICLE INFO

Received: 26 August 2024

Accepted: 30 August 2024

Available online: 16 December 2024

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Abstract: Purpose: This study aims to identify the primary determinants of consumer behavior influencing customer satisfaction in the context of online mobile application (App) purchases of perishable products. Utilizing the well-established SERVQUAL (Service Quality) model, which has been extensively studied in various service-oriented settings, the research seeks to determine the factors with the greatest impact on customer satisfaction during online transactions of perishable products. **Design:** The investigation focuses on analyzing the five core dimensions of the SERVQUAL model: tangibles, reliability, responsiveness, assurance, and empathy. The study employs a survey methodology administered through Google Forms, targeting the population residing in the Klang Valley of Malaysia. A total of 400 samples were successfully collected using a snowball sampling technique. **Methodology:** The study employs the SERVQUAL model as the theoretical framework to examine the dimensions of tangibles, reliability, responsiveness, assurance, and empathy. The survey, conducted through Google Forms, targeted the population in the Klang Valley of Malaysia, with a sample size of 400 collected through snowball sampling. **Findings:** The study's outcomes reveal the robust predictive capability of the overarching SERVQUAL model in the realm of online perishable product procurement. Notably, the assurance dimension emerges as the most influential factor, emphasizing its pivotal role in shaping and defining customer satisfaction for online retailers of perishable goods in the Malaysian market. **Novelty:** This research contributes to the understanding of consumer behavior in online perishable product purchases, by identifying determinants of consumer behavior; the study promotes sustainable production and responsible consumption within the perishable products category, offering insights beneficial for online retailers in the Malaysian market. This study aligns with United Nations sustainable development goals especially industry innovation, food security and responsible consumption.

Keywords: SERVQUAL; sustainable consumption; consumer behaviour; customer satisfaction; e-commerce; perishable products

1. Introduction

The high rate of agricultural product damage or spoiling during the production process or shipping can have a detrimental impact on the reliability of businesses (Kamaruzaman and Omar, 2020). Entrepreneurs have faced the distressing situation of discovering their goods severely damaged and discarded in trash bins during visits

to the delivery service company. These incidents become significant sources of customer dissatisfaction, arising from late or non-arrival of products, order inaccuracies, or the receipt of damaged goods (Gajewska et al., 2020). Such instances not only lead to direct financial losses but also erode customer satisfaction, and loyalty. To maintain a positive reputation and ensure customer satisfaction, businesses must address these issues proactively by implementing robust quality control measures, reliable shipping methods, and efficient customer support to resolve any arising problems swiftly.

Besides most corporate organizations are unaware of how customer satisfaction is impacted by after-sales service aspects. Failure to recognize the significance of those elements has an impact on company relations and causes consumer unhappiness (Shokoohyar et al., 2020). Ngaliman et al. (2019) asserts that attentiveness, however, directly harms customers. They will still respond negatively and continue looking for other sources of information in order to be satisfied, regardless of how willing the staff is to assist them, how quickly and appropriately they can be served, or how well and clearly they provide information.

Finally, a research claims that Malaysian online shoppers still lack trust and confidence in using the Internet as a buying channel (Chua et al., 2017). Customers seek empathy from salespeople in the neighborhood of 50%, and 54% prefer to do business with organizations that put diversity, equity, and inclusion first. The organization must understand how to make the service in order to please the clients, and empathy is a form of service that can be seen in an employee's attitude and action (Yeo et al., 2023). However, analysis of personality characteristics in the Internet age revealed reductions in some personality qualities, including empathy.

The study primarily targets customers who are knowledgeable and experienced in placing purchase orders for perishable products, encompassing items such as meats, milk, aquatic produce, and both processed and unprocessed goods. This study aimed to investigate the impact of SERVQUAL dimensions specifically; reliability, responsiveness, tangibles, assurance, and empathy on consumer satisfaction within the context of online mobile App based shopping for perishable goods in Klang Valley, Malaysia. The research adds to the current knowledge in the areas of consumer behavior, e-commerce, and the assessment of service quality. It provides insights into the specific context of online perishables purchasing, customer buying habits which is a relatively understudied area. The study provides valuable insights into customer satisfaction with online perishable purchasing in the Klang Valley. By understanding the specific dimensions of service quality that significantly impact satisfaction, businesses can identify areas for improvement and tailor their strategies to better meet consumer expectations. Previous studies in other industries revealed that implementing the SERVQUAL model can give a competitive edge, attracting and retaining customers, leading to increased profitability. Additionally, this research can help optimize operational processes, reducing costs and enhancing efficiency. For academia, it contributes to knowledge and methodology, while for industry; it provides practical guidance for success in the online perishable goods market.

This study contributes to sustainable development in several ways by addressing the challenges related to the online purchase of perishable goods, the study aims to reduce the high rate of agricultural, marine products and processed

food damage during the distribution process. This research in turn, can contribute to the reduction of food waste, aligning with sustainable development goals. The research recommends implementing quality control measures and efficient customer support to address issues related to online perishable product purchases. Optimization of operational processes not only reduces costs for businesses but also contributes to a more sustainable and efficient supply chain. By understanding and addressing the dimensions of service quality, as outlined by the SERVQUAL model, can lead to improved customer satisfaction. Satisfied customers are more likely to be loyal to a brand, reducing the need for constant acquisition of new customers. This contributes to the sustainability of businesses in the long run.

The research provides valuable insights for businesses operating in the online perishable goods market. Understanding the specific dimensions of service quality that significantly impact satisfaction enables businesses to tailor their strategies, implement improvements, and align with sustainable practices. This can contribute to the overall sustainability of the industry. The study adds to the current knowledge in the areas of consumer behavior, e-commerce, and the assessment of service quality. Academic contributions are essential for the continuous improvement of theories and methodologies, fostering a deeper understanding of sustainable practices in various fields.

2. Literature review

The basic SERVQUAL model, introduced by Parasuraman, Zeithaml, and Berry, was first published in 1985, and the model was later revised in 1988. The SERVQUAL model, with its five dimensions (tangibles, reliability, responsiveness, assurance, and empathy), has become widely accepted and used in various industries to measure and improve service quality. While there are indeed other scales and models available for assessing service quality, the choice of using SERVQUAL often depends on factors such as its widespread recognition, extensive application in research, and the comprehensive nature of its dimensions. The SERVQUAL model for its well-established reputation, comparability across studies, and the ability to draw on a substantial body of literature that utilizes this specific framework. However, it's essential to justify their choice of measurement tool in the context of the study and to consider alternative scales if they better suit the research objectives or if there are advancements in the field that warrant their use. Xu et al. (2024) investigate past and present research trends in the field of energy transition and green finance as well as project possible future domains using bibliometric analysis.

An exhaustive literature review has been undertaken across three main areas: customer satisfaction, dimensions of service quality, and existing literature on Malaysian online purchasing. The findings are systematically presented under the following categories for clarity and convenience.

Customer Satisfaction: Customer satisfaction is the customer's evaluation of a good or services in terms of whether the good or services has met their needs and expectation (Lamb et al., 2012; Paul et al., 2014). Customer satisfaction is assessed by looking at expectations and experience, and the consumer is satisfied when the delivery meets or exceeds their criteria, according to Vasic et al. (2019). When it

comes to managing a successful business, customer satisfaction is always a crucial measure to monitor (Nguyen et al., 2020). Satisfaction is also viewed as contentment, pleasure and delight in connection with the fulfillment of expectations derived from a product or service. Customer satisfaction would occur if the services delivered are better than anticipated, and customer disappointment will occur if the service is expected to be less than the customer.

Understanding customer satisfaction from a global perspective is essential in the context of today's interconnected and highly competitive business environment. Several studies and journals have provided insights into the factors that influence customer satisfaction on a global scale. A study by Aris et al. (2020) demonstrated that customer trust in e-commerce platforms is closely linked to brand reputation and plays a pivotal role in determining satisfaction levels. This highlights the significance of building and maintaining trust in the Malaysian online market. Furthermore, a study grounded in Zygiaris et al. (2022) investigated how customer service quality affects customer satisfaction in the realm of online shopping. The findings underscored the substantial influence of factors such as responsiveness, reliability, empathy, and assurance in customer service on overall customer satisfaction. Emphasizing the significance of delivering exceptional customer service emerged as a key take away from the research, emphasizing its pivotal role in elevating customer satisfaction within the context of online shopping. Recognizing and addressing these elements becomes imperative for businesses seeking to cultivate heightened levels of customer satisfaction, thereby fostering customer loyalty and long-term success in the dynamic and diverse online market. Iridianathan et al. (2022) found that intrinsic and extrinsic components do impacting employee satisfaction.

Providing high-quality services has become essential for success in the fiercely competitive business world of today. Customer satisfaction, loyalty, and retention can all be significantly impacted by a company's service quality. As a result, many firms now place a high focus on monitoring and enhancing the quality of their services. The SERVQUAL model functions as a valuable instrument for assessing the congruence between customers' perceptions about service quality and the actual service they experience. Initially proposed by Parasuraman et al. (1985), this model has gained extensive usage across diverse industries for the evaluation and improvement of service quality.

Tangibles, in the framework of the SERVQUAL model, represent one of the five dimensions utilized to gauge service quality. This dimension focuses on the physical appearance of facilities, equipment, personnel, and communication materials. These dimensions serve as benchmarks for assessing the quality of services offered by organizations, especially within the service industry. "Tangibles" specifically target the tangible and physical aspects and cues that customers encounter when engaging with a service provider. This encompasses the physical facilities, tools or equipment employed in service delivery and the appearance of staff members—elements collectively classified as tangibles (Parasuraman et al., 1988).

As per Yeo et al. (2023), the adverse impacts of COVID-19 on various facets of the socio-economic system prompted a transformation in the retail industry's

approach, moving away from conventional shopping methods toward online avenues. Consequently, tangible attributes such as responsiveness, assurance, and empathy exerted a substantial and positive influence on customer satisfaction in the context of online purchases. The findings of this study have significance for online business owners who want to enhance their offerings and eventually increase consumer happiness. In addition, ease of use, virtual tours, and visualization are among tangible e-service quality, as outlined by Moon et al. (2020), additional dimensions of intangible e-service excellence include information content, dependability, security, and personalization. The findings underscore the significant interplay between tangible and intangible e-service quality, emphasizing the crucial role of e-service quality in elevating client satisfaction and fostering loyalty.

Reliability, from the words of Parasuraman et al. (1988), is the capacity to deliver accurate service on schedule and at the same degree of performance each time. It involves fulfilling promises, providing services as expected, and maintaining a high level of accuracy and consistency. Reliability extends to the delivery process. Customers expect their purchases to arrive within the specified time frame. Additionally, Liang and Zhang (2023) are investigated the relationship between customer loyalty and service quality in the fresh food e-commerce sector within the context of new retail dynamics. Their findings suggest a positive impact of reliability on customer satisfaction in fresh food e-commerce. A study by Mayasari and Simanjuntak (2022) is aim to understand how the quality of e-commerce services influences both customer satisfaction and loyalty. Their research reveals that e-customer satisfaction is integral to e-customer loyalty, with the e-commerce service quality variable, encompassing responsiveness, dependability/reliability, user-friendliness, personalization, and efficiency, significantly influencing e-customer satisfaction. Recognizing the importance of accessible and responsive customer support, reputable online retailers strive to address customer issues promptly and effectively. Aladwani (2021) study focuses on the role of customer support in enhancing reliability and customer satisfaction in the realm of online shopping.

Responsiveness, According to Parasuraman et al. (1988), responsiveness pertains to the willingness of an organization's staff members to promptly serve customers. It involves being attentive to customer needs, providing quick service, and showing a willingness to help. Responsiveness is essential for addressing customer inquiries, solving problems, and adapting to changing customer requirements. The study conducted by Liang and Zhang (2023) sheds light on a crucial and evolving aspect of the retail industry, particularly within the realm of fresh food e-commerce. Madhavedi (2010), conducted a study on fresh produce supply chains, revealing that customer satisfaction is heightened when firms selling perishable products respond promptly to customer needs. As technology and consumer preferences undergo continuous changes, the boundaries between online and offline channels are becoming increasingly blurred. In this dynamic landscape, the perishable and time-sensitive nature of fresh food products underscores the importance of service quality, encompassing tangibility, reliability, responsiveness, assurance, and empathy. The research findings indicate a positive impact of responsiveness on consumer satisfaction.

Furthermore, the study by Mayasari and Simanjuntak (2022), which explores the correlation between e-commerce service quality and e-customer satisfaction and loyalty, emphasizes a positive and noteworthy relationship between responsiveness and e-customer satisfaction. Specifically, the research reveals that Shopee's services, characterized by their swift resolution of issues and prompt responses to customer concerns, directly influence customer satisfaction. This impact is evident in Shopee's effective meeting of customer expectations, ultimately leading to an overall increase in customer satisfaction. Essentially, the research underscores those higher levels of responsiveness exhibited by Shoppe's services result in a greater enhancement of customer satisfaction. These findings align with research by Xin et al. (2023), which similarly demonstrated a positive influence of responsiveness on customer satisfaction. Therefore, this study contributes to a growing body of evidence emphasizing the critical role of responsiveness in shaping customer perceptions and overall satisfaction.

Assurance encompasses services personnel's expertise, professionalism, and the ability to instill trust and confidence (Parasuraman et al., 1988). It involves employees understanding the importance of demonstrating courtesy, showcasing their capabilities, and fostering confidence and trust in customers, ultimately enhancing customer satisfaction and trust in the company (Yeo et al., 2023). In the SERVQUAL model adapted to the context of online purchasing, "Assurance" is a critical dimension used to assess service quality. It revolves around the trustworthiness, competence, and credibility conveyed by e-commerce platforms and online retailers. Assurance begins with the assurance of website security and privacy. Customers need to trust that their personal and financial information is handled securely. Research by Hair et al. (2019) emphasizes the importance of secure online transactions in building customer confidence. Customers have able access to support representatives who can assist them effectively.

As per Yeo et al. (2023) research, the adverse effects of COVID-19 on the overall socio-economic landscape have led to a significant shift in the retail industry, moving away from traditional shopping methods toward online platforms. Yeo contends that assurance plays a substantial and positive role in enhancing the satisfaction of online shoppers. Additionally, Hui et al. (2023) intend to investigate the impact of elements such as cost, dependability, responsiveness, certainty, and empathy on customers' satisfaction with e-commerce delivery services. According to their research, assurance has a favorable influence on customers' satisfaction with the delivery services of e-commerce. In a study conducted by Dhingra et al. (2020), the objective is to examine how the service quality of e-commerce websites affects customer satisfaction. The findings reveal that among the various aspects of e-service quality, assurance is the only factor that significantly influences consumer satisfaction and purchase intention.

Empathy extends to customer support that is empathetic and responsive to customers' concerns and inquiries. It involves showing care, concern, and a personalized approach to customer interactions. Empathy contributes to a positive emotional connection between the service provider and the customer. Ku and Li (2018) discussed the impact of personalized recommendations on enhancing the online shopping experience. Research by Kim et al. (2019) examines the influence of

empathetic customer support on customer satisfaction and loyalty. Liang and Zhang (2023) are conducted a study on the relationship between customer loyalty and service quality in the realm of fresh food e-commerce, set against the backdrop of the new retail landscape. The findings reveal that empathy quality positively influences customer satisfaction in the context of fresh food e-commerce. The results from the study by Nguyen et al. (2023), examining the impact of five dimensions of logistics service quality on customer satisfaction for fresh food e-commerce in three provinces of Southern Vietnam, indicate that personnel contact quality, delivery quality, and empathy quality significantly affect customer satisfaction. In addition, Hui et al. (2023) have investigated the influence of various variables on customer satisfaction with e-commerce delivery services, including pricing, reliability, responsiveness, assurance, and empathy. According to their findings, each of these factors—price, dependability, assurance, and empathy—positively contributes to the satisfaction of customers with e-commerce delivery services.

SERVQUAL Model, has five dimensions, according to Parasuraman et al. (1988): tangibles, which are outside elements, such as physical facilities, equipment, and employee appearance; reliability, which is the fulfillment of a promise to the customer; responsiveness, which is the attitude of service provider who provide immediate service to the customer; assurance, which is the customer's trust and faith in ability, qualification, and competence. The service quality model "SERVQUAL" ranks as the most significant of service quality models and one of the most widely used models to measure quality in service sectors due to its comprehensiveness and practical application (Kim and Lee, 2017).

According to Mitropoulou and Tsoufas (2021), the widely accepted tool for assessing service quality is SERVQUAL. This paradigm holds significant sway in various industries, such as banking, telecommunications, healthcare, hotels, education, logistics, and e-commerce. The application of the SERVQUAL framework has been a focal point in numerous previous studies. For instance, Jaiswal and Kant (2017) investigated the impact of perceived service quality factors on customer satisfaction within the public sector banks of India. In Greece, Peitzika et al. (2020) conducted a study primarily focused on the service quality expectations of gym patrons, utilizing the five dimensions of the SERVQUAL scale to gauge service quality levels. Moreover, Peitzika et al. (2020) uncovered a discrepancy between customer happiness and perceived service quality.

Predicting customer satisfaction in the realm of perishable products, particularly within the domain of online app-based purchases, is an intricate and multifaceted challenge. The inherent complexities stem from the nature of perishable goods, which often rely on visual cues for quality assessment. Online distribution platforms may struggle to effectively convey these nuances, leaving customers uncertain about the freshness and condition of the products upon delivery. In this dynamic environment, continuous improvement and a steadfast commitment to a customer-centric approach are paramount for success in online sales of perishable products.

In light of these challenges, there is a significant need to study customer satisfaction concerning purchases of perishable products through an Online Mobile app, utilizing service quality dimensions. Understanding customer satisfaction in this context is crucial for firms and their delivery service partners. It allows them to

identify the intrinsic aspects that should be considered in the specific marketing of perishables through online platforms. By exploring service quality dimensions, businesses can enhance the overall customer experience, address potential pain points, and build a more effective and customer-centric marketing strategy for perishable goods in the online domain.

Conceptual Framework: Figure 1 represents the conceptual frameworks for the influencers of customer satisfaction in online mobile application based purchasing of perishable products, in Klang valley, Malaysia.

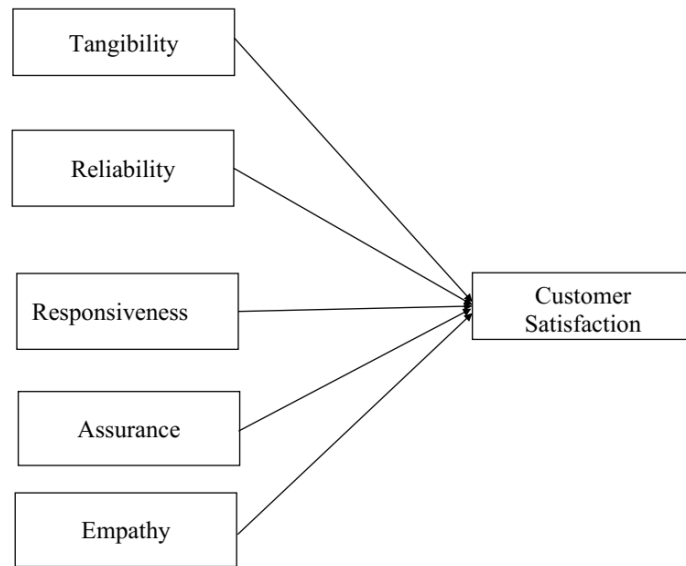


Figure 1. Conceptual framework.

Hypotheses: From the conceptual framework, the following hypotheses are formulated to establish the relationship between the customer satisfactions and dimensions of service quality.

- 1) Tangibles elements significantly and positively predict customer satisfaction towards online mobile application based purchasing of perishable products.
- 2) Reliability significantly and positively predicts customer satisfaction towards online mobile application based purchasing of perishable products.
- 3) Responsiveness significantly and positively predicts customer satisfaction towards online mobile application based purchasing of perishable products.
- 4) Assurance significantly and positively predicts customer satisfaction towards online mobile application based purchasing of perishable products.
- 5) Empathy significantly and positively predicts customer satisfaction towards online mobile application based purchasing of perishable products.
- 6) All dimensions of the SERVQUAL model are significant predictors of customer satisfaction towards online mobile application based purchasing of perishable products.

Customer satisfaction has been the subject of extensive research across diverse domains. Nevertheless, the complex factors that underlie customer satisfaction continue to captivate researchers who aim to unravel their intricate dynamics. This research initiative is motivated by a serious need, especially within the context of

online purchasing of perishable products, to explore the dimension of customer satisfaction, an area that has received comparatively less attention. Furthermore, the application of the SERVQUAL model proves to be a valuable tool in uncovering gaps within all five dimensions, providing a robust framework for predicting and enhancing customer satisfaction in this specific domain.

3. Research methodology

The study focuses on the online purchasing behavior of Klang Valley internet purchasers, a region with a population of 8 million people known for rapid growth and urbanization. The study aims to understand online shopping behavior in this urban setting and address logistical challenges related to perishable product deliveries. The research was conducted in 11 cities within Klang Valley, including Kuala Lumpur, Shah Alam, Subang Jaya, and others. The choice of this location is due to its high population density, urbanization, and well-developed logistics infrastructure.

The sampling design involved selecting a representative sample from the target population due to the impracticality of surveying the entire population. A quantitative approach, particularly correlation analysis, was employed to analyze data collected through online questionnaires. The sample size was determined to be 400 respondents to estimate population percentages with a confidence level of 95 percent based on Yamane (1967) formula. The snowball sampling was selected due to no sampling frame available for this study. A self-administered questionnaire was used to gather data, which was then analyzed using IBM SPSS Statistics Version 29.0. The questionnaire was structured into three main parts to collect comprehensive data on various aspects of online perishable product purchasing in Klang Valley. Please refer to Appendix for the sources of the questionnaire. Data was collected from the public during the quarter three of 2023.

The study utilizes both correlation analysis and multiple linear regression analysis to understand relationships between variables and make predictions. Simple linear regression is used to estimate scores on one variable using another, while multiple linear regression examines how multiple independent variables influence a dependent variable, accounting for interactions between predictors. These analytical techniques help researchers gain insights and draw meaningful conclusions from the data.

4. Results and discussion

The data analysis begins with the examination of the reliability and validity of the instrument employed in the study. According to Zikmund et al. (2010) a high factor loading indicates that the factor has enough variation from the variable, and the rule of thumb for each item is more than 0.6. The reliability test done on the preliminary testing results are all shown in **Table 1**, the Cronbach's alpha for both the dependent and independent variables are between 0.807 and 0.871 which are within the rule of thumb. Hence the questionnaires show adequate internal consistencies which are deemed appropriate for the research as showed in **Table 1**.

Table 1. Outcome of reliability analysis.

Variable	Cronbach's Alpha	N of Item	Reliability Level
Tangibles (X1) (Independent Variable)	0.862	8	Good
Reliability (X2) (Independent Variable)	0.865	8	Good
Responsiveness (X3) (Independent Variable)	0.853	8	Good
Assurance (X4) (Independent Variable)	0.858	8	Good
Empathy (X5) (Independent Variable)	0.871	8	Good
Customer Satisfaction (Y) (Dependent Variable)	0.807	5	Good

4.1. Descriptive analysis

The age group that recorded the highest number of respondents was 30 to 39 years old, which accounted for 47% with the sample size ($n = 400$). The statistical analysis revealed that the mean age was 35 years, with both the median and mode also being 35. The standard deviation for this age group was calculated to be 6.117, and the variance was found to be 37.422. These statistics provide valuable insights into the age distribution of the survey respondents and the central tendencies within the age group. Among the survey participants, 205 individuals, accounting for 51.2% of the sample size ($n = 400$), identified as male, while 195 individuals, comprising 48.8% of the sample size ($n = 400$), identified as female. Among the participants, the majority identified as Malay, with 267 individuals, constituting a substantial 66.8% of the total sample size of 400 respondents. The Chinese ethnic group was the second most prominent, with 97 individuals, making up 24.3% of the sample. Additionally, the Indian ethnic group was represented by 36 respondents, comprising 9% of the overall sample.

The education levels of the respondents exhibit a diverse range of qualifications and accomplishments. Among the participants, the highest number held a bachelor's degree or its equivalent, with 152 individuals, constituting a significant 38% of the total sample size of 400 respondents. Following closely were those with master's degrees or equivalent qualifications, with 118 respondents, making up 29.5% of the sample. Additionally, 59 individuals, comprising 14.8% of the sample, possessed a Doctorate degree or its equivalent, reflecting a notable academic achievement. Furthermore, 57 respondents, or 14.2% of the sample, held a Diploma or technical school certificate, signifying their specialized training and expertise. Finally, 14 individuals, amounting to 3.5% of the sample size, possessed a Secondary school certificate, representing a diverse educational background within the study population.

A significant majority, comprising 54.3% of the sample size ($n = 400$), reported a monthly income of RM3000 or below. In contrast, a smaller yet notable group of 6 respondents, comprising 1.5% of the sample, reported monthly incomes of RM12001. The area distribution of respondents in the survey illustrates a diverse representation across various areas. Among the surveyed individuals, a notable

10.5% (42 respondents) hailed from Kuala Lumpur, the capital city of Malaysia. Other urban areas, such as Ampang Jaya, were also well-represented, with 52 respondents making up 13% of the sample. Furthermore, Kajang, Bandar Baru Bangi, and Rawang each accounted for 9.8% of the sample (39 respondents each). Shah Alam and Selayang constituted 9% and 8.5% of the sample, respectively, with 36 and 34 respondents each. Lastly, Subang Jaya, Klang, Petaling, and Semenyih also contributed to the survey, with varying proportions, adding to the geographic diversity of the study.

4.2. Online purchase habits

The survey also delved into the online purchasing habits of respondents concerning perishable products, shedding light on their frequency of such transactions. Notably, a substantial 37.0% (148 respondents) reported making online purchases of perishable products at least once a month. This suggests a significant portion of respondents who engage in periodic online shopping for items with a limited shelf life. Furthermore, 31.8% (127 respondents) indicated that they make these purchases at least once a week, demonstrating a consistent online shopping pattern for perishable items. Similarly, 31.3% (125 individuals) reported doing so at least 2–3 times per week, underscoring a considerable number of respondents who engage in frequent online shopping for perishables.

The survey probed into the amount of time respondents allocate to online purchasing of perishable products each month, providing insights into their shopping habits. Remarkably, the largest group, comprising 25.0% of the sample, reported spending between 5 and 10 h per month on such online purchases. Consumers value the ease of browsing and buying from home, comparing prices, exploring a wide range of options, and accessing detailed product information which causes this group of consumer indicates a substantial portion of respondents who dedicate a significant amount of time to shopping for perishable items through online platforms.

The survey indicates that the preferred payment modes for online purchases of perishable products among respondents vary, but online banking or e-payments emerged as the most favored choice, with 35.5% of the sample opting for this method. This preference likely reflects the convenience and security of digital transactions. Debit cards are the next most popular choice, selected by 26.8% of the respondents, highlighting the convenience of making payments directly from a bank account. Credit cards are also commonly used, with 19.3% of respondents choosing this option, indicating a willingness to leverage credit for online shopping. Cash on delivery, selected by 18.5% of the sample, represents a significant minority who prefer to pay in cash upon delivery, possibly due to trust and familiarity with this payment method.

The reasons for online purchasing of perishable products encompass a diverse range of factors. Foremost among these considerations is the desire to avoid long queues, with 19.5% of the sample (78 respondents) valuing the convenience of sidestepping physical store lines by opting for online shopping. This preference underscores the time-saving aspect of e-commerce, which is also highlighted by the 16.5% of respondents (66 individuals) who aim to save time through online

purchases. Convenience and Low Price/Discounts tie for the next most important factors, each selected by 17.5% of respondents (70 individuals). This suggests that a substantial portion of those surveyed appreciates both the ease of online shopping and the potential cost savings it offers. Furthermore, product variety and the ability to access a wide range of perishable items online were important to 16.5% of the sample (66 respondents). This showcases the appeal of diverse choices and availability in the digital marketplace. Finally, easy ordering was the preference of 12.5% of the sample (50 respondents), highlighting the significance of a straightforward and user-friendly online shopping experience.

4.3. Hypothesis testing

The aim of this study is to examine whether the SERVQUAL components have an impact on customer satisfaction when buying perishable products online. We explored the SERVQUAL dimensions encompassing tangibles, reliability, responsiveness, assurance, and empathy to measure their correlation with customer satisfaction in the context of online purchasing perishable products. The research hypotheses encompass a total of six propositions that align with our research queries and objectives. A comprehensive overview of the outcomes for each hypothesis has been compiled and is presented. In the subsequent sections, a thorough discussion of these findings will be undertaken, substantiated by pertinent literature and empirical evidence.

H1: Tangibles elements significantly and positively predict customer satisfaction towards online mobile application based purchasing of perishable products.

In this hypothesis, it is suggested that tangibles have a positive and significant impact on customer satisfaction within the context of online purchases of perishable products. The statistical results from the research substantiate this hypothesis, revealing a positive correlation between tangibles and customer satisfaction. This is evident in a standardized coefficient of 0.791 and a statistically significant p -value of 0.000.

Yeo et al. (2023) research supports the hypothesis that tangibles exert a positive and significant influence on customer satisfaction in the realm of online purchases for perishable products. Their study emphasizes how the impact of COVID-19 on the socio-economic system has steered the retail industry toward online shopping, highlighting the crucial role of tangible qualities, such as receptivity, assurance, and empathy, in enhancing customer satisfaction in online transactions. Furthermore, Moon (2017) research underscores the importance of tangible e-service quality factors like ease of use, virtual tours, and visualization. Collectively, these findings underscore the crucial relationship between tangible e-service quality and customer contentment, reinforcing the significance of tangible qualities in the online purchase of perishable products.

H2: Reliability significantly and positively predicts customer satisfaction towards online mobile application based purchasing of perishable products.

In this hypothesis, it is asserted that reliability plays a positive and significant role in predicting customer satisfaction within the context of online purchases of

perishable products. The statistical results from the study substantiate this hypothesis, revealing a positive correlation between reliability and customer satisfaction. This is evident in a standardized coefficient of 0.827 and a statistically significant p -value of 0.000.

Various studies provide support for the hypothesis that reliability has a positive and significant impact on customer satisfaction in the realm of online purchases for perishable products. Luo et al. (2019) research emphasized the critical role of reliability in online purchases and its connection to customer loyalty. Liang and Zhang (2023) found that reliability in fresh food e-commerce positively influences customer contentment. Mayasari and Simanjuntak (2022) study explored how e-commerce service quality, including dependability (reliability), affects customer satisfaction and loyalty. Aladwani (2021) examined the role of customer support in enhancing reliability and customer satisfaction in online purchases. These combined findings affirm the importance of reliability in augmenting customer satisfaction in the online purchase of perishable products.

H3: Responsiveness significantly and positively predicts customer satisfaction towards online mobile application based purchasing of perishable products.

In this hypothesis, it is postulated that responsiveness possesses a positive and significant capability to predict customer satisfaction in the context of online purchasing of perishable products. The study's statistical results regarding customer satisfaction and responsiveness were found to be positive, characterized by a standardized coefficient of 0.798 and a statistically significant p -value of 0.000. The hypothesis that responsiveness positively and significantly influences customer satisfaction in the context of online purchasing of perishable products is strongly supported by various research studies.

A study by Liang and Zhang (2023), focusing on fresh food e-commerce, highlights the importance of responsiveness in enhancing consumer satisfaction. It acknowledges that in the evolving landscape of online and offline retail channels, responsiveness plays a crucial role in meeting customer expectations and positively impacting satisfaction. Secondly, Mayasari and Simanjuntak (2022) research on e-commerce service quality and e-customer satisfaction demonstrates a clear and positive relationship between responsiveness and e-customer satisfaction. Their findings emphasize that businesses, such as Shopee, which prioritize prompt issue resolution and quick responses to customer concerns, achieve higher levels of customer satisfaction. This aligns with the research conducted by Xin et al. (2023), which also shows a positive influence of responsiveness on customer satisfaction.

H4: Assurance significantly and positively predicts customer satisfaction towards online mobile application based purchasing of perishable products.

In this hypothesis, it is suggested that responsiveness holds a positive and significant predictive capacity for customer satisfaction in the context of online purchases of perishable products. The study's statistical findings concerning customer satisfaction and responsiveness are affirmative, evidenced by a standardized coefficient of 0.798 and a statistically significant p -value of 0.000. The proposition that responsiveness positively and significantly impacts customer satisfaction in the context of online purchases of perishable products is robustly supported by several research studies. Initially, the investigation by Liang and Zhang

(2023), concentrating on fresh food e-commerce, underscores the crucial role of responsiveness in enhancing consumer satisfaction. It recognizes that within the evolving landscape of online and offline retail channels, responsiveness plays a pivotal role in meeting customer expectations and positively influencing satisfaction. Additionally, the research conducted by Mayasari and Simanjuntak (2022) on e-commerce service quality and e-customer satisfaction reveals a distinct and positive correlation between responsiveness and e-customer satisfaction. Their findings underscore that businesses, such as Shoppe, which prioritize prompt issue resolution and swift responses to customer concerns, attain higher levels of customer satisfaction. This aligns with the research by Xin et al. (2023), which similarly demonstrates a positive impact of responsiveness on customer satisfaction.

H5: Empathy significantly and positively predicts customer satisfaction towards online mobile application based purchasing of perishable products.

In this hypothesis, it is postulated that empathy positively and significantly influences customer satisfaction in the context of online purchasing of perishable products. The study’s statistical findings regarding customer satisfaction and empathy were found to be positive, with a standardized coefficient of 0.810 and a statistically significant *p*-value of 0.000. The hypothesis that empathy positively and significantly influences customer satisfaction in the context of online purchasing of perishable products is supported by various research studies. For example, the study conducted by Nguyen et al. (2023), which focused on the logistics service quality in fresh food e-commerce, found that empathy quality significantly impacted customer satisfaction. Their research, conducted in Southern Vietnam, highlighted the importance of empathy in shaping customer perceptions and satisfaction in the context of e-commerce. Furthermore, the upcoming study by Huat et al. (2023), which plans to investigate variables affecting customer satisfaction with e-commerce delivery services, includes empathy as one of the factors under consideration. According to their preliminary findings, empathy plays a positive role in enhancing customer satisfaction with e-commerce delivery services.

H6: All dimensions of the SERVQUAL model are significant predictors of customer satisfaction towards online mobile application based purchasing of perishable products.

5. Results and discussions

Pearson Correlation is used to evaluate the degree of the relationship between independent variables (IV) separately on dependent variable (DV). The value of coefficient of +1 and -1 represent the positive and negative linear relationships between the independent and dependent variables. **Table 2** represented the calculation of Pearson correlation coefficient analysis during this study.

Table 2. Outcome of pearson correlation coefficient analysis.

		Tangible	Reliability	Responsiveness	Assurance	Empathy	Customer Satisfaction
Customer Satisfaction	Pearson Correlation	0.791*	0.827*	0.798*	0.845*	0.810*	1
	Sig.	0.000*	0.000*	0.000*	0.000*	0.000*	
	N	400	400	400	400	400	400

Note: * Correlation is significant at the $p \leq 0.001$.

According to **Table 2**, it is shown that the correlation coefficient among dependent variable and five independent variables. According to the Schober et al. (2018), the size of correlation coefficient (± 0.70 to ± 0.8) has Strong positive/negative correlation. The Pearson correlation that has the strongest correlation with customer satisfaction is the Assurance dimension with a value of 0.845. The rest of the SERVQUAL dimensions are between the value of 0.798 to 0.827 which indicates that they have strong and positive correlations with customer satisfaction (DV). In conclusion, the correlation between customer satisfaction with all the independent variables shows the similar relationship of strong positive correlation.

The results of hypotheses are provided in **Table 3**, it is evident that all the research hypotheses tested have been accepted. This means that the variables under investigation, namely tangibles, reliability, responsiveness, empathy, and assurance, were found to be positively related separately with the customer satisfaction. These results affirm the importance of these factors in influencing and contributing to the overall satisfaction of customers.

Table 3. Results of hypotheses testing.

Hypotheses	Status
H1: Tangibles elements significantly and positively predict customer satisfaction towards online mobile application based purchasing of perishable products.	Accepted
H2: Reliability significantly and positively predicts customer satisfaction towards online mobile application based purchasing of perishable products.	Accepted
H3: Responsiveness significantly and positively predicts customer satisfaction towards online mobile application based purchasing of perishable products.	Accepted
H4: Assurance significantly and positively predicts customer satisfaction towards online mobile application based purchasing of perishable products.	Accepted
H5: Empathy significantly and positively predicts customer satisfaction towards online mobile application based purchasing of perishable products.	Accepted
H6: All dimensions of the SERVQUAL model are significant predictors of customer satisfaction towards online mobile application based purchasing of perishable products.	Accepted

In order to assess whether the combination of all independent variables collectively influences the dependent variable, a multi-linear regression analysis was conducted, and the results were found to be statistically significant. The multiple linear regression analysis, as indicated in **Table 4**, demonstrates that the model aligns well with the research for predicting customer satisfaction.

Table 4. Multiple linear regression analysis.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.869 ^a	0.755	0.752	2.03764

a. Predictors: (Constant), Empathy, Tangible, Assurance, Reliability, Responsiveness; b. Dependent Variable: Customer Satisfaction.

The R square value is 0.755, suggesting that approximately 75.5% of customer satisfaction can be predicted by the independent variables, which are tangibles,

reliability, responsiveness, assurance, and empathy. Conversely, the remaining 24.5% of customer satisfaction is attributed to factors not considered in this research.

Table 5 shows that the model is significant in modelling the data with *p*-value less than 0.05.

Table 5. Regression ANOVA for customer satisfaction.

ANOVA ^a					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	5041.305	5	1008.261	242.840	0.000
1 Residual	1635.872	394	4.152		
Total	6677.178	399			

a. Dependent Variable: Customer Satisfaction; b. Predictors: (Constant), Empathy, Tangible, Assurance, Reliability, Responsiveness

Based on **Table 6**, the unstandardized coefficients that have the highest predictability of customer satisfaction are assurance (Beta = 0.272) and followed by reliability (Beta = 0.171). The lowest influence is reported to be empathy which has a beta value of 0.068. Referring to **Table 6**, the multiple linear regression model would be:

$$Y = 0.987 + 0.079X1 + 0.171X2 + 0.103X3 + 0.272X4 + 0.068X5$$

In which Y, indicated the customer satisfaction level of purchasing perishable goods from online stores in Klang Valley. Meanwhile, X1 was Tangible, X2 was Reliability, X3 was Responsiveness, X4 was assurance, and X5 will be empathy. Assurance stands out as having the highest predictability of customer satisfaction, with a Beta value of 0.272, whereby when X4 increases by 1 unit, Y will increase 0.272 unit. This was followed by reliability, when X2 increases by 1 unit, Y will increase 0.171 unit. Then, for the independent variable of tangible, when X1 increases by 1 unit, Y will increase 0.079 unit. Followed by empathy, when X5 increases by 1 unit, Y will increase 0.068 unit. Lastly the dimension with the lowest influence on customer satisfaction is reported to be responsiveness, with a Beta value of 0.003, when X3 increases by 1 unit, Y will increase 0.103 unit. Since all five variables of SERVQUAL are essential for the study, the consideration of multicollinearity factors is initiated only when the values approach the higher end. As a rule of thumb, when the Variance Inflation Factor (VIF) exceeds 10, or the tolerance falls below 0.1, significant multicollinearity is detected, indicating the need for correction.

Table 6. Coefficients.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	0.987	0.428		2.308	0.031		
Tangible	0.079	0.037	0.121	2.131	0.034	0.193	5.170
Reliability	0.171	0.04	0.265	4.319	0.000	0.166	6.040

Table 6. (Continued).

Model	Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	Sig.	Collinearity Statistics	
	<i>B</i>	Std. Error	Beta			Tolerance	VIF
Responsiveness	0.103	0.044	0.004	2.340	0.028	0.150	6.683
Assurance	0.272	0.041	0.415	6.555	0.000	0.155	6.446
Empathy	0.068	0.011	0.107	2.193	0.046	0.151	6.604

a. Dependent Variable: Customer Satisfaction.

In this hypothesis, it is posited that the overall SERVQUAL construct positively and significantly influences customer satisfaction in the context of online purchasing of perishable products. The hypothesis that SERVQUAL dimension is positively and significantly influences customer satisfaction in the context of online purchasing of perishable products is supported by Zygiaris et al. (2022). His article strongly supports the statement that SERVQUAL dimensions have a positive relationship with customer satisfaction. In the context of the post-pandemic auto care industry, the study found that service quality dimensions, including tangibles, reliability, and assurance all exhibited a significant and positive impact on customer satisfaction. Whereas responsiveness dimension has no effect on customer satisfaction, and empathy has mild effect.

The results indicated that when considered collectively, all these service quality dimensions had a positive influence on customer satisfaction. Moreover, when examined individually, Tangible, Reliability, and Assurance were found to have a positive and significant impact on customer satisfaction. The study findings indicate that, customer demographics, nature of industry and the particular product or service context, “Responsiveness” emerges as an insignificant factor in predicting customer satisfaction. This deviation from previous studies highlights a unique perspective on this variable. The industry’s nature, combined with the characteristics of the customer base and the specific offering, seems to diminish the perceived significance of “Responsiveness” among the study respondents.

The current article emphasizes the importance of recognizing and prioritizing these dimensions to enhance customer satisfaction. It further highlights specific actions, such as providing personal attention, friendly greetings, clear communication, and prompt services, as essential components of delivering high-quality service that contributes to customer satisfaction. This comprehensive examination of the auto care industry reinforces the fundamental role of SERVQUAL dimensions in driving positive customer experiences and satisfaction. The hypothesis also aligns with the Octaviana and Sugiarto (2021) which strongly supports the statement that SERVQUAL dimensions have a positive relationship with customer satisfaction.

On the other hand, the variable “Empathy” demonstrates a moderate impact on predicting customer satisfaction. Noteworthy is the strong influence of “Tangibility”, “Reliability”, and “Assurance” in predicting customer satisfaction. As a result, the study recommends that marketers prioritize service quality dimensions such as tangibility, reliability, and assurance. Additionally, a strategic focus on enhancing “Empathy” could contribute positively to customer satisfaction. This nuanced

understanding of the varying importance of service quality dimensions provides valuable guidance for marketers in refining their strategic approaches.

6. Conclusion and implication

Implication of this study is that this study on consumer satisfaction in online mobile application based perishable goods purchasing in the Klang Valley, Malaysia contributes to consumer behavior, e-commerce, and service quality knowledge. It explores an under-researched area, using the SERVQUAL model to understand how service quality dimensions affect consumer satisfaction. This enriches e-commerce and service quality models. The study's use of the SERVQUAL model offers a robust method for assessing service quality in online perishable purchases, benefiting future research. These findings can guide further studies on factors like trust and personalization that impact customer satisfaction in e-commerce. This study offers insights into enhancing consumer satisfaction in online perishable purchases in the Klang Valley.

The assurance dimension of SERVQUAL has been revealed as a critical factor influencing customer satisfaction in the realm of online purchasing of perishable products. To optimize the online shopping experience and enhance customer satisfaction, it is strongly recommended that e-commerce platforms and online retailers prioritize the bolstering of assurance-related aspects. First and foremost, transparency in product information is paramount. E-commerce platforms should provide comprehensive and accurate details about perishable items, encompassing aspects such as freshness, sourcing, and quality. This transparency instills trust and assures customers regarding the quality of the products they intend to purchase. Secure payment systems are equally indispensable. It is imperative to implement robust and reliable payment mechanisms that safeguard customers' financial information during online transactions for perishable goods. Adhering to stringent data security standards is non-negotiable.

In conclusion, there exists a notable positive correlation between tangibles, reliability, responsiveness, assurance, and empathy concerning customer satisfaction in online purchasing of perishable products. The analysis of the study's regression results reveals that "Tangibility", "Reliability", and "Assurance" play pivotal roles as strong predictors of customer satisfaction, while "Responsiveness" emerges as an insignificant factor. This departure from conventional findings underscores the nuanced impact of industry dynamics, customer diversity, and specific product or service attributes. Additionally, "Empathy" demonstrates a moderate influence on customer satisfaction. These insights offer perishable products marketers a tailored perspective, emphasizing the strategic prioritization of service quality dimensions based on the unique characteristics of the industry and customer preferences. This nuanced understanding provides a foundation for renewing marketing strategies, enhancing customer experiences, and ultimately fostering heightened levels of customer satisfaction within the studied context. The addressed challenges in the online purchase of perishable goods, improving service quality, and understanding customer satisfaction contributes to the broader goals of sustainable development by

promoting efficient resource use, reducing waste, and fostering a positive impact on both businesses and consumers.

One limitation of this study is its exclusive focus on the five SERVQUAL characteristics: tangibles, reliability, responsiveness, assurance, and empathy. While these dimensions are crucial in understanding consumer satisfaction in online perishable goods purchasing, there may be other dimensions or factors that also play a significant role in shaping the consumer experience. Future research could explore additional dimensions and variables that might impact satisfaction in this context, providing a more comprehensive understanding of the subject. Future research in the realm of online perishable goods purchasing and consumer satisfaction can explore several directions such as investigating additional service quality dimensions beyond the traditional SERVQUAL model. Explore dimensions like convenience, personalization, and trust to understand their impact on consumer satisfaction in online perishable purchasing. Besides, the research may extend in investigating how sustainability practices and eco-friendly options in online perishable goods purchasing affect consumer satisfaction. Understand how consumers perceive and value sustainability in their choices.

Author contributions: Conceptualization, SM, LET, WCH, CKW and RKP; methodology, SM, LET, WCH, CKW and RKP; software, WCH and RKP; validation, SM, LET and WCH; formal analysis, SM; investigation, LET and WCH; resources, WCH and CKW; data curation, SM, LET, XY and WCH; writing—original draft preparation, LET, WCH and SM; writing—review and editing, WCH, LET and SM; visualization, WCH, LET and SM; supervision, WCH, CKW and MP; project administration, MP, WCH and XY; funding acquisition, WCH, CKW, MP, XY and SM. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

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Appendix

Table A1. Measurement item of tangible with customer satisfaction towards online purchasing perishable products.

No.	Items	Source
1	The online perishables products website is visually appealing.	
2	The user interface of the online perishable's products website has a well-organized appearance.	Wattoo and Iqbal (2022)
3	The website layout of online perishables products website helps me in searching and selecting the right product.	
4	The online perishables products website is intelligible and readable.	
5	The online perishables products website is visual appealing of leaflets and promotional material.	
6	The online perishables products in website have responsible promotion.	Gajewska et al. (2020)
7	The information in online perishables products in website is well organized.	
8	The online perishables products website ensures correct technical functioning.	

Table A2. Measurement item of reliability with customer satisfaction towards online purchasing perishable products.

No.	Items	Source
1	The online perishables products website keeps its promises to deliver a product or service on a specified date.	
2	Transactions with the online perishable's products website are error-free.	Wattoo and Iqbal (2022)
3	The online perishables products website maintains accurate customer records.	
4	The online perishables products website delivers products and services accurately at the first attempt.	
5	The online perishables products website takes short respond time to complaint.	
6	The online perishables products website provides customer service without reservation.	Gajewska et al. (2020)
7	The online perishables products website provides compatibility of services with the offer.	
8	The online perishables products website is easy access to the service.	

Table A3. Measurement item of responsiveness with customer satisfaction towards online purchasing perishable products.

No.	Items	Source
1	The online perishables products website gives prompt service.	
2	The online perishables products website is always willing to help customers.	
3	The online perishables products website keeps customers updated on the status of the product.	Wattoo and Iqbal (2022)
4	When a service is inefficient, the online perishables products website offers other alternatives to minimize inconveniences	
5	Good Information transmission regarding to timeliness of the service when I do online purchase perishables products.	
6	Efficient and fast customer service when I do online purchase perishables products.	Gajewska et al. (2020)
7	Quick response to customer's questions and needs when I do online purchase perishables products.	
8	Readability of information when I do online purchase perishables products.	

Table A4. Measurement item of assurance with customer satisfaction towards online purchasing perishable products.

No.	Items	Source
1	The online perishables products website is trustworthy.	
2	The online perishables products website instills confidence in customers while purchasing.	
3	The online perishables products website provides customers with authentic payment portals to make their payment for the products purchased.	Wattoo and Iqbal (2022)
4	The online perishables products website's name is well-known and has a good reputation.	
5	Customers' personal information is not misused is ensured by the online perishable's products website.	
6	The online perishables products website trusted and credibility of staff.	
7	The online perishables products website has transaction security measures in place.	Gajewska et al. (2020)
8	The online perishables products website offers professional assistance.	

Table A5. Measurement item of empathy with customer satisfaction towards online purchasing perishable products.

No.	Items	Source
1	I feel I have gained a gratifying sense of security when doing online purchasing perishables products.	
2	The online perishables website's staff will give me sympathy and comfort, and provided good return service when necessary, during online purchasing.	Jiang et al. (2020)
3	The online perishables website's staff will put themselves in a position to solve problems for me.	
4	The online perishables website's staff will pay special attention to solving my problems during online purchasing perishables products.	
5	I will get full help and support; The online perishables website's staff will protect my personal information privacy when doing online purchasing.	
6	The online perishables products website is supported by thoughtful staff.	Shiu et al. (2009)
7	The online perishables website's staff have customer' best interest at heart.	
8	The online perishables products website's staff understands the needs of its customers.	

Table A6. Measurement item of customer satisfaction towards online purchasing perishable products.

No.	Items	Source
1	I am very satisfied with the online purchasing perishables products I use.	
2	Online purchasing perishables products shop that I use meets my expectations.	
3	I do not have any complaints about the online purchasing perishables products I use.	Salman and Evelyn (2023)
4	Online purchasing perishables products is getting close to the ideal online retailers.	
5	Online purchasing perishables products always meets my needs.	