Investigating the Impacts of Post-Purchase Experience and Socio-Demographics on Fresh Produce App Retention

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Abstract. This study analyzed the impact of e-logistics service quality (E-LSQ) and food quality on customer satisfaction and continuance intention to use fresh produce mobile apps in Indonesia. The elements of E-LSQ include product information, order management, and order fulfillment. A survey of 364 users of a grocery apps was conducted through convenience sampling. The results based on SEM analysis revealed that the order fulfillment and food quality were significant drivers of customer satisfaction and continuance intention. In addition, marital status and household size moderated the satisfaction and the continuance intention relationship. The findings provide insight into key factors in e-grocery retention and suggest the need for logistic improvements to ensure food quality. This study contributes by linking service quality concepts to the emerging mobile grocery context.

Keywords: Product information, order managing, order fulfilment, perceived food quality, and socio-demographic.

1. Introduction

The COVID-19 pandemic has significantly switched consumer behavior, especially in urban areas, including the shift toward online shopping for fresh food products (Alaimo et al., 2020). Deloitte Insight stated that during the pandemic, every U.S. household tended to purchase fresh food online at least once a week (Renner et al., 2020). One of the reasons that motivate urban residents to move towards online shopping services is the convenience shopping factor (Kaushik, Mohan, and Kumar 2020). As is known, urban residents generally have a high level of busyness, so consumers want to be able to carry out various activities simultaneously. Online shopping services offer convenience, such as easy access to various product information, home delivery service offers, and various personalization of delivery times or payment methods (Mofokeng 2021; Simmons et al. 2022). In addition, online fresh food services are available when offering various types of products and brands, even those that are difficult to find in physical stores (Jain, Gajjar, and Shah 2021; Renner et al. 2020). Furthermore, García et al. (2021) stated that e-grocery offers various convenience logistics services as a value proposition and an effort to increase competitive advantage. At the same time, Monoarfa et al. (2023) mentioned that one attractive factor that encourages Indonesian consumers to switch services to online shopping services is the alternative attractiveness of e-grocery, both in terms of convenience and benefits of technology, as well as online shopping value.

In reality, marketing fresh food products is not easy. The perishable characteristics of fresh food provide challenges for retail grocery businesses to develop logistics strategies to maintain product quality and shopping convenience (Kaswengi and Lambey-Checchin 2019). Perceived product quality has a broad scope, namely the results of customer evaluation of product quality from before to after purchase (Sadílek 2019). For this reason, several supporting capacities for perceived product quality through e-logistics service quality, including personnel contact quality, delivery quality, information quality, and empathy (Jiang et al. 2021). Additionally, Hong et al. (2019) stated that based on an e-commerce online review, the reliability of logistics services, which includes speed and timeliness of delivery, packaging quality, and freshness, are the main factors that drive customer satisfaction. The match between customer expectations and actual product quality when the product is received is the reason for customer satisfaction/dissatisfaction, which drives repurchase intention (Cao, Ajjan, and Hong 2018; Singh and Söderlund 2020).

Based on previous research findings, post-purchase experience is a critical factor that drives customer satisfaction and intention to use fresh food e-commerce applications sustainably. For this reason, several research questions are the focus of the research, including: 1) How do e-logistics service quality elements play a role in customer post-purchase experience? 2) How do e-logistics service quality elements play a role in encouraging the achievement of perceived food quality? and 3) How does the socio-demographic factor moderate continuance intention?

According to the research questions, this study aims to investigate the impact of the post-purchase experience of e-logistic service quality and food quality on customer satisfaction and continuance intention on fresh produce e-commerce. This study also predicts the possibility of socio-demographic characteristics to catalyze the satisfaction-continuance intention relationship. This study will contribute scientifically to extending the concept of e-service quality to emerging fresh produce e-commerce. Apart from that, the findings also provide practical contributions for e-tail businesses regarding the importance of strengthening e-logistics service quality to maintain food freshness, and the logistics capacity is one of the keys to fresh produce app retention.

2. Literature Review

2.1. Post-purchase experience

Post-purchase experience is a customer's perception of the results of their interactions with products or services as part of their journey after making a purchase. Customers will experience a pleasant

experience when the actual performance of a product or service is comparable to or exceeds expectations or what the customer previously thought, and vice versa. Customers' experiences with these products and services include cognitive, emotional, behavioral, sensorial, and social aspects (Lemon and Verhoef 2016). Furthermore, the post-purchase experience will be described by confirmation of satisfaction/dissatisfaction, contributing to intentions for the next purchase (Darley, Blankson, and Luethge 2010). In other words, post-purchase experience is essential for customer loyalty, retention, and advocacy (Oliver 1999; Singh and Söderlund 2020).

On the other hand, if a customer has a negative experience with a product or service, the customer will feel disappointed. The customer will likely express this through negative reviews or complaints, which in the long term can reduce the intention to shop again or affect the image and reputation of the product and service (Ma et al. 2022). Companies often implement several strategies to improve the post-purchase experience, including shipping, order delivery, asking for feedback, handling returns and exchanges, and other services that companies implement as part of customer loyalty programs (Cao et al. 2018; Singh and Söderlund 2020).

Ingaldi & Ulewicz (2019) stated that personalizing services to suit customer needs and desires is a company's effort to improve post-purchase experience. In the era of advances in information technology, efforts to personalize services in e-retail businesses can be through product recommendations based on purchase history, search history, or customer preferences. As with online shopping mobile payment services, platforms offer e-payment alternatives with different cost consequences according to customer choice (Fan et al. 2021). Another case is an e-commerce application that offers a choice of shipping service companies with various timeframes of shipping and shipping costs (Cao et al. 2018). Likewise, e-grocery platforms offer several alternative delivery service times, even instant delivery services, to meet customers' needs to be able to process their food ingredients as quickly as possible (Singh and Söderlund 2020). These personalized offers aim to provide shopping convenience so that customers have a positive post-purchase experience, have a sense of loyalty, and are reluctant to switch services

2.2. E-logistic service quality

As physical services develop towards electronic services, service quality measurement has expanded. Parasuraman et al. (2005) and Rafiq et al. (2012) stated that the scope of measuring e-service quality includes the dimensions of efficiency, system availability, fulfillment, and privacy. In the supply chain industry, Rafele (2004) has designed a measurement of logistics service quality by adapting the Parasuraman, Zeithaml, and Berry (PZB) service quality model - which consists of the dimensions of the tangible component, way of fulfillment, and informative action. Furthermore, specifically for e-grocery shopping services, Magalhães (2021) explained that the components of electronic logistics services are structured based on three phases, namely 1) the pre-transaction phase - when customers access information about products and services, 2) the transaction phase - when customers carry out the process. Ordering, payment transactions, and 3) post-transaction phase – when the e-grocery company fulfills customer transactions by delivering products according to orders.

Implementing the e-logistics service quality strategy is very crucial. E-logistics service quality is critical in determining perceived product quality (Kaswengi and Lambey-Checchin 2019; Martín, Pagliara, and Román 2019). Just as fresh food products have 'perishable' characteristics, e-grocery services must have good logistics capacity to maintain quality (Fernandes, Moori, and Filho 2018; de Kervenoael et al. 2016). Even Cao et al. (2018) added that e-logistics service quality is part of the company's efforts to improve post-purchase experience. Similarly, García et al. (2021) argued that logistics service quality also contributes to the value proposition of e-grocery services, increasing the service's competitiveness and attractiveness.

a. Product Information

Mofokeng (2021) stated that e-information of product, product variety, and product delivery reflects product quality, which is a crucial element to improve post-purchase experience and provide a strong

impetus for the growth of customer loyalty using online shopping services. Likewise, de Araújo et al. (2022)) stated that product information that describes the nutritional content and raw materials contained in the product, as well as the level of safety for consumption, contributes to building perceptions of product quality, including extrinsic attributes presented on the packaging, such as price and label information. Based on several reviews of previous research, this research proposes the following hypothesis.

H1. Product information has a positive effect on order management.

H2. Product information has a positive effect on order fulfillment.

H3. Product information has a positive effect on perceived food quality.

b. Order management

Peinkofer & Jin (2023) stated that order management strongly impacts order fulfillment. Likewise, Fernandes et al. (2018) explained that a company's logistics capability plays a role in determining the quality of logistics services. Companies can predict the arrival of products and meet the timeliness of products received when the company can manage orders well. García et al. (2021) explained logistics strategies related to order management, including inventory management, delivery time slots, and delivery routes and areas. According to Hu et al. (2022), order management indicates that the company has good credibility and reputation in fulfilling customer commitments, thereby contributing to customer satisfaction and loyalty. Based on several reviews of previous research, this research proposes the following hypothesis.

H4. Order managing has a positive effect on order fulfillment.

H5. Order managing has a positive effect on perceived food quality.

H6. Order managing has a positive effect on customer satisfaction.

c. Order fulfillment

Peinkofer & Jin (2023) stated that order fulfillment describes the level of service quality of a retail business. In the 'signaling theory' perspective, order fulfillment is asymmetric information that signals quality perceptions. In more detail, order fulfillment in the e-grocery retail business reflects the company's ability to build a supply chain strategy, manage inventory, and implement a logistics strategy, which contributes to shaping the value proposition of the retail business (García et al. 2021). Furthermore, Mkansi & Nsakanda (2021) added that in the e-grocery business, increasing the number of logistics services is part of value creation, which aims to make delivery area coverage more affordable so that companies can increase the achievement of order fulfillment through the ability to predict delivery periods and maintain product quality. In addition, Kaswengi & Lambey-Checchin (2019) argued that the order fulfillment element includes the company's efforts to maintain product freshness and durability through good packaging techniques. Likewise, Ma et al. (2022) stated that order fulfillment, including appropriate packaging techniques and delivery times, can ensure that perishable products avoid the risk of damage or reduction in product quality. In comparison, Cao et al. (2018) stated that elements of order fulfillment include shipping services, tracking, and exchange and return services. Based on several reviews of previous research, this research proposes the following hypothesis.

H7. Order fulfillment has a positive effect on perceived food quality.

2.3. Perceived food quality

Sadílek (2019) explained the total food quality model – perceived product quality is a comparison between product quality before and after purchase (expected and experienced quality). Several factors contribute to perceived product quality, including expected quality, actual product performance based on intrinsic and extrinsic attributes, and perceived product costs. Those factors contribute to determining the level of customer satisfaction when consuming food. In more detail, the total food quality model explains several fundamental dimensions of perceived product quality, namely hedonic

characteristics of the product (visual attractiveness of the product), product health benefits (food health), product convenience (packaging that provides convenience and comfort), as well as guaranteeing standardization of product quality (product process).

Other research, Cang & Wang (2021) and Kaswengi & Lambey-Checchin (2019) stated that product quality in the online retail business of fresh agricultural products includes freshness and food safety. Meanwhile, Wang (2013) stated that perceived product quality includes product and packaging visualization, benefits, and quality assurance. Otherwise, Konuk (2019) believed that perceived food quality results from consumer evaluation regarding the taste, freshness, and presentation of food served in restaurants. The study found that perceived food quality is the most crucial factor in customers' choice of restaurants and is also a critical factor in determining customer satisfaction, revisit intentions, and word-of-mouth intentions. Based on several reviews of previous research, this research proposes the following hypothesis.

H8. Perceived food quality has a positive effect on customer satisfaction.

H9. Perceived food quality positively affects continued intention to use fresh produce apps.

H10. Customer satisfaction positively affects continued intention to use fresh produce apps.

2.4. The role of socio-demographic as moderating factors

Van Droogenbroeck & Van Hove (2017) explained that socio-demographic conditions significantly motivate the use of e-grocery shopping services. The results of his research stated that most e-grocery service customers are young individuals in households with young children and relatively busy jobs and do not have the opportunity and sufficient time to shop outside the home physically. In addition, young customers tend to be quicker able to adapt to technology, so online shopping is more accessible than older people. Furthermore, Van Hove (2022) added that women dominate e-grocery service customers because they are family shopping decision-makers. Another finding regarding the importance of socio-demographic factors – Dominici et al. (2021) said that not only are gender and age factors, but marital status and household size factors have a more substantial influence in encouraging intentions to use online food purchasing services. Based on several reviews of previous research, this research proposes the following hypothesis.

H11a. Gender moderates the relationship between customer satisfaction and continued intention to use fresh produce apps.

H11b. Age moderates the relationship between customer satisfaction and continued intention to use fresh produce apps.

H11c. Marital status moderates the relationship between customer satisfaction and continued intention to use fresh produce apps.

H11d. Household size moderates the relationship between customer satisfaction and continued intention to use fresh produce apps.

3. Research methods

3.1. Sampling and data collection

The sampling unit for this research is fresh produce mobile application users living in Jakarta, Indonesia. Researchers use convenience sampling to select samples. Convenience sampling is one of non-probability sampling methods where units are selected for inclusion due to convenience (Baxter, Courage, and Caine 2015). The Jakarta area was chosen as the research object. McKinsey stated that fresh produce applications are in great demand by people in big cities, including Jakarta, the center of government and business in Indonesia (Kuijpers, Wintels, and Yamakawa 2020). In addition, researchers require that respondents are fresh produce mobile application users over 25 years old and have made at least three transactions in the last six months so that the respondent has sufficient post-purchase experience. The age limit requirement for respondents is based on the results of a Ken

Research survey that users of e-grocery services in Indonesia are, on average, aged 25 years and over (Sanjeev 2022). The research questionnaire was distributed through an online survey on social media to capture many users of the fresh produce mobile apps for two months – of the 415 respondents who filled out the questionnaire, 364 fulfilled the requirements as a research sample.

3.2. Questionnaire design

The questionnaire consists of several parts. In the first part, the researcher conveyed the research objectives and asked the respondents' willingness to participate in this research as the ethical approval. Apart from that, the researcher also submitted a cover letter stating that the researcher was responsible for maintaining the confidentiality of respondent data and that the data would be only for this research. In the second part, the questionnaire asked about the respondent's socio-demographic profile, such as gender, age range, marital status, and household size. Furthermore, in the third part, to evaluate customer behavior, especially the intention to reuse fresh produce mobile apps, this research questionnaire presents 32 items, which are used to measure six variables and asked respondents to rate these statements based on a 5-point Likert scale (point 1 for "Strongly Disagree" up to point 5 for "Strongly Agree").

3.3. Research instruments

This research has analyzed the causal relationships of six variables in a structural model, where each variable uses several instruments in its measurement. Post-purchase experience of e-logistics service quality consists of three variables, namely product information, order management, and order fulfillment, with a total of 15 measurement items (Jain et al. 2021; Rafele 2004; Rafiq et al. 2012). Product information measurement includes four items: information about product availability, product category, product description, and product visualization. Meanwhile, measuring order management includes five items: confirmation of shopping cart, time slot delivery, arrival time, transaction process, and schedule delay. Next, the measurement of order fulfillment includes six items: reliability of delivery personnel, product suitability, well-packaged, timeliness of delivery, speed of delivery, and notification of product receipt.

The perceived food quality variable is the customer's perception of the product's visual appeal, freshness, edibility, food safety, good condition, and overall food quality (Kaswengi and Lambey-Checchin 2019; Konuk 2019). Furthermore, the customer satisfaction variable describes the conformity between expectations and actual performance of fresh produce mobile applications, which consists of six items, and the continuance intention measured based on five items (Jumaan, Hashim, and Al-Ghazali 2020; Sullivan and Kim 2018).

3.4. Analysis method

Hair Jr et al. (2019) stated that the appropriate sample size for structural equation modeling (SEM) is above 200 or 5 to 10 times the total number of measurement items. For this reason, with a total number of items of 32 – so, the number of samples obtained in the online survey of 364 is sufficient to be processed using the structural equation modeling method.

Additionally, Hair Jr. et al. (2019) said that SEM is a data analysis method capable of estimating the influence of causality paths between variables in a complex structural model through a comprehensive calculation process so that the results of the analysis can be depicted comprehensively. This research uses AMOS 24 software to process structural equation modeling, while the construct validation process uses SPSS 24 software. Several steps in the structural equation modeling analysis method include: 1) Construct validation, 2) Confirmatory factor analysis, and 3) Hypothesis testing.

An overview of the conceptual model that explains the influence between variables in the structural model is presented in Fig 1.
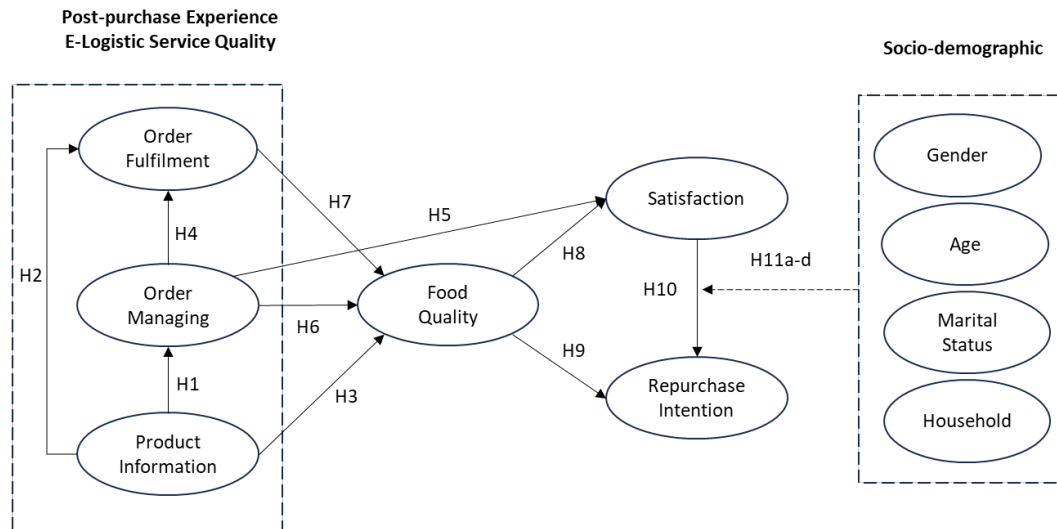
Fig. 1: The proposed conceptual model

4. Findings and Discussion

4.1. The analysis of socio-demographic factors

Based on the results of data collection on 364 samples, the socio-demographic profile of users of the fresh produce mobile application in Jakarta, Indonesia, is as presented in Table 1.

Table 1: Socio-demographic profile of respondents

Socio-demographic items	Frequency (n=364)	Percentage (%)
Gender		
Man	73	20.05
Women	291	79.95
Age		
25 – 34	265	72.80
35 – 44	43	11.81
45 – 54	40	10.99
Above 54	16	4.40
Marital status		
Single	129	35.44
Married	223	61.26
Other	12	3.30
Household size		
Only one person	96	26.37
Two members	114	31.32
Three members	79	21.70
More than three members	75	20.60

According to Table 1, the most users of fresh produce e-commerce are female and aged between 25 and 34 years, with marital status and quite diverse household sizes. This finding aligns with Van Hove (2022), women dominated e-grocery service customers because they are household managers, so women make most household shopping decisions. At the same time, a Ken Research survey mentioned that customers of online fresh grocery shopping services in Indonesia are generally individuals aged 25 to 37 years, single and married. However, most customers are young households with children under five and with relatively busy working conditions who have to shop in physical stores (Agarwal and Jain 2022). In addition, young customers generally have good digital literacy, making it easier to adapt to mobile applications (Dharmesti et al. 2019).

4.2. The analysis of structural equation modeling (SEM)

a. Construct validity

Before analyzing the structural model, construct validity is first carried out. Several stages in construct validity include validity testing, reliability testing, and correlation testing, all carried out using SPSS 24 software. In testing the instrument's validity, this study uses a factor analysis approach based on each item's factor loading value, which requires it to be above 0.5. Next, this study conducts a construct reliability test to ensure the measurement's reliability, indicated by a Cronbach's alpha value above 0.7 (Malholtra et al., 2016). The results of the validity and reliability tests are presented in Table 2.

Table 2: The validity and reliability of the construct

Variables and items	Factor Loadings	Cronbach's alpha
Product Information (PI) - Jain et al. (2017); Rafele (2004); Rafiq et al. (2012)		
PI1. The application informed the product availability.	0.838	0.794
PI2. The product category made it easy to find what I needed.	0.896	
PI3. The product's description enabled me to get the product details.	0.764	
PI4. The application presented the product visualization.	0.660	
Order Managing (OM) - Jain et al. (2017); Rafele (2004); Rafiq et al. (2012)		
OM1. The application confirmed the content of shopping cart.	0.587	0.714
OM2. The application offered multiple time slots for delivery.	0.627	
OM3. The application able to predict the time of product arrival.	0.770	
OM4. The application informed the transaction process.	0.894	
OM5. The e-grocery application is always willing to inform if time of delivery is out of schedule	0.890	
Fulfilment (FL) - Jain et al. (2017); Rafele (2004); Rafiq et al. (2012)		
FL1. The personnel are reliable during shipping time.	0.709	
FL2. The company delivered items as I ordered.	0.796	0.763
FL3. The product's well packaged.	0.787	
FL4. The company delivered products within suitable time frame.	0.782	
FL5. The company provides me an instant delivery	0.784	
FL6. The company notified product receipt	0.648	
Food Quality (FQ) - Kaswengi and Lambey-Checchin (2019); Konuk (2019)		
FQ1. Food presentation was visually attractive.	0.623	0.827
FQ2. Food looks fresh.	0.717	
FQ3. Food delivered are edible.	0.759	
FQ4. Food delivered save to consume.	0.780	
FQ5. Food are intact condition.	0.768	
FQ6. Overal, product has a good quality.	0.749	
Satisfaction (SA) - Sullivan & Kim, (2018); Jumaan et al. (2020)		
SA1. Satisfied with website quality.	0.754	
SA2. Satisfied with product availability.	0.623	0.816
SA3. Satisfied with ordering process.	0.700	
SA4. Satisfied with timeliness delivery.	0.821	
SA5. Satisfied with product quality.	0.759	
SA6. Overall, I satisfied when shopping with this mobile application.	0.667	

Continuance Intention (CI) - Sullivan & Kim, (2018); Jumaan, Hashim dan Al-Ghazali (2020)		
CI1. If I were to buy the groceries, I would likely to buy it from the same mobile application.	0.643	0.815
CI2. I want to reuse to the mobile application for my next purchases.	0.711	
CI3. I Intend to revisit the mobile application in the future.	0.807	
CI4. I would like to revisit the mobile application soon.	0.822	
CI5. I always revisit the mobile application when I want to shop.	0.799	

Based on Table 2, the construct validity showed that all items met the requirements with factor loading values above 0.5 and Cronbach's alpha values above 0.7. All items were valid for measuring variables, and these measurements had high consistency and reliable for research. Furthermore, construct validity also conducts the Pearson correlation test to ensure that each variable in the structural model does not have multicollinearity. This test assesses the correlation magnitude between one variable and other variables in the structural model. However, the magnitude of this correlation will not exceed the limit of 0.8, which means that one variable and another variable do not have a vital intersection or do not have similar characteristics (Shrestha 2020). The results show that the correlation between variables is not higher than 0.8, which concludes that there is no multicollinearity. Then, the details of the Pearson correlation test are presented in Table 3.

Table 3: Pearson correlation test

N = 364	Mean	Std. Deviation	FQ	PI	OM	FL	SA	CI
FQ	4.447	0.374	1	-	-	-	-	-
PI	0.354	0.497	0.514**	1	-	-	-	-
OM	4.318	0.425	0.448**	0.550**	1	-	-	-
FL	4.360	0.421	0.551**	0.587**	0.677**	1	-	-
SA	4.389	0.353	0.521**	0.408**	0.482**	0.511**	1	-
CI	4.446	0.405	0.463**	0.463**	0.496**	0.524**	0.527**	1

Note: FQ (food quality, PI (product information), OM (order managing), FL (order fulfilment), SA (satisfaction), CI (continuance intention). ** Correlation is significant at the 0.01 level (2-tailed).

b. Confirmatory factor analysis

Next, the second stage in SEM analysis is confirmatory factor analysis to test the goodness of fit model. This test ensures that the structural model has a fit level corresponding to the required cut-off value (Hair Jr et al. 2019). This study utilized AMOS 24 software to conduct the goodness of fit test and improve the model. The process needs to modify the structural model by eliminating items with a Modification Indices (M.I.) value exceeding 10.0 to achieve the minimum M.I. value. This structural model modification process is carried out until the structural model has a probability value ≥ 0.05. When the probability value meets the requirements, the other requirements are fit, so the structural model is declared to have the goodness of fit—the goodness of fit model test after the modification process is presented in Table 4.

Table 4: The goodness of fit model

Fit indices	Cut-off value	Value	Result
Chi-square	As minimum as possible	92.503	Fit
Probability	≥ 0.05	0.524	Fit

CMIN/DF	≤ 2.00	0.984	Fit
RMSEA	≤ 0.08	0.000	Fit
GFI	≥ 0.90	0.969	Fit
AGFI	≥ 0.90	0.956	Fit
TLI	≥ 0.95	1.001	Fit
CFI	≥ 0.95	1.000	Fit

c. Hypothesis test

The output of the fit model is in Fig 2. Then, AMOS 24 processes the data of the fit model to conduct the hypothesis test. At this stage, the researcher tests whether the hypothesis development based on the theoretical framework proposed in this research is proven based on the data obtained on the research object.
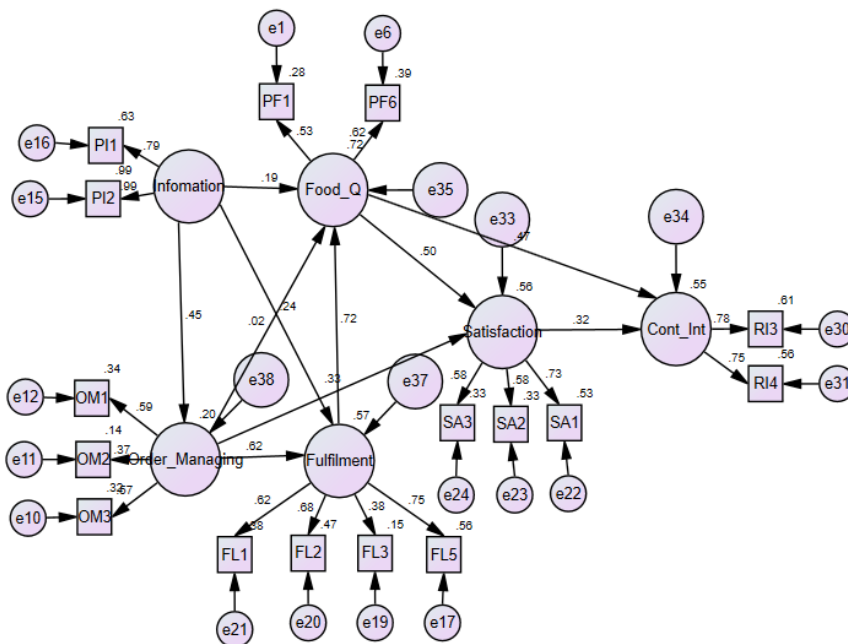

Fig. 2: The fit of proposed conceptual model

The Fig 2 shows the explanation power of squared multiple correlations for each endogenous variable. The R square (R2) indicates the percentage of squared multiple correlations of the total variance of the endogenous variable explained by the exogenous variable (Hair Jr. et al. 2017). The R2 implies that the research model accounts for 54.7% of the variance of continuance intention to use fresh produce mobile apps, 56.0% of the total variance of customer satisfaction, and 72.4% of the total variance of perceived food quality. Joseph F. Hair et al. (2013) suggested in scholarly research that focused on marketing issues that R2 values for endogenous latent variables are considered as follows: 0.75 (substantial), 0.50 (moderate), and 0.25 (weak). The result concludes that the movement of perceived food quality and customer satisfaction as the exogenous variables in a structural model significantly impacts the intention to use fresh produce mobile apps. Then, the results of the hypothesis testing decisions are presented in Table 5.

Table 5: The result of hypothesis test

Hypothesis	Coefficient (β)	Critical ratios (C.R)	Probability (ρ)	Result
H1. PI → OM	0.279	5.792	***	Accepted
H2. PI → FL	0.158	3.213	0.001	Accepted
H3. PI → FQ	0.086	2.613	0.009	Accepted
H4. OM → FL	0.664	5.310	***	Accepted

H5. OM → FQ	0.016	0.147	0.883	**Rejected**
H6. OM → SA	0.321	2.491	0.013	Accepted
H7. FL → FQ	0.514	6.840	***	Accepted
H8. FQ → SA	0.640	3.708	***	Accepted
H9. FQ → CI	0.698	3.748	***	Accepted
H10. SA → CI	0.377	2.780	0.005	Accepted

Note: FQ (food quality), PI (product information), OM (order managing), FL (fulfilment), SA (satisfaction), CI (continuance intention). Significance level $\rho \leq 0.05$ and *** $\rho \leq 0.01$.

Table 5 shows that among the ten proposed hypotheses of direct effect, the findings supported the nine proposed hypotheses which met the requirements for a probability value (ρ) below 0.05 and a critical ratio (C.R) value above 1.96, except for the proposed hypothesis H5 which rejected that order managing (OM) has an insignificant influence on perceived food quality (FQ) – as can be seen from the coefficient (β) and C.R values, which are lower than other causal relationships. Moreover, the estimates of the mediating effect in the structural model are presented in Table 6.

Table 6: The estimation of the mediation effect

Hypothesis	Direct effect	Indirect effect	Total effect	Result
PI → OM → FL	0.235	0.276	0.511	Partial mediation
OM → FL → FQ	0.000	0.470	0.470	Full mediation
PI → OM → SA	0.000	0.428	0.428	Full mediation
OM → FL → SA	0.328	0.234	0.562	Partial mediation
PI → FQ → CI	0.000	0.407	0.407	Full mediation
FL → FQ → CI	0.000	0.460	0.460	Full mediation
OM → SA → CI	0.000	0.405	0.405	Full mediation

Note: FQ (food quality), PI (product information), OM (order managing), FL (fulfilment), SA (satisfaction), CI (continuance intention). Significance level $\rho \leq 0.05$.

According to Tables 5 and Table 6, product information directly and indirectly impacts order fulfillment, so order management is a partial mediator. Likewise, order fulfillment has a partial mediating role in the interaction between order management and customer satisfaction. By comparing the information, the direct impact of product information on order fulfillment is lower (the coefficient β = 0.158) than when the relationship between product information and order fulfillment considering the role of order managing as a mediator – the coefficient β of total effect increased by 0.511. Moreover, the direct impact of order management on customer satisfaction was also lower (the coefficient β = 0.321) compared to when including the role of order fulfillment as a mediating variable (the coefficient β of total effect increased to 0.562). Apart from partial mediation, several variables also play a full mediating role. It means that the causal relationship between variables does not occur directly but requires the contribution of mediating variables. The position of perceived food quality as a full mediator is crucial to link the influence of post-purchase logistics service quality to continuance intention to use fresh produce mobile apps.

Furthermore, this research also predicts the moderating role of socio-demographic factors, which can accelerate the drive for customer satisfaction toward continued intention to use fresh produce mobile apps. Several socio-demographic factors proposed as hypotheses include gender, age, marital status, and household size in terms of the number of family members. The results of testing the moderation effect are presented in Table 7 as follows.

Table 7: The estimation of the moderation effect

Hypothesis	Coefficient (β)	Critical ratios (C.R)	Probability (ρ)	Result
H11a. ZSA * ZGEN	-0.025	-0.525	0.600	**Rejected**
H11b. ZSA * ZAGE	-0.017	-0.360	0.719	**Rejected**
H11c. ZSA * ZMAR	-0.094	-2.176	0.030	Accepted

H11d. ZSA * ZHHO	-0.078	-2.077	0.045	Accepted

Note: ZSA (Z-score of satisfaction), ZGEN (Z-score of gender), ZMAR (Z-score of marital status), ZHHO (Z-score of household condition). Significance level $\rho \leq 0.05$.

5. Discussions

Tracing back Magalhães (2021) statement regarding the three phases of logistics services, the research findings have proven acceptance of the proposed hypotheses H1, H2, and H4 - as well as answering the first research question regarding the three important components of e-logistics service quality. The logistics service stages are a description of the purchasing decision process, starting from the customer's response to product information services (pre-transaction phase), then continuing to the ordering service phase (transaction phase), to delivery services as the phase for fulfilling customer requests (post-transaction phase).

The pre-transaction and post-transaction phases are proven to affect perceived food quality directly, so the research results supported H3 and H7. Customers are directly connected to the product in the pre-transaction and post-transaction phases. These findings answered the research problem regarding the alleged role of e-logistics service quality as a determinant of product freshness. de Araújo et al. (2022) and Mofokeng (2021) stated the importance of presenting information about product visualization, product descriptions, and labels stating product quality guarantees through the mobile apps page to describe product quality to arouse customer interest. In addition, the accuracy of delivery times is a benchmark important measure of customer order fulfillment, essential in perceived food quality (Fernandes et al. 2018; Peinkofer and Jin 2023).

Furthermore, research findings state that the transaction phase reflected through order managing does not directly influence perceived food quality (rejected H5). However, order management impacts customer satisfaction (accepted H6). This finding uncovered that the e-logistic service quality has an impact on customer satisfaction. As Jiang et al. (2021) stated the order process as an element of logistics services is an essential factor that supports sustainable management of fresh food e-commerce, which crucially influences customer satisfaction and determines the sustainability of using the service. The order process, in this case, includes easy, fast, and effective ordering procedures (Lin et al. 2016), as well as personalization of services that support customer conveniences, such as alternative delivery times and payment methods (Jilcott Pitts et al. 2018; Magalhães 2021; Zhu and Semeijn 2013).

After discussing several elements of logistics service quality, the research findings stated that order fulfillment has the most significant impact on perceived food quality, with a coefficient β value of 0.514. As Martín et al. (2019) stated, order fulfillment is a critical component that fills the gap between product perception informed on the website and perceived product performance. One crucial component in order fulfillment is packaging techniques. Fresh food products are susceptible to damage or decrease in quality, such as easily broken, quickly wilted, and easily rotted. Additionally, packaging plays a vital role in maintaining product integrity, freshness, and durability during delivery (Vandichel 2015; Wang and Zhang 2020). Apart from that, on-time delivery is also an essential component in order fulfillment. Delivery times that are too long also have an impact on reducing product quality as well as reducing customer satisfaction (Jain et al. 2021). Furthermore, order fulfillment not only has an impact on perceived food quality but also provides a boost to customer satisfaction, which has the potential to drive customers to make repeat purchases in the future (Cao et al. 2018; Jain et al. 2021; Mofokeng 2021).

When order fulfillment is the primary key to realizing product quality, perceived food quality also has a vital influence on customer satisfaction and continued intention to use fresh produce mobile apps. Even when compared with the role of customer satisfaction, the contribution of perceived food quality is more outstanding in encouraging continuance intention. So, the research results supported H8, H9, and H10. This finding answered the proposed research question that customer experience regarding the

quality of e-logistics services and product freshness is the primary key to customer satisfaction and loyalty characterized by sustainable use of services. As Kaswengi & Lambey-Checchin (2019) said that general product quality and freshness play a role in increasing the frequency and volume of consumer shopping in the future.

Furthermore, socio-demographic factors also have an essential role in accelerating the drive for customer satisfaction to continue intention to use fresh produce mobile apps. The research findings rejected H11a and H11b – gender and age are insignificant in determining continuance intention. At the same time, Adaji et al. (2018) and Van Droogenbroeck & Van Hove (2017) stated that gender and age are no longer determinants of healthy shopping habits in e-commerce. Even though the research results show that most fresh produce mobile app customers are women, it does not rule out the possibility that men also actively use online shopping services. Even Medina (2019) stated that with the increasing number of single men in big cities, men also decided to shop for fresh grocery products. Likewise, in terms of age, it is not only young consumers who are interested in using online shopping services as Kvalsvik (2022) believed that older customers will also choose to use online shopping services due to situational factors, such as their residence position being far from access to physical stores.

However, the research findings accepted H11c and H11d that marital status and household size significantly moderate the intention to use fresh produce m-application. These findings align with Dominici et al. (2021) that marital status increases household needs, so online shopping is an easy alternative for modern families in big cities. Likewise, Van Hove (2022) believed that young couples with young children tend to use online grocery shopping because of busy household activities and working situations.

6. Conclusion

This study makes an essential contribution by investigating how e-logistics service quality and food quality significantly influence customer satisfaction and retention for fresh produce mobile apps. Analysis of survey data from 364 users in Indonesia found that order fulfillment and food quality are critical to driving satisfaction and continuance intention, while order management directly impacts satisfaction. The results suggest that grocery apps must focus on supply chain capabilities like packaging, timely delivery, and inventory management to preserve food quality. The perceived logistic quality, in turn, is essential for customer retention. Theoretically, the study expands service quality concepts to the mobile grocery domain and provides a framework for further research. While focused on Indonesia, the findings have practical implications for grocery retailers globally, emphasizing the need to strengthen logistics to ensure food freshness and quality. With the rapid growth of mobile grocery apps, this research offers timely insights into how service and product factors affect key customer behaviors and highlights areas for continued improvement.

7. Managerial Implication

Research findings state logistics service quality's importance in improving customers' post-purchase experience. One of the elements of e-logistics service quality is product information. Product information is the spearhead of service in the pre-transaction phase because the product information on the mobile apps page depicts product quality visually and descriptively, acting as a purchase stimulus. Regarding product information, e-tail companies can develop strategies to improve the quality of mobile app information systems, both in terms of system performance, accuracy, and data integration, as well as developing service features that maximize the convenience and benefits of shopping. Furthermore, order management is part of the transaction phase, vital in bridging product information services and order fulfillment, which can continuously increase customer satisfaction. Companies can improve order management quality through the flexibility of time delivery and digital payment services, information on arrival time predictions, and confirmation of the accomplished order process. The success of order management services requires real-time and integrated data and information support. Furthermore,

order fulfillment reflects the quality of e-logistics services – companies can assess order fulfillment quality through the conformity of product delivery, timeliness delivery, and notification of product receipt.

Product information and order fulfillment are essential factors that improve perceived food quality, directly impacting customer satisfaction and continuance intention. Companies can ensure guaranteed product quality and product freshness with the support of e-logistics service quality. It is equally known that the durability of perishable products depends on logistics facilities such as storage and delivery facilities and delivery duration. Thus, companies need strong logistics capability to implement the e-logistic service quality (Fernandes et al. 2018). E-order management systems, such as storage and delivery systems and facilities, determining delivery areas, and predicting delivery duration are crucial for e-tail management. García et al. (2021) and Verhoef & Bijmolt (2019) argued that e-logistics quality has the potential to be a value proposition to increase the competitiveness of e-grocery shopping services. For this reason, this study concludes that the strength of perceived e-logistics services and perceived product quality (freshness) are key factors that drive the success and desirability of the fresh produce mobile apps business.

8. Limitations and future directions

The data collecting of this study conducted an online survey which allows for respondent perception bias, so research conclusions may not adequately describe actual customer behavior. In addition, this study only surveyed users of fresh produce mobile apps living in Jakarta, Indonesia, involving a single country scope. However, the research results have opportunity to apply across countries similar to Indonesia, such as the Southeast Asia region or other developing countries where fresh product mobile apps emerge as an alternative fresh food shopping service. The extended conceptual framework by including other theories as factors driving satisfaction and sustainability intentions could be an idea for future research to contribute more scientifically to the field of fresh food e-marketing and provide recommendations for fresh produce mobile app business actors.

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