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# The Role of Customer Satisfaction in Linking Service Quality and Customer Loyalty in E-Logistics Management in West Java

**Nurul Aziz Pratiwi*, Ratih Hurriyati, Puspo Dewi Dirgantari**

Faculty of Economics and Business Education, Universitas Pendidikan Indonesia

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*Correspondence: Nurul Aziz Pratiwi
Email: nurulazizpratiwi@gmail.com

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**Abstract:** The rapid growth of e-commerce in Indonesia has increased the strategic role of e-logistics services in shaping customer experience and competitiveness, particularly in West Java as one of the largest logistics markets. This study aims to examine the effect of e-logistics service quality on customer loyalty, with customer satisfaction as a mediating variable. A quantitative research approach was employed using a survey method. Data were collected from 200 e-logistics service users in West Java through structured questionnaires and analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS 4.0. The results reveal that e-logistics service quality has a positive and significant effect on customer satisfaction. Customer satisfaction also has a positive and significant effect on customer loyalty. However, e-logistics service quality does not directly influence customer loyalty. Further analysis confirms that customer satisfaction fully mediates the relationship between e-logistics service quality and customer loyalty. These findings indicate that improving service quality alone is insufficient to foster customer loyalty unless it is translated into perceived satisfaction. This study highlights the strategic role of customer satisfaction as a key mechanism linking service quality and loyalty in the e-logistics context. The results provide theoretical contributions to service quality and loyalty models in digital logistics, as well as practical implications for e-logistics providers and e-commerce platforms in designing customer-oriented service strategies to enhance long-term customer retention in West Java.

**Keywords:** E-Logistics Service Quality, Customer Satisfaction, Customer Loyalty, SEM-PLS

## Introduction

### The Growth of Electronic Commerce (E-commerce) in Indonesia

The growth of electronic commerce (e-commerce) in Indonesia has experienced very rapid development in recent years. The national e-commerce industry is projected to reach a market value of USD 83 billion in 2025, increasing significantly from USD 30 billion in 2020 (Administration, 2020). This massive expansion of e-commerce has also driven the development of the electronic logistics (e-logistics) sector as the operational backbone of the industry. In 2025, the value of Indonesia's e-commerce logistics market was recorded at USD 5.27 billion and is estimated to increase to USD 7.93 billion by 2030 with a compound annual growth rate (CAGR) of 8.52% (Intelligence, 2025). The rapid growth of e-commerce has

fundamentally transformed consumer shopping behavior and expectations regarding logistics services (Nguyen, D. H., de Leeuw, S., & Dullaert, 2018) Modern consumers increasingly demand fast, accurate, and transparent delivery services, which places additional pressure on e-logistics providers to continuously innovate and improve service quality. This shift in consumer expectations has made logistics service quality a critical competitive differentiator in the e-commerce industry, as customers are no longer solely evaluating products but also the entire shopping experience, including the delivery process (Mentzer, J. T., Flint, D. J., & Hult, 2001).

West Java Province plays a strategic role in Indonesia's e-commerce and logistics ecosystem. With its large population and continuously developing infrastructure, West Java controls approximately 17% of the national e-commerce logistics market share in 2024 (Intelligence, 2025). This region not only serves as a distribution center for Jakarta and its surroundings but also demonstrates significant online consumption growth in secondary cities such as West Java and Bekasi. Increased internet penetration and smartphone affordability have driven online shopping activities outside metropolitan areas, thereby creating opportunities as well as challenges for e-logistics service providers. The unique characteristics of West Java's market present both opportunities and complexities for e-logistics operations. The geographic diversity, ranging from densely populated urban areas to more remote rural regions, requires logistics providers to develop flexible and adaptive delivery strategies. Furthermore, the varying levels of digital literacy among consumers in different areas necessitate differentiated approaches in customer service and communication, making the relationship between service quality, satisfaction, and loyalty particularly nuanced in this context (Zeithaml, V. A., Parasuraman, A., & Malhotra, 2002).

In the highly competitive e-commerce industry, logistics service quality has become a crucial factor in determining business success. Various studies show that logistics service quality significantly influences customer satisfaction and customer loyalty in the e-commerce context (Akıl, S., & Ungan, 2022) (Do, D. N., Tran, P. D. T., & Nguyen, 2023). Important dimensions of service quality include delivery timeliness, product condition upon receipt, order accuracy, and mechanisms for handling order discrepancies, all of which directly impact customer experience (Nasrudin, W. M., Maarif, M. S., & Suharjito, 2025). Research in the field of service quality has evolved from traditional retail contexts to the digital commerce environment, where the intangible nature of online transactions makes the physical delivery experience even more critical (Parasuraman, A., Zeithaml, V. A., & Malhotra, 2005). The moment of delivery represents the only tangible touchpoint between the e-commerce platform and the customer, making it a decisive factor in shaping overall satisfaction. This "moment of truth" in e-logistics has been recognized as having a disproportionate impact on customer perceptions and subsequent behavioral intentions (Collier, J. E., & Bienstock, 2006). Customer satisfaction has long been identified as a key mediating variable in the relationship between service quality and customer loyalty (Caruana, 2002). In the e-logistics context, customer satisfaction is not only influenced by operational aspects such as delivery speed but also by information transparency, ease of tracking, and customer service responsiveness. Recent research findings show that

customers who are satisfied with logistics services tend to make repeat purchases and recommend e-commerce platforms, thereby increasing customer loyalty (Aqabneh, 2025).

The mediating role of customer satisfaction suggests that the pathway from service quality to loyalty is not always direct but rather operates through the psychological and emotional evaluation processes that customers undergo (Cronin, J. J., Brady, M. K., & Hult, 2000). This understanding is particularly relevant in the e-logistics industry, where technical service excellence must be translated into perceived value and emotional connection with customers. The formation of satisfaction involves cognitive evaluation of service performance against expectations, as well as affective responses to the service experience, both of which subsequently influence loyalty behaviors.

Although numerous studies have discussed the relationship between service quality, satisfaction, and customer loyalty in various industry contexts, research specifically exploring the mediating role of customer satisfaction in the relationship between e-logistics service quality and customer loyalty in West Java remains limited. This is important given the unique market characteristics of West Java, marked by demographic diversity, varying levels of digital literacy, and continuously developing logistics infrastructure (Nasrudin, W. M., Maarif, M. S., & Suharjito, 2025). E-logistics service providers in West Java face challenges in maintaining consistent service quality amid increasing order volumes, high customer expectations regarding delivery speed, and intense competition among various e-commerce platforms and logistics companies. Therefore, this research aims to identify the dimensions of e-logistics service quality that most influence customer satisfaction, as well as analyze the mediating role of customer satisfaction in the relationship between service quality and customer loyalty in West Java. By understanding this relational mechanism, this research is expected to provide theoretical contributions to the development of e-logistics service quality models and produce practical implications for logistics service providers and e-commerce platforms in formulating effective strategies to improve customer retention and strengthen competitive advantage in West Java.

## Literature Review

E-logistics or electronic logistics refers to the integration of digital technology in supply chain management processes to support e-commerce transactions (Gunasekaran & Ngai, 2003). The evolution of e-logistics has been driven by technological advancements such as real-time tracking systems, automated warehousing, route optimization algorithms, and data analytics, all of which aim to enhance operational efficiency and customer experience. In the contemporary e-commerce landscape, e-logistics encompasses not only the physical movement of goods but also the digital infrastructure that enables visibility, communication, and coordination throughout the delivery process (Boyer, K. K., & Hult, 2006). The theoretical foundation for understanding the relationship between service quality, satisfaction, and loyalty in e-logistics draws from several established frameworks. The service quality paradigm, originally developed for traditional service industries, has been adapted to address the unique characteristics of digital commerce and logistics services (Parasuraman, A., Zeithaml, V. A., & Berry, 1988). In e-logistics, service quality extends beyond traditional dimensions to include digital touchpoints, information accuracy, and

technological reliability, reflecting the hybrid nature of online-to-offline service delivery (Zeithaml, V. A., Parasuraman, A., & Malhotra, 2002).

In the e-commerce context, several studies have also found the mediating role of customer satisfaction. (Wu, 2020) found that customer satisfaction with post-delivery services mediates the relationship between the quality of such services and repurchase intention. (Aqabneh, 2025) in their research in Palestine found that customer satisfaction plays a mediating role in the relationship between e-logistics service quality and customer loyalty. These findings across different geographic and cultural contexts suggest a robust theoretical relationship, yet the specific mechanisms and strength of these relationships may vary depending on local market conditions and consumer characteristics.

**The Influence of E-Logistics Service Quality on Customer Satisfaction**

Logistics service quality has a significant influence on customer satisfaction in the e-commerce context(Akıl, S., & Ungan, 2022; Do, D. N., Tran, P. D. T., & Nguyen, 2023; Rashid, Y., & Rasheed, 2024). Service quality dimensions such as delivery timeliness, product condition upon receipt, and order accuracy have been proven to directly impact customer experience(Mentzer, J. T., Flint, D. J., & Hult, 2001). The importance of delivery timeliness cannot be overstated in the context of e-commerce, where instant gratification has become an increasingly important expectation (Griffis, S. E., Rao, S., Goldsby, T. J., & Niranjan, 2012). Customers who experience delays or uncertainties in delivery schedules often express dissatisfaction, which can overshadow other positive aspects of the shopping experience (Rao, S., Goldsby, T. J., & Iyengar, 2011). Similarly, receiving products in good condition is fundamental to satisfaction, as damaged goods not only create inconvenience but also generate doubt about the reliability of the entire e-commerce ecosystem.

In the West Java context, which has demographic diversity and varying levels of digital literacy, consistency in e-logistics service quality becomes an important factor in shaping customer satisfaction. Customers who receive timely delivery services, products in good condition, and transparent tracking information tend to feel satisfied with their online shopping experience(Collier, J. E., & Bienstock, 2006). The ability to track shipments in real-time has become particularly valued by customers, as it provides a sense of control and reduces anxiety associated with online purchases where products cannot be physically examined before purchase.

Moreover, the responsiveness of customer service in handling inquiries or problems related to deliveries plays a crucial role in satisfaction formation (Parasuraman, A., Zeithaml, V. A., & Malhotra, 2005). When issues arise, customers expect quick resolution and empathetic communication from e-logistics providers. The quality of problem-solving and recovery efforts often determines whether a negative experience can be transformed into a neutral or even positive one, thereby maintaining or restoring customer satisfaction.

**H1: E-logistics service quality has a positive and significant effect on customer satisfaction in West Java.**

**The Influence of Customer Satisfaction on Customer Loyalty**

Customer satisfaction has long been viewed as a primary predictor of customer loyalty (Caruana, 2002)(Danurdara, A. B., & Masatif, 2025). Further research shows that customers who are satisfied with logistics services have a higher tendency to make repeat purchases and provide positive recommendations for e-commerce platforms (Aqabneh, 2025)(Wu, 2020). In the highly competitive e-commerce environment in West Java, customer satisfaction with logistics services becomes a crucial differentiating factor. Customers with high satisfaction levels tend to develop attachment to specific platforms and reduce the likelihood of switching to other providers. This attachment is particularly important in markets where multiple e-commerce platforms offer similar products at comparable prices, making the service experience—especially logistics—a key competitive battleground.

The formation of loyalty through satisfaction is also influenced by the cumulative effect of repeated satisfactory experiences (Bolton, 1998). A single positive delivery experience may generate satisfaction, but sustained loyalty requires consistent service quality across multiple transactions. This consistency builds trust and confidence in the service provider, creating switching barriers that protect customer relationships against competitive pressures.

**H2: Customer satisfaction has a positive and significant effect on e-commerce customer loyalty in West Java.**

**The Influence of E-Logistics Service Quality on Customer Loyalty**

Besides the indirect path through customer satisfaction, e-logistics service quality can also have a direct influence on customer loyalty. Superior service can create barriers to exit, as customers realize that similar quality may not be easily found on other e-commerce platforms. In the West Java context, characterized by strong online consumption growth especially in secondary cities, consistency in e-logistics service quality becomes an important factor encouraging customers to remain loyal to specific platforms, even without an explicit satisfaction evaluation process.

**H3: E-logistics service quality has a positive and significant effect on customer loyalty in West Java.**

**The Mediating Role of Customer Satisfaction**

Several studies show that customer satisfaction plays a mediating role in the relationship between service quality and customer loyalty. (Wu, 2020) found that satisfaction with post-delivery services serves as a link between service quality and repurchase intention. Similar findings were presented by (Aqabneh, 2025), who identified customer satisfaction as a significant mediator in the relationship between e-logistics service quality and customer loyalty. Research by (Baron, R. M., & Kenny, 1986) established the foundational framework for understanding mediation effects in causal relationships, which has been widely applied in service quality research. The mediating role of satisfaction suggests that service quality improvements must be perceived and evaluated by customers to generate loyalty outcomes (Cronin, J. J., Brady, M. K., & Hult, 2000). This mediation implies that e-logistics providers

cannot simply focus on technical service excellence but must also ensure that quality improvements are visible and meaningful to customers, thereby translating into satisfaction and subsequently loyalty (Parasuraman, A., Zeithaml, V. A., & Malhotra, 2005).

In the West Java context, this mediating role indicates that e-logistics service quality not only affects customer loyalty directly but also through the formation of customer satisfaction levels first. Satisfaction functions as an evaluative process that translates perceptions of service quality into behavioral commitment in the form of loyalty.

**H4: Customer satisfaction positively and significantly mediates the relationship between e-logistics service quality and customer loyalty in West Java.**

## Methodology

This research employs a quantitative approach with a survey method to test the causal model among variables. The main analytical technique is Structural Equation Modeling-Partial Least Squares (SEM-PLS). Independent variables include e-logistics service quality, while customer satisfaction serves as the mediating variable, and customer loyalty as the dependent variable. The choice of SEM-PLS as the analytical method is appropriate for this research because it allows simultaneous testing of complex relationships among multiple variables, including direct and indirect (mediated) effects (Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, 2017). SEM-PLS is particularly suitable for exploratory research and situations where the focus is on prediction and theory development rather than theory confirmation, making it ideal for investigating the mediating role of satisfaction in a specific regional context like West Java.

The research population consists of e-commerce customers in West Java who have used e-logistics services. The sample is determined using purposive sampling technique with the criteria of respondents who have made at least three online purchases with delivery in the past six months. The sample size is targeted at 200 respondents to ensure statistical power (Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, 2021). The selection of 200 respondents is based on the requirements of SEM-PLS analysis which uses the 10 times rule, meaning the minimum sample size must be 10 times the largest number of structural paths directed at a particular construct in the structural model. Since this research has multiple paths, the use of 200 respondents not only meets the minimum requirement but also improves model estimation accuracy, loading value stability, and overall structural analysis power. This sample size provides adequate statistical power to detect medium effect sizes and ensures the reliability of path coefficient estimates in the structural model (Cohen, 1988).

The research is conducted in West Java, as a center for e-commerce activity with varying levels of technology adoption, allowing generalization of findings to similar contexts in Indonesia (Sudirman, D., Anggraini, R., & Sari, 2023). The geographic scope enables capturing the diversity of e-logistics experiences across urban and semi-urban areas, providing a comprehensive understanding of the satisfaction-loyalty relationship in different market segments within the province. The main instrument uses a structured questionnaire with a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree),

adapted from valid instruments such as the SERVQUAL model (Parasuraman, A., Zeithaml, V. A., & Berry, 1988), E-S-QUAL for online service quality (Parasuraman, A., Zeithaml, V. A., & Malhotra, 2005), and customer loyalty scales (Zeithaml, V. A., Berry, L. L., & Parasuraman, 1996). Data collection tools include Google Forms for online surveys and face-to-face interviews for validation. The questionnaire design incorporates items measuring multiple dimensions of e-logistics service quality, including reliability, timeliness, information accuracy, security, and responsiveness (Mentzer, J. T., Flint, D. J., & Hult, 2001). Customer satisfaction is measured through overall satisfaction evaluations as well as satisfaction with specific service attributes (Oliver, 1999). Customer loyalty is assessed through behavioral intentions such as repurchase intention, willingness to recommend, and resistance to switching to competitors (Zeithaml, V. A., Berry, L. L., & Parasuraman, 1996).

Analysis is conducted using SmartPLS 4.0 software for SEM-PLS, which supports evaluation of measurement and structural models (Ringle, C. M., Wende, S., & Becker, 2022). Data is collected through online surveys distributed via email, WhatsApp, and West Java e-commerce customer platforms, as well as offline surveys at strategic locations. The collection period takes place over 2-3 months, beginning with a pilot test on 30 respondents to ensure instrument validity and reliability (Cronbach's alpha > 0.7). Respondents are provided with informed consent, and data is anonymized for research ethics(Santoso, B., Handoko, T., & Nugroho, 2022). Analysis begins with descriptive statistics for respondent profiles, followed by evaluation of the measurement model including convergent validity (Average Variance Extracted/AVE > 0.5), discriminant validity (Fornell-Larcker criterion and HTMT ratio), and composite reliability (CR > 0.7) (Fornell, C., & Larcker, 1981). The structural model is tested using bootstrapping with 5,000 resamples for path coefficient significance and R-squared values. Hypotheses are tested with t-test ($p < 0.05$), and the mediating effect is evaluated using the VAF (Variance Accounted For) approach (Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, 2017). SmartPLS software is used for visualization and interpretation of results (Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, 2021).

The bootstrapping procedure ensures the stability and reliability of parameter estimates, particularly for the mediation analysis where indirect effects are examined (Preacher, K. J., & Hayes, 2008). The significance of the mediating effect is assessed using the bootstrapping confidence interval approach, which provides accurate estimates of indirect effects without assuming normal distribution of the sampling distribution

## Result and Discussion

This section discusses the results of the analysis of research data obtained from the respondent questionnaire and discusses the empirical findings. The analysis was conducted using the SEM-PLS method to test construct validity and reliability, as well as the relationships between research variables in accordance with the formulated hypotheses. The analysis results are then discussed with reference to theory and previous research to provide a comprehensive understanding of the phenomenon under study. The respondent profiles in this study were compiled to provide an overview of the basic characteristics of e-logistics service users in West Java. A total of 200 respondents participated, and all data

were deemed suitable for analysis. Respondent profiles are presented based on three main categories: gender, age, and frequency of e-logistics use.

**Table 1.** Respondent Profile.

| Characteristics | Category | Frequency | Precent (%) |
|---|---|---|---|
| Gender | Female | 118 | 59 |
| | Male | 82 | 41 |
| Age (Years) | Under 20 | 9 | 4.5 |
| | 20-30 | 57 | 28.5 |
| | 31-40 | 48 | 24 |
| | Over 40 | 86 | 43 |
| Frequency of e-Logistics Use (Times/Month) | 1-2 | 55 | 27.5 |
| | 3-5 | 87 | 43.5 |
| | 6-10 | 49 | 24.5 |
| | More than 10 | 9 | 4.5 |

Source : Data obtained by researchers, 2025

Based on respondent characteristics, gender distribution shows a predominance of female respondents at 59%, while male respondents were 41%. This composition indicates a tendency for female respondents to participate more strongly in e-logistics use. Descriptively, these proportions are relatively balanced, but significant percentage differences indicate potential variations in e-logistics usage behavior based on gender.

In terms of age, respondents were predominantly aged 40 and over (43%), followed by those aged 20–30 (28.5%) and those aged 31–40 (24%). This distribution indicates that e-logistics users in this study tend to be adults and professionally mature. The predominance of the over-40 age group may reflect a higher level of operational needs and work experience, potentially influencing the intensity and effectiveness of e-logistics use. The wide variation in age distribution provides an adequate basis for conducting segmentation analysis by age group.

Based on the frequency of e-logistics use per month, the majority of respondents were in the moderate usage category, namely 3–5 times per month (43.5%), followed by low usage 1–2 times per month (27.5%) and high usage 6–10 times per month (24.5%). Meanwhile, the very high usage category (more than 10 times per month) only included 4.5% of respondents. This pattern indicates that e-logistics has been used routinely, but has not reached a very high level of intensity for the majority of respondents.

## Measurement Model Analysis

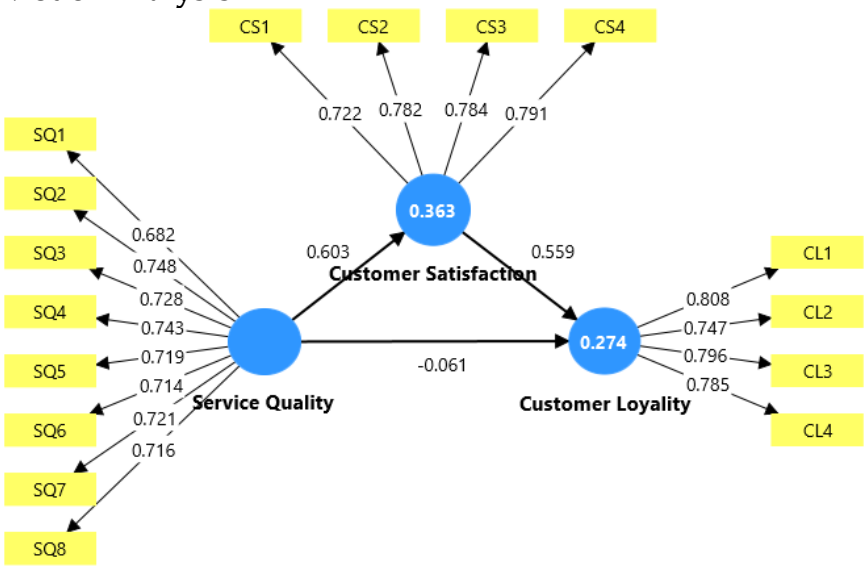


**Figure 1.** Path Diagram (Outer Loading).
Source : Smart-PLS, 2025

The figure above shows that Service Quality has a positive effect on Customer Satisfaction with a path coefficient of 0.603, indicating that better service quality increases customer satisfaction. Furthermore, Customer Satisfaction also has a positive effect on Customer Loyalty with a coefficient of 0.559, indicating that satisfied customers tend to have higher loyalty. However, the test results show that Service Quality has no direct effect on Customer Loyalty, as indicated by a weak and negative path coefficient of -0.061. This indicates that improving service quality does not automatically increase customer loyalty without prior satisfaction.

The R-square value of 0.363 for the Customer Satisfaction variable indicates that 36.3% of the variation in customer satisfaction can be explained by Service Quality. Meanwhile, the R-square value of 0.274 for Customer Loyalty indicates that 27.4% of the variation in customer loyalty is explained by Service Quality and Customer Satisfaction. Overall, these results confirm that Customer Satisfaction acts as a mediating variable in the relationship between Service Quality and Customer Loyalty.

## Reliability and Validity Test

**Table 2.** Reliability and Validity Test.

| Variable | Cronbach'a Alpha | Composite Reliability (rho_a) | Composite Reliability (rho_c) | Average Variance Extracted (AVE) |
|---|---|---|---|---|
| Service Quality | 0.869 | 0.871 | 0.897 | 0.520 |
| Customer Satisfaction | 0.772 | 0.777 | 0.854 | 0.593 |
| Customer Loyality | 0.792 | 0.797 | 0.865 | 0.615 |

Source : Data obtained by researchers, 2025

The results of the measurement and structural model tests, shown in Table 2 above, indicate that the Service Quality, Customer Satisfaction, and Customer Loyalty constructs meet the criteria for analysis using SmartPLS. Based on Table 2, all variables have Cronbach's Alpha and Composite Reliability (rho_a and rho_c) values above 0.70, indicating that the indicators used have good internal consistency and are able to reliably measure the constructs. Furthermore, the Average Variance Extracted (AVE) values for all three variables are also above the minimum threshold of 0.50, thus concluding that the measurement model meets convergent validity and is suitable for use in testing relationships between variables.

After the measurement model was declared valid and reliable, the structural model test revealed that Service Quality has a positive effect on Customer Satisfaction with a path coefficient of 0.603. These results indicate that improving service quality can significantly increase customer satisfaction levels. Furthermore, Customer Satisfaction also positively influences Customer Loyalty with a coefficient of 0.559, indicating that satisfied customers tend to have a higher level of commitment and loyalty to the company.

However, the test results show that Service Quality does not have a direct effect on Customer Loyalty, as indicated by a path coefficient of -0.061. This finding indicates that service quality alone is insufficient to build customer loyalty without perceived satisfaction. In other words, Customer Satisfaction acts as a mediating variable, bridging the relationship between Service Quality and Customer Loyalty.

The R-square value of 0.363 for the Customer Satisfaction variable indicates that Service Quality explains 36.3% of the variation in customer satisfaction. Meanwhile, the R-square value of 0.274 for Customer Loyalty indicates that the combination of Service Quality and Customer Satisfaction explains 27.4% of the variation in customer loyalty. While there are other factors outside the model that influence customer loyalty, these results confirm that customer satisfaction is a key factor in building loyalty.

**Table 3.** Model Fit Index (PLS-SEM).

| Model Fit Index | Value | Boundary Criteria | Description |
|---|---|---|---|
| SRMR (Standardized Root Mean Square Residual) | 0.067 | <0.08 | Good model fit |
| d_ULS | 0.616 | <HI95/HI99 | Model fit |
| d_G | 0.170 | <HI95/HI99 | Model fit |
| Chi-Square | 195.117 | Not a primary criterion | Not used as a primary determinant |
| NFI (Normed Fit Index) | 0.842 | >0.90 | Fair (marginal) model fit |

Source : Data obtained by researchers, 2025

Based on the test results in Table 3, this research model was evaluated using several model fit indices, namely SRMR, d_ULS, d_G, Chi-Square, and NFI, each of which provides different information regarding the model's level of fit. The Standardized Root Mean Square

Residual (SRMR) value of 0.067 indicates a good level of fit for the model, as it is below the recommended threshold of 0.08. SRMR measures the average difference between the observed correlation and the correlation predicted by the model. This SRMR result confirms that the model has good overall model fit. The d_ULS value of 0.616 and d_G of 0.170 indicate that both indices are below the HI95/HI99 bootstrapping threshold. This indicates that there is no significant difference between the empirical and theoretical models, and therefore the constructed model structure can be considered to be a good fit for the data. The acceptability of these two indices strengthens the evidence that the research model has good structural consistency.

The Chi-Square value of 195.117 was not used as the primary criterion for assessing model fit in PLS-SEM. This is because the Chi-Square statistic is highly sensitive to sample size, so in relatively large samples, the Chi-Square value tends to be high even though the model fits the data. Therefore, even if the Chi-Square value obtained is relatively large, it cannot be used as a basis for concluding that the model is not fit. In the context of PLS-SEM, the primary focus is directed towards alternative indices such as SRMR, d_ULS, and d_G. Meanwhile, the Normed Fit Index (NFI) value of 0.842 indicates that the model's fit is in the fair or marginal category, as it has not yet reached the ideal value of ≥ 0.90. The NFI measures the extent to which a proposed model is better than the null model. An NFI value approaching 1 indicates a model that is improving. Although the NFI value in this study was not optimal, it is still acceptable for predictive and exploratory PLS-SEM research, as well as for models involving latent constructs with multiple indicators. Therefore, this NFI value does not weaken the overall model's suitability, but rather indicates room for model improvement in future research.

Overall, the model fit evaluation results indicate that the PLS-SEM model used in this study meets most of the model suitability criteria. The SRMR, d_ULS, and d_G indices consistently show good results, while the NFI has a sufficient level of fit. These combined results confirm that this research model is suitable for testing the structural relationships between Service Quality, Customer Satisfaction, and Customer Loyalty.

## Hypothesis Testing

**Table 3.** Hypothesis Testing.

| Variable | Original Sample (O) | Sample Mean (M) | Standard Deviation | T Statistics (\|O/STDEV\|) | P Value |
|---|---|---|---|---|---|
| Customer Satisfaction - Customer Loyality | 0.559 | 0.561 | 0.071 | 7.923 | 0.000 |
| Service Quality - Customer Loyality | -0.061 | -0.061 | 0.076 | 0.814 | 0.416 |
| Service Quality -Customer Satisfaction | 0.603 | 0.609 | 0.041 | 14.568 | 0.000 |
| Service Quality - Customer Satisfaction -Customer Loyality | 0.337 | 0.342 | 0.050 | 6.697 | 0.000 |

Source : Data obtained by researchers, 2025

Based on the hypothesis testing results in Table 3, the following findings were obtained:

1. Customer Satisfaction - Customer Loyalty

   This relationship has a path coefficient (Original Sample) of 0.559, with a T-statistic of 7.923 and a P-value of 0.000. The T-statistic is greater than 1.96 and the P-value is less than 0.05, indicating that the effect of Customer Satisfaction on Customer Loyalty is significant and positive. This indicates that higher customer satisfaction leads to higher customer loyalty.
2. Service Quality - Customer Loyalty

   This relationship has a path coefficient of –0.061, with a T-statistic of 0.814 and a P-value of 0.416. These values indicate that the effect of Service Quality on Customer Loyalty is insignificant. Thus, service quality does not directly influence customer loyalty.
3. Service Quality - Customer Satisfaction

   This relationship has a path coefficient of 0.603, with a T-statistic of 14.568 and a P-value of 0.000, indicating a positive and significant effect. This means that improving service quality directly increases customer satisfaction.
4. Service Quality → Customer Satisfaction → Customer Loyalty (Indirect Effect)

   This mediation path has a coefficient of 0.337, with a T-statistic of 6.697 and a P-value of 0.000, indicating a significant indirect effect. This proves that Customer Satisfaction mediates the relationship between Service Quality and Customer Loyalty.

**The Effect of E-Logistics Service Quality on Customer Satisfaction**

The results of the hypothesis test indicate that e-logistics service quality has a positive and significant effect on customer satisfaction. This finding indicates that the better the quality of e-logistics service provided, the higher the level of customer satisfaction. In the context of e-logistics, aspects such as delivery reliability, timeliness, accuracy of tracking information, security of goods, and responsiveness of customer service are important factors shaping customer perceptions of service quality. When e-logistics services meet or exceed customer expectations, customers will evaluate the experience positively, which is reflected in increased customer satisfaction. These results align with the view that service quality is a key determinant in shaping customer satisfaction with technology-based and digital services.

**The Effect of Customer Satisfaction on Customer Loyalty**

The results also indicate that customer satisfaction has a positive and significant effect on customer loyalty. This finding confirms that satisfied customers tend to exhibit loyal behaviors, such as reusing services, recommending services to others, and establishing a long-term commitment to e-logistics service providers. Customer satisfaction reflects the overall evaluation of the service experience received. Therefore, when the experience is consistent and satisfying, customers will develop trust and emotional attachment. Thus,

customer satisfaction serves as a key foundation for building customer loyalty in the highly competitive e-logistics industry.

**The Effect of E-Logistics Service Quality on Customer Loyalty**

Unlike the two previous relationships, the test results show that e-logistics service quality does not directly influence customer loyalty. This finding indicates that although service quality is important, customers do not automatically become loyal simply because the service provided is of good quality. In the context of e-logistics services, customers tend to assess loyalty based on their overall experience, not solely on technical service attributes. In other words, service quality must first be internalized by customers in the form of satisfaction before it can drive loyalty. This finding suggests that customer loyalty is more complex and influenced by psychological and evaluative factors, not just by direct service performance.

**The Mediating Role of Customer Satisfaction in the Relationship between E-Logistics Service Quality and Customer Loyalty**

The results of the indirect effect test indicate that customer satisfaction fully mediates the relationship between e-logistics service quality and customer loyalty. This full mediation is demonstrated by the insignificant direct effect of service quality on loyalty, while the indirect effect through customer satisfaction proved significant. This finding confirms that customer satisfaction is a key mechanism bridging service quality and customer loyalty. This means that improving e-logistics service quality will only impact loyalty if it creates customer satisfaction. Therefore, a company's strategy to increase customer loyalty should not only focus on improving operational service quality, but also on managing the overall customer experience to generate sustainable satisfaction.

**Conclusion**

Based on the data analysis and discussion regarding the influence of e-logistics service quality on customer satisfaction and loyalty, the following conclusions can be drawn:

1. E-logistics service quality has a positive and significant effect on customer satisfaction. This indicates that the better the quality of e-logistics services provided, in terms of reliability, timeliness, information accuracy, security, and responsiveness of digital services, the higher the perceived level of customer satisfaction.
2. Customer satisfaction has a positive and significant effect on customer loyalty. These findings indicate that customers who are satisfied with e-logistics services tend to have a stronger commitment, demonstrated through repeated use of the service, a desire to continue using the same provider, and a tendency to recommend the service to others.
3. E-logistics service quality does not have a direct effect on customer loyalty. These results indicate that good service quality does not automatically generate customer loyalty. Customer loyalty is more influenced by the customer's experience and overall evaluation of the service received, which is reflected in the level of satisfaction.

4. Customer satisfaction fully mediates the relationship between e-logistics service quality and customer loyalty. This confirms that customer satisfaction is a key factor bridging the influence of service quality on loyalty. In other words, improving the quality of e-logistics services will only impact customer loyalty if it can consistently create a sense of satisfaction.
5. E-logistics companies are advised to prioritize improving customer satisfaction as the primary strategy in building loyalty, with a focus on aspects of reliability, timeliness, information accuracy, security, and responsiveness of digital services. Investment in real-time tracking technology, accurate notification systems, and responsive customer service can be strategic steps to enhance customer satisfaction, which will ultimately drive long-term loyalty. Considering that e-logistics service quality does not have a direct effect on customer loyalty, companies need to ensure that every improvement in service quality can be perceived and evaluated positively by customers to create a consistently satisfying experience.

Overall, this study concludes that customer satisfaction plays a strategic role in building customer loyalty in e-logistics services.

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