INTERNATIONAL JOURNAL OF SOCIAL SCIENCE, EDUCATIONAL, ECONOMICS, AGRICULTURE RESEARCH AND TECHNOLOGY (IJSET) | ISSN (E): 2827-766X
Website: https://ijset.org/ | Volumes 5 No. 8 (2026)

CUSTOMER SATISFACTION LAST MILE DELIVERY IN ECOMMERCE SUPPLY CHAIN: STUDY ON SHOPEE AND TOKOPEDIA

Nasywa Natania[1*], Abdurrahman Faris Indriya Himawan[2]
[1]International ICT Business, Faculty Of Economics And Business, Telkom University, Bandung
[2]International ICT Business, Faculty Of Economics And Business, Telkom University, Bandung
E-mail: nasywanataniar@gmail.com[1], farislike@telkomuniversity.ac.id[2]

Received: 02/06/2026 | **Revised** : 11/06/2026 | **Accepted:** 23/06/2026 | **Published** :08/07/2026

Abstract

The continuous expansion of Indonesia's e-commerce market has made last-mile delivery a decisive factor in shaping customer experience. As competition intensifies between Shopee and Tokopedia, delivery performance increasingly influences how customers evaluate their shopping experience and whether they choose to repurchase. Although both platforms have strengthened their logistics systems and digital capabilities, issues related to delivery punctuality, reliability, cost transparency, and courier service quality remain evident. This research explores how different aspects of last-mile delivery contribute to customer satisfaction and examines whether these relationships differ between the two platforms. Drawing upon Expectation-Confirmation Theory and supported by service quality perspectives, the study focuses on delivery speed, delivery reliability, tracking visibility, courier professionalism, and delivery cost as key variables. A quantitative explanatory approach was adopted through survey distribution to active e-commerce users in Indonesia. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), followed by Multi-Group Analysis. The findings are expected to provide empirical insights into the delivery attributes that most strongly influence customer satisfaction while supporting academic discussions on e-commerce logistics and managerial decision-making to improve last-mile delivery performance.

Keywords: customer satisfaction; delivery performance; e-commerce logistics; last-mile delivery; platform comparison

INTRODUCTION

E-commerce in Indonesia has experienced remarkable growth, with the gross merchandise value (GMV) projected to reach 90.35 billion USD by 2025, marking a 15.51 percent compound annual growth rate toward 185.71 billion USD by 2030 (Mordor Intelligence, 2025). This surge is fueled by widespread mobile adoption, urbanization, and the dominance of platforms like Shopee and Tokopedia, which together command over 60 percent of online sales (Statista, 2025). The research object in this study focuses on last-mile delivery services within the e-commerce supply chain, specifically comparing Shopee and Tokopedia as leading platforms in Indonesia (Li et al., 2021). Shopee, with an active user base exceeding 103 million, holds a dominant share of gross merchandise value in the Indonesian market, while Tokopedia, following its merger with TikTok Shop under the GoTo Group, leverages content-driven commerce to capture a growing segment (Business of Apps, 2025; Tech in Asia, 2025).

In this dynamic landscape, last mile delivery emerges as the most critical yet inefficient segment in e-commerce supply chains, often accounting for up to 50 percent of total logistics costs amid growing urban freight volumes (Santana et al., 2022). The rapid expansion of Indonesia's e-commerce industry has intensified demands on last mile delivery performance, making it a critical determinant of customer satisfaction and platform competitiveness (Zaatariyah et al., 2023). Despite substantial investments by Shopee and Tokopedia in logistics infrastructure, significant academic and practical challenges remain, particularly regarding delivery efficiency, reliability, cost structures, and sustainability (Silva et al., 2023; Wang et al., 2023). Customers increasingly expect faster and more accurate deliveries, yet recurrent issues such as delivery delays, inconsistent courier performance, and limited infrastructure indicate persistent gaps between customer expectations and operational outcomes (Sharma et al., 2022).

Several prior studies have explored related domains and laid the foundation for evaluating delivery performance. For instance, Vrhovac et al. (2024) identified the most influential factors on customer satisfaction in last-mile delivery, finding that delivery speed, courier professionalism, trust in courier service, and price are the strongest positive predictors of satisfaction. Similarly, Lai et al. (2021) examined parcel locker services in last-mile logistics and determined that timeliness is the strongest predictor of satisfaction, followed by reliability, security, responsiveness, and tangibles. From an emerging market perspective, Mogire et al. (2023) measured the level of customer satisfaction with last-mile delivery in Kenya, concluding that users are most satisfied with delivery options but least satisfied with returns. Furthermore, Aljohani (2024) empirically examined the influence of last-mile delivery attributes in Saudi Arabia, noting a strong preference for next-day delivery and showing that delivery quality significantly mediates overall e-commerce satisfaction. On the aspect of alternative solutions, Altuntaş Vural and Aktepe (2021) explained the failure of a large-scale collection-and-delivery point (CDP) network, revealing that the failure was caused by inadequate network design, lack of consumer convenience, poor IT integration, and absence of horizontal collaboration.

In a broader logistics and supply chain context, Sidik et al. (2024) demonstrated that logistics capabilities significantly influence firm performance, particularly in terms of operational efficiency, responsiveness, and service quality. Azmi et al. (2025) developed a dynamic capabilities framework in Malaysia, showing that dynamic capabilities significantly enhance supply chain resilience and reduce operational disruptions. Exploring technological implementation, Himawan et al. (2024) evaluated supply chain performance using a smart and sustainable approach, finding that the implementation of smart supply chain systems improves operational transparency, efficiency, and sustainability performance. Relatedly, Himawan et al. (2023) analyzed supply chain transformation strategies and discovered that supply chain transformation significantly improves efficiency, coordination, and service performance. Lastly, linking logistics with environmental aspects, Oloruntobi et al. (2025) assessed biofuel implementation viability, demonstrating that sustainable transportation solutions can improve long-term operational efficiency while reducing environmental impact.

Beyond these conditions, the central problem of this research lies in the way last mile delivery has been studied in the existing literature. Much of the prior work examines delivery quality through a single broad construct or relies on general service quality scales that were not designed for the specific stages of last mile fulfilment. To address this gap, the present research departs from the single construct and generic scale approaches and instead decomposes last mile delivery into five measurable attributes that reflect the actual delivery experience, namely delivery speed, delivery reliability, delivery cost, tracking visibility, and courier professionalism. These attributes are then modelled together against customer satisfaction within a Partial Least Squares Structural Equation Modeling framework, which allows the relative weight of each attribute to be estimated simultaneously rather than in isolation. This framework also supports a Multi Group Analysis that compares the satisfaction mechanism across Shopee and Tokopedia, a comparison that aggregate single platform studies cannot provide.

METHOD

This study is designed as explanatory-causal quantitative research that seeks not only to measure the magnitude of influence of last-mile delivery quality dimensions on customer satisfaction but also to statistically test the causal pathways and comparative differences between two dominant e-commerce platforms in Indonesia: Shopee and Tokopedia. The methodology is exclusively quantitative with a survey strategy as the primary data collection mechanism (Sekaran, & Bougie, 2016). Furthermore, the unit of analysis is the individual consumer, data collection remains non-intrusive through an online questionnaire, the research setting is non-contrived (real-world e-commerce usage), and the temporal design is cross-sectional.

Regarding the respondents, the population in this study refers to all Indonesian citizens aged 18 years and above who have conducted at least three purchase transactions on either Shopee or Tokopedia within the last six months. To ensure adequate representation, the final minimum acceptable threshold is set at 400 valid responses, with an enforced quota of at least 200 respondents per platform in order to maintain adequate statistical power for Multi Group Analysis as recommended by Hair et al. (2022). The sampling technique uses a hybrid non probability approach (Saunders et al., 2015). First, purposive sampling is applied, followed by snowball sampling and paid online panel recruitment to enhance response diversity and completeness. All variables are measured reflectively using primary data collected through a structured questionnaire. The measurement in this research is a modification rather than a pure replication of a single existing instrument, maintaining its foundation in internationally validated scales

utilizing a 5-point Likert scale. Specifically, the indicators for Delivery Speed and Courier Professionalism were adapted from Vrhovac et al. (2024) and Aljohani (2024). For Delivery Reliability and Tracking Visibility, the measurement items were developed based on Lai et al. (2021) and Mogire et al. (2023). In addition, Delivery Cost and the dependent variable, Customer Satisfaction, incorporate conceptual elements and scale adaptations from Vrhovac et al. (2024), Aljohani (2024), and Lai et al. (2021).

The rigorous appraisal of validity and reliability within this investigation adheres to an intricate, multifaceted protocol, meticulously calibrated to safeguard the precision and steadfastness of every measurement indicator employed. Content validity is meticulously forged via a deliberative expert appraisal mechanism, while face validity undergoes scrutiny through an array of cognitive debriefing sessions. Convergent validity is gauged by dual benchmarks: outer loadings surpassing 0.708 and an Average Variance Extracted (AVE) threshold of no less than 0.50 per construct. Discriminant validity is probed utilizing the Fornell-Larcker benchmark alongside the Heterotrait-Monotrait Ratio (HTMT). In terms of consistency, internal consistency reliability is quantified via Cronbach's alpha and Composite Reliability metrics.

For the final evaluation, this inquiry harnesses Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS version 4.1.1, an analytical paradigm judiciously chosen for its adeptness in navigating elaborate configurations replete with latent constructs, its resilience amid non-normally distributed data, and its formidable facilitation of Multi-Group Analysis essential for juxtaposing Shopee and Tokopedia cohorts. The structural paradigm is dissected through path coefficients, the coefficient of determination (R^2), effect magnitudes (f^2), and predictive pertinence (Q^2 derived from blindfolding). Ultimately, hypotheses undergo adjudication via bootstrapping entailing ten thousand subsamples, adopting a two-tailed significance benchmark of $p < 0.05$ to ascertain relational import, followed by PLS-MGA to discern if noteworthy divergences manifest between the Shopee and Tokopedia cohorts.

RESULTS AND DISCUSSION

Respondent Characteristics

This descriptive analysis aims to map the demographic profiles of the 384 respondents who successfully participated and provided valid questionnaire responses. Understanding these background traits helps contextualize their evaluations of last-mile delivery services on both Shopee and Tokopedia. The demographic data encompasses gender, age groups, primary e-commerce platform utilized, shopping frequency, and provincial domicile, all of which are systematically compiled in Table 1.

Table 1. Characteristics of Respondents

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	173	45.1
	Female	211	54.9
Age Group	18-24 years old	110	28.6
	25-34 years old	174	45.3
	35-44 years old	74	19.3
	45 years old and above	26	6.8
E-commerce Platform	Shopee	192	50.0
	Tokopedia	192	50.0
Shopping Frequency (in the last 6 months)	1-3 times	80	20.8
	4-6 times	131	34.1
	7-10 times	113	29.4
	More than 10 times	60	15.6
Domicile (Province)	Banten	36	9.4
	DKI Jakarta	77	20.1
	Jawa Barat	113	29.4
	Jawa Tengah	68	17.7

	Jawa Timur	39	10.2
	Sumatera Utara	18	4.7
	Others	33	8.6
Total		**384**	**100.0**

Source: Data Processed (2026)

In terms of gender distribution, the data reveals that female consumers represent the majority of the sample, accounting for 211 individuals or 54.9 percent. Male consumers comprise the remaining 173 respondents, representing 45.1 percent. This distribution suggests that online shopping activities in Indonesia, particularly on platforms like Shopee and Tokopedia, capture a slightly higher interest among women, even though male participation remains substantial within the digital retail ecosystem. Furthermore, the analysis of age groups indicates that the largest segment of respondents falls within the 25-34 age range, with 174 individuals, followed by the 18-24 age group at 110 individuals. Respondents aged 35-44 number 74, while those aged 45 and above represent the smallest share at 26 individuals. This breakdown confirms that the active e-commerce users sampled for this study are concentrated among youth and working-age populations who are naturally adaptive to digital transactions and logistics platforms. Crucially for this comparative study, the e-commerce platform variable exhibits a perfectly symmetrical distribution, with Shopee and Tokopedia users split evenly at 192 respondents each. This equal sample size was deliberately structured during data collection to satisfy the technical requirements for multi-group comparison. This balanced layout ensures that the comparative analysis of last-mile delivery performance in subsequent sections remains objective, fair, and free from structural bias toward either platform. Regarding online shopping frequency over the past six months, respondents who placed orders 4-6 times constitute the largest group at 131 individuals. Users with a frequency of 7-10 purchases follow at 113 individuals, whereas infrequent shoppers who make 1-3 purchases total 80 individuals. The remaining 60 respondents are highly active users with more than 10 transactions, verifying that the sample possesses sufficient hands-on experience to reliably evaluate courier performance and fulfillment timelines. Geographically, the respondent pool is primarily anchored in West Java (Jawa Barat), contributing 113 respondents, followed by DKI Jakarta with 77 individuals and Central Java (Jawa Tengah) with 68 individuals. Consumers residing in East Java (Jawa Timur) account for 39 individuals, Banten accounts for 36 individuals, North Sumatra (Sumatera Utara) stands at 18 individuals, and other scattered locations make up the final 33 individuals. This geographic concentration reflects national logistics realities, where domestic e-commerce volume remains heavily centered around Java due to population density and highly established transport infrastructure.

Measurement Model Assessment (Outer Model)

The data analysis in this study is executed using Partial Least Squares Structural Equation Modeling (PLS-SEM). This analytical process is divided into two major stages: the assessment of the measurement model (outer model) and the evaluation of the structural model (inner model).

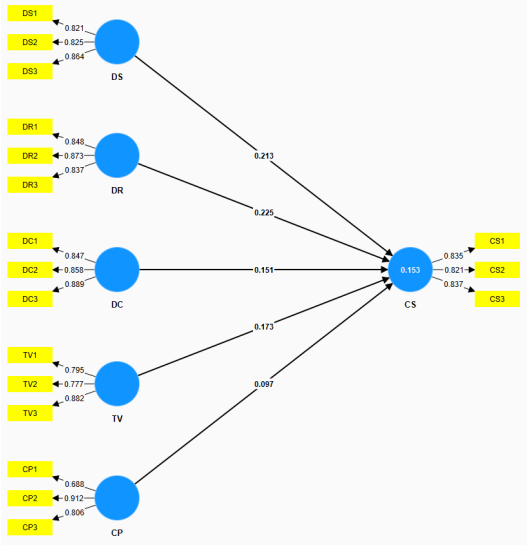

Fig 1. Path Modeling

Outer loadings measure the relationship between each indicator and its underlying latent construct. According to established psychometric standards, outer loadings should exceed the threshold of 0.708 to prove that the indicators share a high level of common variance with the latent variable.

Table 2. Outer Loadings

Indicator	CP	CS	DC	DR	DS	TV
CP1	0.788					
CP2	0.912					
CP3	0.806					
CS1		0.835				
CS2		0.821				
CS3		0.837				
DC1			0.847			
DC2			0.858			
DC3			0.889			
DR1				0.848		
DR2				0.873		
DR3				0.837		
DS1					0.821	
DS2					0.825	
DS3					0.864	
TV1						0.795
TV2						0.777
TV3						0.882

Source: SmartPLS 4 Output (2026)

The measurement values presented in Table 4.2 demonstrate that every single empirical item successfully exceeds the required psychometric threshold of 0.708. The lowest outer loading is observed in item TV2 at 0.777, while the highest loading is recorded for item CP2 at 0.912. Because all structural indicators exhibit values above the minimum baseline, every survey item is retained for subsequent path modeling, establishing that the underlying constructs possess strong item-level reliability.

Table 3. Fornell-Larcker Criterion Matrix

Construct	CP	CS	DC	DR	DS	TV

CP	0.113					
CS	0.113	0.167				
DC	0.078	0.167	0.054			
DR	0.061	0.270	0.054	0.044		
DS	0.097	0.260	0.098	0.044	0.068	
TV	0.068	0.216	0.069	0.077	0.068	0.068

Source: SmartPLS 4 Output (2026)

The correlation patterns detailed in Table 3 confirm that the cross-construct correlations remain low across the entire measurement framework. The vertical and horizontal relationships indicate that the latent variables do not capture overlapping characteristics. This confirms that the statistical setup meets the initial requirements for discriminant validity before moving to more modern assessment indices.

Table 4. Heterotrait-Monotrait Ratio (HTMT)

Relationship	**HTMT Value**
CS <-> CP	0.113
DC <-> CP	0.078
DC <-> CS	0.167
DR <-> CP	0.061
DR <-> CS	0.270
DR <-> DC	0.054
DS <-> CP	0.097
DS <-> CS	0.260
DS <-> DC	0.098
DS <-> DR	0.044
TV <-> CP	0.068
TV <-> CS	0.216
TV <-> DC	0.069
TV <-> DR	0.077
TV <-> DS	0.068

Source: SmartPLS 4 Output (2026)

As shown in Table 4, the HTMT ratios for all construct pairs are well below the maximum allowable threshold of 0.850. The highest structural value is observed between Customer Satisfaction and Delivery Reliability at 0.270, followed by the relationship between Customer Satisfaction and Delivery Speed at 0.260. These low values prove that the constructs are empirically distinct from each other, confirming excellent discriminant validity for all logistics attributes.

Table 5. Construct Reliability and Validity Summary

Construct	**Cronbach's Alpha**	**Composite Reliability (rho_a)**	**Composite Reliability (rho_c)**	**Average Variance Extracted (AVE)**
CP	0.775	0.871	0.847	0.651
CS	0.776	0.777	0.870	0.691
DC	0.835	0.868	0.899	0.748
DR	0.814	0.821	0.889	0.728
DS	0.786	0.794	0.875	0.700
TV	0.760	0.811	0.859	0.671

Source: SmartPLS 4 Output (2026)

The reliability and validity indices summarized in Table 5 demonstrate high instrument quality across all constructs. Every single variable records a Cronbach's alpha and composite reliability index that comfortably exceeds the 0.700 threshold, confirming excellent internal consistency. Additionally, the AVE values range from 0.651 to

0.748, which are well above the 0.500 minimum requirement. This proves that the empirical items provide solid convergent validity for the overall model. Model fit assessment confirms that the structural framework adequately reflects the empirical data. This is verified primarily through the Standardized Root Mean Square Residual (SRMR), where values under 0.080 indicate a proper fit.

Table 6. Model Fit Summary

Metric	Saturated Model	Estimated Model
SRMR	0.057	0.057
d_ULS	0.550	0.550
d_G	0.255	0.255
Chi-square	609.576	609.576
NFI	0.729	0.729

Source: SmartPLS 4 Output (2026)

According to the model fit indicators detailed in Table 4.6, the SRMR value stands at exactly 0.057 for both the saturated and estimated models. Because this number is below the 0.080 threshold, it confirms that the structural model matches the sample data well. The matching parameters between the saturated and estimated models show that the overall setup is stable and free from structural discrepancies.

The predictive relevance of the model is analyzed using the PLSpredict procedure, which applies a 10-fold cross-validation technique. Positive Q square predict values confirm that the model offers meaningful out-of-sample predictive power.

Table 7. PLSpredict Assessment

Indicator	Q2 predict	PLS-SEM RMSE	LM RMSE	PLS-SEM MAE	LM MAE
CS1	0.072	0.871	0.883	0.694	0.705
CS2	0.081	0.888	0.905	0.731	0.736
CS3	0.093	0.890	0.909	0.728	0.741

Source: SmartPLS 4 Output (2026)

The out-of-sample predictive markers provided in Table 4.7 reveal positive Q square predict values for all target indicators of the dependent variable. Furthermore, when evaluating the prediction errors, the PLS-SEM Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) values for every indicator are lower than the naive Linear Model (LM) benchmarks. This pattern confirms that the measurement framework holds high predictive power.

Structural Model Evaluation and Hypothesis Testing (Inner Model)

Before evaluating the structural paths, the model must be checked for potential multicollinearity issues among the indicators. High collinearity can distort the estimation of path coefficients. A Variance Inflation Factor (VIF) value below 5.00 indicates that the model is free from problematic multicollinearity.

Table 8. Variance Inflation Factor (VIF)

Indicator	VIF Value	Status
CP1	1.683	No Collinearity
CP2	1.591	No Collinearity
CP3	1.531	No Collinearity
CS1	1.672	No Collinearity
CS2	1.553	No Collinearity
CS3	1.591	No Collinearity
DC1	1.958	No Collinearity
DC2	2.080	No Collinearity
DC3	1.823	No Collinearity
DR1	1.699	No Collinearity
DR2	1.874	No Collinearity
DR3	1.824	No Collinearity
DS1	1.598	No Collinearity
DS2	1.640	No Collinearity
DS3	1.707	No Collinearity
TV1	1.496	No Collinearity
TV2	1.524	No Collinearity
TV3	1.600	No Collinearity

Source: SmartPLS 4 Output (2026)

The inner VIF values shown in Table 8 demonstrate that all item-level collinearity indicators fall comfortably below the conservative threshold of 5.00. The highest recorded value is observed for indicator DC2 at 2.080, while the lowest is found in TV1 at 1.496. These low metrics confirm that there are no redundant overlaps among the indicators, allowing the structural path estimations to proceed without statistical distortion. The R-square value indicates the proportion of variance in the endogenous construct that can be explained by the exogenous constructs within the model. Higher values reflect a stronger explanatory power for the dependent variable.

Table 9. Coefficient of Determination (R-square)

Endogenous Construct	R-square	R-square Adjusted
Customer Satisfaction (CS)	0.153	0.142

Source: SmartPLS 4 Output (2026)

As displayed in Table 9, the R-square value for Customer Satisfaction is 0.153, with an adjusted R-square of 0.142. This shows that the five last-mile delivery attributes, Courier Professionalism, Delivery Cost, Delivery Reliability, Delivery Speed, and Tracking Visibility, collectively account for 15.3 percent of the variance in Customer Satisfaction. While this explanatory capacity is considered modest, it highlights that last-mile delivery performance acts as a distinct and meaningful contributor to overall user satisfaction within the broader e-commerce ecosystem. The f-square effect size measures the unique contribution of an exogenous variable toward explaining a specific endogenous latent construct. Effect sizes are classified into three baseline categories: 0.020 represents a small effect, 0.150 represents a medium effect, and 0.350 signifies a large effect.

Table 10. f-square Effect Size Matrix

Exogenous Construct	Customer Satisfaction (CS)	Effect Level
Courier Professionalism (CP)	0.011	None / Weak
Delivery Cost (DC)	0.027	Small
Delivery Reliability (DR)	0.060	Small
Delivery Speed (DS)	0.053	Small
Tracking Visibility (TV)	0.035	Small

Source: SmartPLS 4 Output (2026)

The individual effect markers listed in Table 10 reveal that Delivery Reliability exerts the highest relative impact on Customer Satisfaction with an f-square value of 0.060, followed closely by Delivery Speed at 0.053. Delivery Visibility and Delivery Cost also post small but noticeable effect sizes at 0.035 and 0.027, respectively. Conversely, Courier Professionalism records an f-square value of 0.011, indicating that its isolated strength in driving overall satisfaction is minimal. To evaluate the predictive relevance of the model beyond the immediate dataset, the PLSpredict function was applied with a 10-fold cross-validation method. Positive values for the Q square predict metric demonstrate viable predictive power.

Table 11. PLSpredict Evaluation

Dependent Indicator	Q2 predict	PLS-SEM RMSE	LM RMSE	PLS-SEM MAE	LM MAE
CS1	0.072	0.871	0.883	0.694	0.705
CS2	0.081	0.888	0.905	0.731	0.736
CS3	0.093	0.890	0.909	0.728	0.741

Source: SmartPLS 4 Output (2026)

The out-of-sample statistics shown in Table 11 yield positive Q square predict scores across all targeted components of the Customer Satisfaction construct. Furthermore, the prediction error evaluation shows that both the Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) for the PLS-SEM approach are lower than the naive Linear Model (LM) benchmarks for every single item. This consistent configuration indicates that the structural model possesses substantial predictive capability. To evaluate the structural hypotheses proposed in this research, bootstrapping with 10,000 subsamples was performed to determine the path coefficients, T-statistics, and P-values. A path is considered statistically significant if its T-statistic exceeds 1.96 or its P-value is lower than the 0.050 significance level.

Table 12. Structural Path Coefficients and Significance

Relationship	Path Coefficient (O)	Sample Mean (M)	Standard Deviation	T Statistics	P Values	Status
CP -> CS	0.097	0.106	0.067	1.457	0.145	Rejected
DC -> CS	0.151	0.158	0.048	3.159	0.002	Accepted
DR -> CS	0.225	0.229	0.046	4.917	0.000	Accepted
DS -> CS	0.213	0.217	0.044	4.797	0.000	Accepted
TV -> CS	0.173	0.178	0.048	3.572	0.000	Accepted

Source: SmartPLS 4 Output (2026)

Table 13. Confidence Intervals Bootstrapping

Relationship	Original Sample (O)	Sample Mean (M)	2.5% Bias	97.5% Bias
CP -> CS	0.097	0.106	-0.122	0.196
DC -> CS	0.151	0.158	0.069	0.251
DR -> CS	0.225	0.229	0.138	0.319
DS -> CS	0.213	0.217	0.129	0.303
TV -> CS	0.173	0.178	0.084	0.273

Source: SmartPLS 4 Output (2026)

The hypothesis testing values detailed in Table 4.12 and Table 4.13 outline the specific impacts of last-mile logistics features on e-commerce satisfaction. For the relationship of Courier Professionalism to Customer Satisfaction (CP -> CS), this path shows a coefficient of 0.097 with a T-statistic of 1.457 and a P-value of 0.145; because the P-value exceeds 0.050 and the confidence interval spans across zero (-0.122 to 0.196), Courier Professionalism does not have a statistically significant effect on Customer Satisfaction in this combined model. In contrast, the Delivery Cost to Customer Satisfaction (DC -> CS) structural path exhibits a positive coefficient of 0.151, supported by a T-statistic of 3.159 and a P-value of 0.002, demonstrating that more favorable or competitive delivery pricing significantly improves user satisfaction. Delivery Reliability to Customer Satisfaction (DR -> CS) scores the highest overall positive influence with a coefficient of 0.225, a strong T-statistic of 4.917, and a P-value of 0.000, confirming that fulfillment accuracy and reliable parcel handling represent the most vital drivers of client satisfaction. Following closely, Delivery Speed to Customer Satisfaction (DS -> CS) demonstrates a strong positive coefficient of 0.213, with a T-statistic of 4.797 and a P-value of 0.000, which highlights that shorter transit times and prompt home deliveries are critical for keeping digital shoppers satisfied. Finally, Tracking Visibility to Customer Satisfaction (TV -> CS) registers a positive coefficient of 0.173, alongside a T-statistic of 3.572 and a P-value of 0.000, emphasizing that providing transparent, real-time updates on a parcel's location significantly enhances user confidence and satisfaction

Multigroup Analysis (MGA)

A Partial Least Squares Multi-Group Analysis (PLS-MGA) was conducted to evaluate whether the structural relationships differ significantly between Shopee users and Tokopedia users. A structural path difference between the two platforms is considered statistically significant if the two-tailed P-value is less than 0.050 or greater than 0.950.

Table 14. MGA Path Coefficients Comparison

Structural Path	Path Difference (Shopee - Tokopedia)	1-Tailed P-Value	2-Tailed P-Value	Result
CP -> CS	0.010	0.421	0.843	No Significant Difference
DC -> CS	-0.124	0.791	0.419	No Significant Difference
DR -> CS	0.084	0.172	0.343	No Significant Difference
DS -> CS	0.144	0.051	0.101	No Significant Difference
TV -> CS	0.161	0.050	0.100	No Significant Difference

Source: SmartPLS 4 Output (2026)

Table 15. MGA Group Confidence Intervals

Structural Path	2.5% (Shopee)	97.5% (Shopee)	2.5% (Tokopedia)	97.5% (Tokopedia)
CP -> CS	-0.262	0.234	-0.210	0.213
DC -> CS	-0.135	0.283	0.119	0.360
DR -> CS	0.157	0.383	0.040	0.311
DS -> CS	0.183	0.408	-0.042	0.268
TV -> CS	0.128	0.375	-0.179	0.199

Source: SmartPLS 4 Output (2026)

The multi-group comparisons outlined in Table 14 and Table 15 reveal that there are no statistically significant differences in the path coefficients between Shopee and Tokopedia at a 5 percent significance level. Specifically, the path difference for Courier Professionalism stands at a minimal 0.010 (two-tailed P-value of 0.843),

showing that courier behavior affects satisfaction similarly across both platforms. Furthermore, the path difference for Delivery Cost is -0.124 (two-tailed P-value of 0.419), which indicates that delivery costs influence satisfaction in a comparable manner for both Shopee and Tokopedia users. For Delivery Reliability, the difference is 0.084 (two-tailed P-value of 0.343), confirming that the critical role of dependable parcel delivery applies equally to both customer groups. Delivery Speed (difference of 0.144, two-tailed P-value of 0.101) and Tracking Visibility (difference of 0.161, two-tailed P-value of 0.100) both show slightly higher coefficients for Shopee. However, because their two-tailed P-values do not cross the 0.050 or 0.950 boundaries, these differences are not statistically significant. Ultimately, this indicates that the core mechanisms driving consumer satisfaction remain stable across both major Indonesian e-commerce platforms.

DISCUSSION

The Influence of Last-Mile Delivery Performance on Customer Satisfaction

The results of this study demonstrate that last-mile delivery performance has a statistically significant influence on customer satisfaction among Indonesian e-commerce users, with four out of five dimensions showing positive effects. Delivery Reliability is the strongest predictor among all variables examined, while Delivery Speed followed closely, both contributing substantially to explaining variations in customer satisfaction. Although the overall model's explanatory power is considered moderate, it confirms that last-mile delivery performance remains a relevant factor in shaping customer evaluations of their online shopping experience.

Further analysis reveals that Tracking Visibility and Delivery Cost also exert positive and significant influences. Real-time and accurate parcel tracking information enhances customer confidence during the delivery process, and when customers perceive shipping fees as reasonable and supported by accessible promotions, their satisfaction increases. In contrast, Courier Professionalism did not reach statistical significance. This result implies that while polite and helpful courier behavior may be appreciated by customers, it does not substantially drive overall satisfaction compared to operational attributes such as reliability and speed in the current research context.

From a theoretical standpoint, the findings are largely consistent with the Expectation-Confirmation Theory, which posits that customer satisfaction arises from the comparison between pre-purchase expectations and actual perceived performance. When last-mile delivery attributes such as reliability, speed, and tracking visibility meet or exceed customer expectations, positive disconfirmation occurs and leads to higher satisfaction. The significant effects of four dimensions highlight the strategic importance of logistics performance in the competitive Indonesian e-commerce market.

These empirical results are supported by several recent studies on last-mile delivery and customer satisfaction. Aljohani (2024) found that last-mile delivery quality significantly mediates overall online shopping satisfaction and repurchase intention. Similarly, Vrhovac et al. (2024) identified delivery reliability and speed as the strongest predictors of user satisfaction. Mogire et al. (2023) reported that reliability and tracking features were key determinants of customer satisfaction in Kenya's emerging e-commerce market, while Klein et al. (2022) also demonstrated that perceived convenience and efficiency of last-mile delivery methods significantly influence consumer acceptance and satisfaction.

A closer reading shows how the five attributes relate to one another rather than acting in isolation. Delivery Reliability and Delivery Speed stand almost level, indicating that Indonesian customers do not trade speed against dependability but expect both at once, operating as twin pillars of satisfaction rather than as substitutes. This pattern sharpens the findings of Harter, Stich, and Spann (2024), who emphasise delivery time as the primary lever in quick commerce, because the present evidence shows that in a competitive two platform market dependability carries weight that is nearly equal to speed.

In addition, Tracking Visibility sits a clear step below the two performance attributes, which positions it as a strong supporting factor that reassures customers during the wait yet cannot offset a parcel that arrives late or damaged. The Indonesian evidence reported in the EMIS analysis (2024) points in the same direction, since real time tracking shaped satisfaction and trust for Shopee users without displacing the core performance attributes. Finally, Delivery Cost enters with a positive sign because the construct was measured through cost fairness and value for money, and this is where the result departs most sharply from Rashid and Rasheed (2024), who report that shipping cost has no significant effect on product satisfaction in Pakistani e-commerce. The contrast is instructive, because the heavy use of free shipping vouchers by Shopee and Tokopedia makes Indonesian customers attentive to whether a

delivery charge feels justified, which turns cost fairness into a meaningful driver in this market even where it is silent elsewhere

Comparison of Key Factors Affecting Customer Satisfaction Between Shopee and Tokopedia

The Multi-Group Analysis (MGA) using the permutation test revealed that there are no statistically significant differences in the path coefficients between Shopee and Tokopedia users. The absence of significant differences suggests that customers of both Shopee and Tokopedia apply comparable standards when evaluating last-mile delivery performance. This finding implies that core operational expectations regarding logistics services have become relatively standardized in the Indonesian e-commerce market. Although Shopee is often perceived as more aggressive in pricing and promotions while Tokopedia has strengthened its position through content-driven commerce, these differences do not appear to create substantial variations in how customers assess delivery quality.

This convergence in customer evaluation patterns may also reflect the increasing competitiveness and operational standardization in Indonesia's e-commerce logistics sector. Customers appear to have developed similar expectations and evaluation criteria regardless of which platform they primarily use, suggesting that competitive advantages in the last-mile segment may be diminishing.

These findings are consistent with recent literature on last-mile delivery across different e-commerce contexts. Escudero-Santana et al. (2022) found that customer preferences for last-mile solutions tend to follow consistent patterns across various retail environments. Similarly, Sorooshian (2022) highlighted that core delivery performance attributes exert relatively stable effects on satisfaction regardless of specific platform characteristics. Bouhouras et al. (2024) observed similar evaluation patterns among different user groups when assessing last-mile delivery options, and Andrei (2024) also noted that operational efficiency and reliability in last-mile delivery produce comparable impacts on customer satisfaction across different e-commerce settings.

Ultimately, the absence of any significant difference is best explained by the shared operational backbone of the two marketplaces, since both rely on overlapping third party courier networks, comparable in app tracking, and similar free shipping mechanics. This reading extends the single platform study of Ruslim and Aurellia (2025), which examined Shopee service attributes in isolation and therefore could not show whether the same mechanism governs a competing platform, while the present comparison demonstrates that it does. Furthermore, the Turkish evidence reported in a recent Partial Least Squares study (2025) supports the same logic by showing that the underlying service quality mechanism in last mile delivery tends to remain stable across providers that share a delivery model.

The Most Significant Last-Mile Delivery Attributes Contributing to Perceived Delivery Quality

Among the five last-mile delivery attributes examined in this study, Delivery Reliability and Delivery Speed emerged as the most influential contributors to perceived delivery quality and customer satisfaction. These two attributes demonstrate the strongest statistical relationships with customer satisfaction and should therefore be prioritized in operational improvements. Delivery Reliability encompasses critical aspects such as on-time performance, parcel condition upon arrival, and successful first-attempt delivery, all of which directly address customers' fundamental expectations regarding service certainty and consistency.

Furthermore, Tracking Visibility also plays a meaningful role in shaping customer perceptions. This attribute enhances transparency and reduces uncertainty during the delivery process, allowing customers to monitor their parcels in real time. Delivery Cost also shows a positive and significant effect, indicating that when shipping fees are perceived as reasonable and supported by accessible promotions, customer satisfaction increases. In contrast, Courier Professionalism did not reach statistical significance. This result suggests that customers tend to prioritize tangible delivery outcomes, such as reliability and speed, over interpersonal interactions with delivery personnel in the current Indonesian e-commerce context.

The dominance of Delivery Reliability and Delivery Speed as the most influential attributes has important implications for both academic understanding and managerial practice. From a theoretical perspective, these findings reinforce the importance of outcome-based service attributes in Expectation-Confirmation Theory and the SERVQUAL framework, particularly the dimensions of reliability and responsiveness (Mohammad et al., 2023). From a practical standpoint, the results suggest that e-commerce platforms should allocate greater resources toward strengthening backend logistics capabilities, route optimization systems, and real-time tracking technologies rather than focusing exclusively on soft-skill training for couriers. Improving these core operational attributes is likely to yield higher returns in terms of customer satisfaction and loyalty.

These conclusions are supported by several recent empirical studies on last-mile delivery attributes. Restuputri et al. (2022) found that Indonesian customers highly value reliability and speed when evaluating last-mile delivery services. Ilieva et al. (2022) reported that delivery performance and reliability significantly impact customer satisfaction in e-commerce environments. Urquhart et al. (2022) emphasized that capacity and reliability constraints in last-mile fulfillment directly affect customer experience and service quality perceptions. Additionally, Vrhovac et al. (2023) demonstrated that user experience in last-mile delivery is strongly shaped by speed, tracking accuracy, and overall operational reliability.

The one attribute that does not follow the expected pattern deserves a fuller explanation, since Courier Professionalism fails to reach significance. On the surface this seems to contradict the service quality tradition, where the conduct of frontline staff usually matters a great deal, and it sits in direct contrast to Vrhovac et al. (2024), who find that the behaviour of delivery personnel does influence customer evaluations in courier services. The contrast becomes understandable once the structure of the Indonesian marketplace model is taken into account. On Shopee and Tokopedia, fulfilment is handled by a rotating pool of third party couriers, so a customer rarely meets the same courier twice and the personal relationship that gives professionalism its weight in dedicated courier services never has the chance to form.

The interaction at the doorstep is also brief and increasingly contactless, which further dilutes the effect of courtesy and appearance. In this platform mediated setting customers appear to judge the outcome of the delivery far more than the manner of the person who hands it over, which pushes the professionalism effect below the level of significance. This is a specific and theoretically grounded contribution rather than a simple null result, because it identifies the boundary condition under which a normally influential service quality attribute loses its force. Read alongside the effect sizes, where Delivery Reliability and Delivery Speed carry the two largest values while Courier Professionalism carries the smallest, the message for platform managers is clear. Investment in dependable and rapid fulfilment yields the highest return in satisfaction, transparent tracking and fair pricing serve as strong supporting levers, and resources devoted to courier presentation are unlikely to move satisfaction as much in a marketplace where the courier relationship is fleeting

CONCLUSION

This study concludes that last-mile delivery performance has a statistically significant influence on customer satisfaction, with Delivery Reliability and Delivery Speed being the most significant contributors to perceived delivery quality. Furthermore, there are no statistically significant differences in the influence of last-mile delivery dimensions on customer satisfaction between Shopee and Tokopedia users, suggesting that operational excellence in last-mile delivery has become a baseline expectation rather than a source of competitive differentiation. Therefore, both Shopee and Tokopedia should prioritize investments in improving delivery reliability and speed, alongside enhancing real-time tracking systems and maintaining competitive yet transparent shipping costs. To create meaningful differentiation in the future, platforms may need to explore other areas, such as sustainability initiatives or personalized delivery options, while future research could integrate additional variables, include other emerging platforms, and explore the role of emerging technologies, such as autonomous delivery vehicles and artificial intelligence-based route optimization.

REFERENCES

Sidik, H., Himawan, A. F. I., Razik, M. A., Abdul-Aziz, M. Z., Muhammad-Hasan, M. Z., & Hasan, N. H. H. W. (2024). The Nexus of Logistics Capabilities on Firm Performance: An Empirical Study on Logistics Service Providers' Perspective. Journal of Maritime Research, 21(2), 118–127.

Azmi, F. R., Sukri, N. M., Sundram, V. P. K., Mahmood, W. H. W., & Himawan, A. F. I. (2025). A dynamic capabilities framework for managing supply chain risk and building resilience in Malaysia's priority manufacturing sectors. PaperASIA, 41(5b), 402–409.

Himawan, A. F. I., Razik, M. A., Zain, R. M., & Mahmood, W. H. W. (2024). Smart halal supply chain performance: Indonesia fishery ports sustainable. International Journal of Innovation and Industrial Revolution (IJIREV).

Himawan, A. F. I., Sidik, M. H., Hasan, M. Z. M., Suryana, I. S., & bin Wan Abdul, W. M. A. (2023). Halal horizons: Revolutionizing supply chains at Indonesian's fishery port. Devotion: Journal of Research and Community Service, 4(8), 1686–1696.

Oloruntobi, O., Mokhtar, K., Himawan, A. F. I., Gohari, A., Onigbara, V., Rozar, N., & Balasudarsun, N. L. (2025). Economic and environmental assessment of fatty-acid-methyl-ester and hydrotreated vegetable oil biofuels viability for future marine engines. Bioresource Technology Reports, 30, 102146.

Aljohani, K. (2024). The role of last-mile delivery quality and satisfaction in online retail experience: An empirical analysis. Sustainability, 16(11), 4743. https://doi.org/10.3390/su16114743

Altuntaş Vural, C., & Aktepe, Ç. (2021). Why do some sustainable urban logistics innovations fail? The case of collection and delivery points. Research in Transportation Business & Management, 45, 100690. https://doi.org/10.1016/j.rtbm.2021.100690

Lai, P.-L., Jang, H., Fang, M., & Peng, K. (2021). Determinants of customer satisfaction with parcel locker services in last-mile logistics. The Asian Journal of Shipping and Logistics, 38(1), 25–30. https://doi.org/10.1016/j.ajsl.2021.11.002

Li, F., Fan, Z.-P., Cao, B.-B., & Li, X. (2021). Logistics service mode selection for last mile delivery: An analysis method considering customer utility and delivery service cost. Sustainability, 13(1), 284. https://doi.org/10.3390/su13010284

Mogire, E., Kilbourn, P. J., & Luke, R. (2023). Customer satisfaction with last-mile delivery in Kenya: An online customer perspective. Journal of Transport and Supply Chain Management, 17, a844. https://doi.org/10.4102/jtscm.v17i0.844

Mohammad, W. A. M., Diab, Y. N., Elomri, A., & Triki, C. (2023). Innovative solutions in last mile delivery: Concepts, practices, challenges, and future directions. Supply Chain Forum: An International Journal, 24(2), 151–169. https://doi.org/10.1080/16258312.2023.2173488

Saunders, M., Lewis, P., & Thornhill, A. (2015). Research methods for business students (7th ed.). Pearson Education.

Sekaran, U., & Bougie, R. (2016). Research methods for business: A skill-building approach (7th ed.). Wiley.

Sharma, V. P., Prakash, S., & Singh, R. (2022). What prevents sustainable last-mile delivery in Industry 4.0? An analysis and decision framework. Sustainability, 14(24), 16423. https://doi.org/10.3390/su142416423

Silva, V., Amaral, A., & Fontes, T. (2023). Sustainable urban last-mile logistics: A systematic literature review. Sustainability, 15(3), 2285. https://doi.org/10.3390/su15032285

Vrhovac, V., Dakić, D., Milisavljević, S., Ćelić, Đ., Stefanović, D., & Janković, M. (2024). The factors influencing user satisfaction in last-mile delivery: The structural equation modeling approach. Mathematics, 12(12), 1857. https://doi.org/10.3390/math12121857

Wang, G., Zhang, Z., Li, S., & Shin, C. (2023). Research on the influencing factors of sustainable supply chain development of agri-food products based on cross-border live-streaming e-commerce in China. Foods, 12(17), 3323. https://doi.org/10.3390/foods12173323

Zaatariyah, R., Muslihudin, M., Nurhuda, A., & Sinta, D. (2023). Comparative study of customer satisfaction and service quality at shopee and tokopedia. Jurnal Ekonomi Lembaga Layanan Pendidikan Tinggi Wilayah I, 3(2), 48-59.

Aljohani, K. (2024). The role of last-mile delivery quality and satisfaction in online retail experience: An empirical analysis. Sustainability, 16(11), 4743. https://doi.org/10.3390/su16114743

Vrhovac, V., et al. (2024). The factors influencing user satisfaction in last-mile delivery: The structural equation modeling approach. Mathematics, 12(12), 1857. https://doi.org/10.3390/math12121857

Mahmood, W. H. W., Yaakob, M. Y., Mohamed, K. A., Azmi, F. R., Hasan, M. Z., & Himawan, A. F. I. (2026). A Review of the Process Control System in Aero-Composite Manufacturing Operations. PaperASIA, 42(1b), 46–56.

Mogire, E., Kilbourn, P. J., & Luke, R. (2023). Customer satisfaction with last-mile delivery in Kenya: An online customer perspective. Journal of Transport and Supply Chain Management, 17(0), a844. https://doi.org/10.4102/jtscm.v17i0.844

Kafi, M. A., Ismail, N., Mohamad, M., Himawan, A. F. I., Chuah, L. F., Ramasamy, R., Rozar, N. M., Razik, M. A., & Zainuddin, N. (2026). Gender inequality in the transport and logistics sector: implications from the perspective of equity and labor market discrimination theories. The International Journal of Logistics Management. https://doi.org/10.1108/IJLM-12-2024-0780.

Klein, P., et al. (2022). Last-mile delivery methods in e-commerce: Does perceived sustainability matter for consumer acceptance and usage? Sustainability, 14(24), 16437. https://doi.org/10.3390/su142416437

Escudero-Santana, A., et al. (2022). Improving e-commerce distribution through last-mile delivery. Journal of Theoretical and Applied Electronic Commerce Research, 17(2), 27. https://doi.org/10.3390/jtaer17020027

Sorooshian, S. (2022). Toward a modern last-mile delivery: Consequences and research needs. Applied System Innovation, 5(4), 82. https://doi.org/10.3390/asi5040082

Bouhouras, E., et al. (2024). Unlocking the potential of pick-up points in last-mile delivery. Applied Sciences, 14(22), 10629. https://doi.org/10.3390/app142210629

Andrei, N., et al. (2024). Transforming e-commerce logistics: Sustainable last-mile solutions. Logistics, 8(3), 71. https://doi.org/10.3390/logistics8030071

Restuputri, D. P., et al. (2022). Customer perception on last-mile delivery services using Kansei engineering. Logistics, 6(2), 29. https://doi.org/10.3390/logistics6020029

Ilieva, G., et al. (2022). Customer satisfaction in e-commerce during the COVID-19 pandemic. Systems, 10(6), 213. https://doi.org/10.3390/systems10060213

Urquhart, R., et al. (2022). Last-mile capacity constraints in online grocery fulfilment. Journal of Theoretical and Applied Electronic Commerce Research, 17(2), 33. https://doi.org/10.3390/jtaer17020033

Vrhovac, V., et al. (2023). Measuring e-commerce user experience in the last-mile delivery process. Mathematics, 11(6), 1482. https://doi.org/10.3390/math11061482