DIJEMSS:
Dinasti International Journal of Education Management and Social Science
E-ISSN: 2686-6331
P-ISSN: 2686-6358
https://dinastipub.org/DIJEMSS dinasti.info@gmail.com +62 811 7404 455
DINASTI PUBLISHER

DOI: https://doi.org/10.38035/dijemss.v7i4

The Effect of on Time Performance, Tracking System and Cargo Insurance on Customer Loyalty Through Customer Satisfaction Moderated By Age

Isti Fani[1], Edi Abdurachman[2], Juliater Simarmata[3], Nofrisel[4]
[1]Institute of Transportation and Logistics Trisakti, Jakarta, Indonesia, istifani.iskandar@gmail.com
[2]Institute of Transportation and Logistics Trisakti, Jakarta, Indonesia, edia@itl.trisakti.ac.id
[3]Institute of Transportation and Logistics Trisakti, Jakarta, Indonesia, juliaters@gmail.com
[4]Institute of Transportation and Logistics Trisakti, Jakarta, Indonesia, nofrisel@gmail.com

Corresponding Author: istifani.iskandar@gmail.com[1]

Abstract: This study examines the effects of on-time performance, tracking systems, and cargo insurance on customer loyalty in logistics services, with customer satisfaction as a mediating variable and age as a moderating factor. A quantitative approach was applied using Partial Least Squares Structural Equation Modeling (PLS-SEM). Data were collected through questionnaires from 318 logistics service users, providing adequate statistical robustness. The findings indicate that on-time performance, tracking systems, and cargo insurance significantly influence both customer satisfaction and customer loyalty. Customer satisfaction plays a key mediating role by strengthening the relationship between service attributes and loyalty. Moderation analysis shows that age strengthens these relationships among Generation Z. Overall, the study highlights the critical role of service reliability, information transparency, and risk protection in enhancing customer satisfaction and loyalty in logistics services

Keyword: On-time performance, Tracking system, Cargo insurance, Customer loyalty, Customer satisfaction, Age.

INTRODUCTION

Indonesia's digital economy has expanded rapidly, driven by the strong growth of e-commerce supported by technological advancement and the increasing adoption of online business models. In 2023, the total number of e-commerce transactions in Indonesia reached 3.71 billion, exceeding the 3.49 billion transactions recorded in 2022. This growth reflects a sustained upward trend in e-commerce activity, largely influenced by changes in consumer purchasing behavior toward online shopping.

Globally, e-commerce growth in 2024 is projected to reach 10.4%, while Indonesia is expected to record the highest growth rate at 30.5%, nearly three times the global average. This rapid expansion highlights the growing importance of selecting reliable logistics and cargo delivery services. Amid the increasing number of logistics service providers, expedition companies are required to develop competitive advantages and value-added services to ensure long-term sustainability and customer retention.

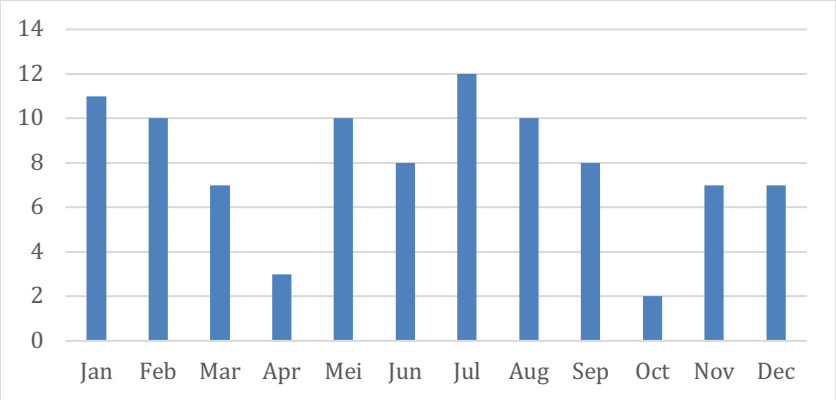
Table 1. The Most Dominant Shipping Service Used By Customers

2017		2018		2019		2020		Predicate
Merk	TBI	Merk	TBI	Merk	TBI	Merk	TBI	
JNE	49,4%	JNE	45,00%	JNE	26,40%	JNE	27,30%	TOP
TIKI	34,70%	J&T	13,90%	J&T	20,30%	J&T	21,30%	TOP
POS	8,40%	TIKI	13,50%	TIKI	13,50%	TIKI	10,80%	TOP
DHL	1,30%	POS	11,60%	POS	5,40%	POS	7,70%	TOP

Sources : Aleron & Nurhadi (2022)

Within the e-commerce logistics market, approximately 30% of total e-commerce transactions are handled by courier and delivery service providers such as JNE, J&T, TIKI, and similar logistics companies. This proportion highlights the substantial dependence of the e-commerce sector on logistics services as an integral component of the value chain.

The increasing share of e-commerce logistics services is also reflected in the competitive dynamics among expedition providers. JNE, which held a dominant market position in 2017, was able to maintain its strong presence and competitive advantage through 2020. This trend indicates that established logistics providers continue to play a critical role in supporting the rapid expansion of e-commerce activities, despite the emergence of new competitors in the market.



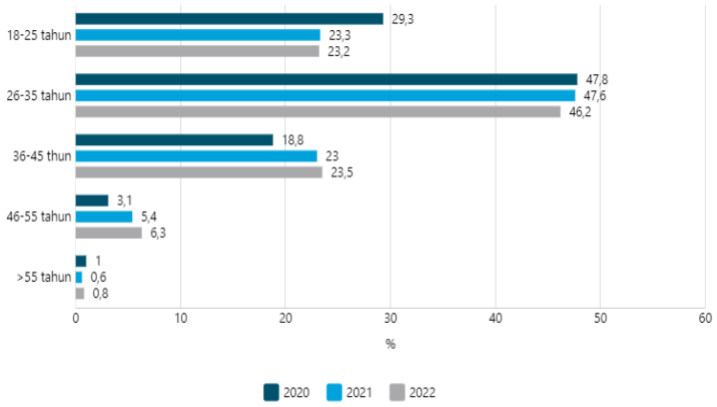
Source: Wibowo (2019)

Figure 1. Complaints Graph for Package Delivery at PT X Expedition

Based on the data presented in Figure 1.3, it can be observed that during the month of July there were 12 customer complaints related to PT X's parcel delivery services. These complaints arose from various issues, including delivery delays, damaged shipments, lost parcels during transit, as well as customer dissatisfaction with the company's complaint-handling process.

One recurring problem in the distribution process is the discrepancy between the information displayed in the tracking system and the actual conditions experienced by customers. Such inconsistencies not only generate customer dissatisfaction but also undermine trust in both logistics service providers and e-commerce platforms.

In e-commerce transactions, cargo insurance serves as an important consumer protection mechanism against the risk of damage or loss during delivery. However, in practice, disputes frequently arise when the compensation received by customers does not correspond to the insured value stated in the cargo insurance policy, further contributing to customer dissatisfaction and perceived service unreliability.



Source: BPS (2023)

Figure 2 Ecommerce Users by Age

Based on the data, Generation Z play a major role in online shopping activities. However, the most dominant users of marketplace platforms are consumers aged 18–25 years. The data also indicate a consistent and stable increase in e-commerce purchases each year, reflecting sustained growth in online consumption.

These findings suggest that customer loyalty remains well maintained, while customer satisfaction with online shopping activities is evident from the previously presented graphical data. This condition is crucial for companies to preserve, as declining satisfaction and loyalty may threaten long-term business sustainability. Therefore, maintaining high levels of customer satisfaction and loyalty is essential for ensuring the continuity and competitiveness of companies operating in the e-commerce ecosystem.

METHOD

This study employs a quantitative research methodology with a structured and sequential research framework. The research was conducted in the Special Capital Region of Jakarta (DKI Jakarta), which serves as the national hub for economic and logistics activities. The study was carried out from January to August 2025. The research population consists of Generation Z residents in the greater DKI Jakarta area. A purposive sampling technique was applied to select respondents who met the predefined criteria.

The required sample size was determined using the formula proposed by Hair et al. (2019), which indicated a minimum of 250 respondents. However, a total of 318 valid responses were collected, exceeding the minimum requirement. This larger sample size enhances data representativeness and reduces potential response bias, particularly in studies incorporating age as a moderating variable.

Primary data were collected through questionnaires distributed to customers who had previously used logistics delivery services, complemented by in-depth interviews with selected respondents. Secondary data were obtained from relevant books, academic journals, undergraduate theses, master's theses, and other supporting literature. Data analysis was conducted using Structural Equation Modeling (SEM) with the assistance of SmartPLS statistical software.

RESULTS AND DISCUSSION

Results

1. Validity Testing

Table 2. Validity Testing

Variable	Indicator	*Loading Factor*	Description
On-Time Performance (X1)	X1.1	0.849	VALID
	X1.2	0.800	VALID
	X1.3	0.884	VALID
	X1.4	0.825	VALID
	X1.5	0.848	VALID
Tracking System (X2)	X2.1	0.828	VALID
	X2.2	0.863	VALID
	X2.3	0.869	VALID
	X2.4	0.853	VALID
	X2.5	0.864	VALID
Cargo Insurance (X3)	X3.1	0.827	VALID
	X3.2	0.749	VALID
	X3.3	0.895	VALID
	X3.4	0.893	VALID
	X3.5	0.884	VALID
Customer Loyalty (Y)	Y1	0.823	VALID
	Y2	0.836	VALID
	Y3	0.750	VALID
	Y4	0.871	VALID
	Y5	0.868	VALID
Customer Satisfaction (Z)	Z1	0.891	VALID
	Z2	0.927	VALID
	Z3	0.842	VALID
	Z4	0.910	VALID
	Z5	0.910	VALID

The validity test results indicate that all indicators have loading factor values above 0.70, demonstrating that each indicator makes a strong contribution to representing the overall variable construct. Accordingly, all indicators for each variable are declared valid and can therefore be utilized in subsequent measurement model and structural model analyses.

2. Heterotrait-Monotrait Ratio (HTMT)

Table 3. HTMT Testing

	OTP	TRCK	INSC	LOYL	SERQ
OTP					
TRCK	0.825				
INSC	0.716	0.716			
LOYL	0.821	0.837	0.787		
CSAT	0.869	0.879	0.803	0.893	

The table above shows that the Heterotrait–Monotrait Ratio of Correlation (HTMT) values are below 0.90, indicating that the variables exhibit good discriminant validity and are therefore considered valid.

3. Reliability Testing

Table 4. Reliability Testing

	Cronbach's alpha	Composite reliability (rho_c)
OTP	0.897	0.924
TRCK	0.908	0.932
INSC	0.904	0.929
LOYL	0.887	0.917
CSAT	0.938	0.953

Based on the reliability test results presented in Table 4.9, the Cronbach's Alpha values obtained for all constructs in this study are ≥ 0.70. Therefore, it can be concluded that the research instruments used in this study are reliable.

4. Coefficient of Determination

Table 5. Coefficient of Determination Testing

	R-square	R-square adjusted
LOYL (Y)	0.717	0.713
CSAT (Z)	0.785	0.783

The R-square value for Customer Loyalty is 0.717, indicating that 71.7% of its variance is explained by the model and classified as strong. Customer Satisfaction shows an R-square value of 0.785, also in the strong category. The Adjusted R-square values of 0.713 for Customer Loyalty and 0.783 for Customer Satisfaction confirm the model's strong explanatory power and good predictive accuracy.

5. GOF

Table 6. GoF Testing

	AVE	R-square adjusted
OTP	0.708	
TRCK	0.732	
INSC	0.725	
LOYL	0.690	0.713
CSAT	0.803	0.783
Avarage	0.732	0.748

Based on the calculation results, the Goodness of Fit (GoF) value is 0.74, indicating that the combined performance of the outer and inner models in this study can be classified as very strong.

6. Hypothesis Testing

Table 7. Hypothesis Testing

	Original Sample	Standart Deviation	T Statistics	Pvalues (1 Tail)	Description
The Effect of On-Time Performance on Customer Loyalty	0.136	0.063	2,177	0.030	H1: Accepted
The Effect of On-Time Performance on Customer Satisfaction	0.334	0.052	6,468	0.000	H2: Accepted
The Effect of the Tracking System on Customer Loyalty	0.195	0.072	2,697	0.007	H3: Accepted

The Effect of the Tracking System on Customer Satisfaction	0.380	0.056	6,776	0.000	H4: Accepted
The Effect of Cargo Insurance on Customer Loyalty	0.190	0.060	3,164	0.002	H5 : Accepted
The Effect of Cargo Insurance on Customer Satisfaction	0.279	0.048	5,878	0.000	H6 : Accepted
The Effect of Customer Satisfaction on Customer Loyalty	0.409	0.079	5,192	0.000	H7 : Accepted
The Effect of On-Time Performance on Customer Loyalty through Customer Satisfaction	0.137	0.033	4,198	0.000	H8: Accepted
The Effect of the Tracking System on Customer Loyalty through Customer Satisfaction	0.156	0.038	4,105	0.000	H9: Accepted
The Effect of Cargo Insurance on Customer Loyalty through Customer Satisfaction	0.114	0.031	3,720	0.000	H10: Accepted
The Effect of On-Time Performance on Customer Loyalty with Age as a Moderating Variable	0.136	0.063	2,177	0.030	H11: Accepted
The Effect of Cargo Insurance on Customer Loyalty with Age as a Moderating Variable	0.334	0.052	6,468	0.000	H12: Accepted
The Effect of the Tracking System on Customer Loyalty with Age as a Moderating Variable	0.195	0.072	2,697	0.007	H13: Accepted
The Effect of Customer Satisfaction on Customer Loyalty with Age as a Moderating Variable	0.380	0.056	6,776	0.000	H14: Accepted

Discussions

1. Hypothesis 1

Based on the test results presented in the table, the path coefficient of On-Time Performance on Customer Loyalty is 0.136, with a T-statistic of 2.177 and a P-value of 0.030. Since the P-value is below the 0.05 significance level, H1 is statistically supported. This finding is consistent with Akıl and Ungan (2022), who argue that delivery time reliability is a key determinant of customer loyalty in supply chain and logistics services. Therefore, this result reinforces the view that improving On-Time Performance is a critical strategy for logistics companies to sustain customer loyalty.

2. Hypothesis 2

The results show that On-Time Performance has a positive effect on Customer Satisfaction, with a coefficient of 0.334, a T-statistic of 6.468, and a P-value of 0.000. The very low P-value indicates that H2 is statistically supported. This finding aligns with Vakulenko et al. (2019), who found that delivery punctuality significantly affects customer satisfaction, particularly in contract-based and long-term service relationships. Thus, enhancing On-Time Performance is essential for increasing customer satisfaction and maintaining service competitiveness.

3. Hypothesis 3

The path coefficient of the Tracking System on Customer Loyalty is 0.195, with a T-statistic of 2.697 and a P-value of 0.007. As the P-value is below 0.05, H3 is accepted. This result is supported by Kembro et al. (2014), who demonstrated that digital tracking systems improve customer relationship quality and foster loyalty through enhanced service reliability and operational transparency. Hence, optimizing tracking systems is a strategic approach to sustaining customer loyalty.

4. Hypothesis 4

The effect of the Tracking System on Customer Satisfaction yields a coefficient of 0.380, a T-statistic of 6.776, and a P-value of 0.000, indicating that H4 is statistically supported. This result is consistent with Emiliana (2025), who found that logistics information visibility through digital tracking systems significantly improves customer satisfaction. Therefore, tracking system optimization is crucial for enhancing service quality and customer satisfaction.

5. Hypothesis 5

The analysis shows that Cargo Insurance has a positive effect on Customer Loyalty, with a coefficient of 0.190, a T-statistic of 3.164, and a P-value of 0.002. Since the P-value is below 0.05, H5 is supported. This finding aligns with Abdul et al. (2020), who emphasized that effective logistics risk management, including cargo insurance, enhances customer trust and loyalty by reducing service uncertainty. Thus, providing cargo insurance is a key strategy for strengthening customer loyalty.

6. Hypothesis 6

Cargo Insurance also has a significant effect on Customer Satisfaction, with a coefficient of 0.279, a T-statistic of 5.878, and a P-value of 0.000, supporting H6. This result is consistent with Park and Min (2022), who found that effective logistics risk management positively contributes to customer satisfaction by enhancing trust and perceived service value. Hence, cargo insurance serves not only as financial protection but also as a strategic factor in improving customer satisfaction.

7. Hypothesis 7

Customer Satisfaction significantly influences Customer Loyalty, with a coefficient of 0.409, a T-statistic of 5.192, and a P-value of 0.000. As the P-value is below 0.05, H7 is accepted. This finding supports Gong et al. (2021), who demonstrated that customer satisfaction has a direct and significant effect on loyalty in logistics and transportation services. Therefore, enhancing customer satisfaction is a central strategy for maintaining long-term customer loyalty.

8. Hypothesis 8

The indirect effect of On-Time Performance on Customer Loyalty through Customer Satisfaction shows a coefficient of 0.137, a T-statistic of 4.198, and a P-value of 0.000, indicating that H8 is statistically supported. This finding is consistent with Wong, Tseng, and Tan (2020), who found that delivery reliability indirectly enhances customer loyalty through customer satisfaction.

9. Hypothesis 9

The indirect effect of the Tracking System on Customer Loyalty through Customer Satisfaction has a coefficient of 0.156, a T-statistic of 4.105, and a P-value of 0.000, supporting H9. This result aligns with Dubey et al. (2020), who showed that digital tracking capabilities enhance customer satisfaction, which in turn strengthens customer loyalty and long-term relationships. The study highlights the strategic role of information technology in logistics beyond operational functions.

10. Hypothesis 10

The indirect effect of Cargo Insurance on Customer Loyalty through Customer Satisfaction yields a coefficient of 0.114, a T-statistic of 3.720, and a P-value of 0.000. Since the P-value is below 0.05, H10 is supported. This finding is consistent with Fan, Stevenson, and

Zhang (2021), who emphasized that logistics risk management, including insurance protection, enhances customer loyalty through customer satisfaction by creating a sense of security in uncertain logistics environments.

11. Hypothesis 11

The moderating effect of age on the relationship between On-Time Performance and Customer Loyalty is significant. For Generation Z, the path coefficient is 0.136, with a T-statistic of 2.177 and a P-value of 0.030, indicating that H11 is supported. This result aligns with Bolton et al. (2020), who found that generational differences moderate the relationship between service performance and customer loyalty. Younger generations tend to evaluate loyalty based on direct and measurable service performance, such as delivery timeliness.

12. Hypothesis 12

The moderating effect of age on the relationship between Cargo Insurance and Customer Loyalty is also significant across generations. For Generation Z, the path coefficient is 0.334, with a T-statistic of 6.468 and a P-value of 0.000, supporting H12. This finding is supported by Wang, Han, and Beynon-Davies (2022), who showed that younger consumers are more responsive to risk mitigation strategies in logistics services. Clear and transparent insurance protection increases loyalty among Generation Z customers.

13. Hypothesis 13

The effect of the Tracking System on Customer Loyalty moderated by age is significant for Generation Z, with a coefficient of 0.195, a T-statistic of 2.697, and a P-value of 0.007, indicating that H13 is supported. This result is consistent with Hänninen and Smedlund (2019), who found that younger customers place greater value on digital transparency and real-time information. The ability to provide fast and accurate technology-based service information is crucial for retaining digitally oriented customers.

14. Hypothesis 14

The results indicate that the moderating effect of age on the relationship between Customer Satisfaction and Customer Loyalty is significant for both age groups, although with different strengths. For Generation Z, the path coefficient is 0.380 with a P-value of 0.000, supporting H14. This finding aligns with Rather, Tehseen, and Parrey (2019), who argued that customer satisfaction exerts a stronger influence on loyalty among consumers with greater consumption experience.

CONCLUSION

Based on the results of data analysis and hypothesis testing, this study concludes that On-Time Performance, the Tracking System, and Cargo Insurance have significant effects on Customer Satisfaction and Customer Loyalty, both directly and indirectly through the mediating role of Customer Satisfaction. Customer Satisfaction is confirmed as a key mechanism that strengthens the relationship between logistics service performance and customer loyalty. Furthermore, age plays an important moderating role, with the findings indicating that Generation Z customers are particularly sensitive to delivery timeliness, digital transparency, and risk protection in shaping their loyalty behavior. Overall, the results emphasize that improving operational performance, information transparency, and risk management is essential for logistics companies to effectively build customer satisfaction and loyalty among Generation Z in a highly competitive e-commerce environment.

REFERENCE

Abdul, S., Khan, R., Yu, Z., Golpîra, H., Sharif, A., & Mardani, A. (2020). A state-of-the-art review and meta-analysis on sustainable supply chain management. *Journal of Cleaner Production, 263*, 123357.

Akıl, S., & Ungan, M. C. (2022). E-commerce logistics service quality. *Journal of Electronic Commerce in Organizations, 20*(1), 1–19.

Aryani, D. A., & Lee, F. S. (2025). Rancang bangun sistem informasi pelacakan status pesanan. *JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika), 10*(2), 1602–1611.

Bolton, R. N., McColl-Kennedy, J. R., Cheung, L., Gallan, A., Orsingher, C., Witell, L., & Zaki, M. (2020). Customer experience challenges in service systems. *Journal of Service Research, 23*(1), 4–21.

Chopra, S., & Meindl, P. (2016). Supply chain management: Strategy, planning, and operation. *Pearson Education*.

Chuasuksanthong, V., Duantrakoonsil, W., & Janyapoon, S. (2025). Analysis of on-time delivery performance in logistics operations. *Edelweiss Applied Science and Technology, 9*(6), 1051–1064.

Dubey, R., Gunasekaran, A., Childe, S. J., Papadopoulos, T., & Wamba, S. F. (2020). Digital supply chain transformation. *International Journal of Production Economics, 220*, 107439.

Emiliana, R. (2025). Strengthening e-commerce customer satisfaction through delivery service transparency. *Journal of Logistics and Digital Commerce, 6*(1), 112–124.

Fan, Y., Stevenson, M., & Zhang, Y. (2021). Risk management framework in logistics and supply chains. *International Journal of Production Research, 59*(6), 1817–1836.

Gong, T., Yi, Y., & Choi, J. N. (2021). Customer satisfaction and loyalty in logistics services. *Journal of Service Management, 32*(3), 465–490.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2019). A primer on partial least squares structural equation modeling (PLS-SEM). *SAGE Publications*.

Hänninen, M., & Smedlund, A. (2019). Digital transparency and customer value creation. *Technology Innovation Management Review, 9*(9), 20–30.

Kembro, J., Selviaridis, K., & Näslund, D. (2014). Information sharing in supply chains. *Supply Chain Management: An International Journal, 19*(5/6), 609–625.

Pantrista, E. T., Hidayati, A. N., Rahmatullah, A., & Tulungagung, K. (2025). Perilaku generasi Z dalam berbelanja melalui e-commerce. *Jurnal Ekonomi dan Bisnis, 3*(6), 1–12.

Vakulenko, Y., Shams, P., Hellström, D., & Hjort, K. (2019). Online retail experience and customer satisfaction. *The International Review of Retail, Distribution and Consumer Research, 29*(3), 306–320.