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The Influence of Air Cargo Packaging, Digital Information, and Air Cargo Tariffs on Logistics Customer Retention Through Logistics Service Quality at Sil Kargo Cikarang

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Keyword

air cargo packaging; digital information; air cargo tariff; logistics service quality; logistics customer retention

Abstract

This research aims to analyze the influence of air cargo packaging, digital information, and air cargo tariffs on logistics customer retention through logistics service quality at SIL Kargo Cikarang. The background of this research is based on the decline in air cargo revenue from 2021 to 2025, the increasing rate of goods damage, digital misinformation, and relatively higher shipping rates compared to competitors. The research employed a quantitative approach using a survey method involving 125 customers of SIL Kargo Cikarang. The data analysis technique used was Structural Equation Modeling–Partial Least Squares (SEM-PLS). The results of the study show that air cargo packaging, digital information, and air cargo tariffs have a positive and significant effect on logistics service quality. Logistics service quality also has a positive and significant effect on logistics customer retention and is able to mediate the influence of the three exogenous variables on logistics customer retention. These findings confirm that improving logistics service quality is a key strategy in retaining customers in the competitive air cargo industry.

INTRODUCTION

SIL Kargo Cikarang as a water cargo delivery service provider faces challenges in the form of revenue decreases from 2021 to 2025. This condition indicates that there is a problem in customer retention (logistics customer retention) (Hussain et al., 2025; Justavino-Castillo et al., 2023; Kawa & Zdrenka, 2024; Lin et al., 2023; Minh et al., 2024). In addition to tariff competition, SIL Kargo Cikarang also faces internal problems in the form of high levels of damage to goods and digital information errors. Company data shows that damage to goods reached 12.19% and digital information errors amounted to 8.58% of total shipments. This condition reflects the lack of optimal Logistics Service Quality.Previous research shows that Logistics Service Quality is the main determinant in retaining logistics service customers (Triet Le Minh et al., 2020). The quality

of logistics services is influenced by Air Cargo Packaging (Huang & Lu, 2023), Digital Information (Ricardianto et al., 2023), and Air Cargo Tariff (Rehman & Ahmer, 2025). Therefore, this study is important to examine the relationship between these variables empirically (Fu & Li, 2023; Helmina et al., 2022; Hosan et al., 2022).

Logistics service quality has been widely recognized as a crucial determinant of customer satisfaction and retention (Asamoah, 2025; Gupta et al., 2023; Hui et al., 2025; Le et al., 2023; Lin et al., 2023; Marcos & Coelho, 2022; Tee et al., 2025). Triet Le Minh et al. (2024) emphasized that logistics service quality significantly affects customer retention, especially in highly competitive service industries. Furthermore, Huang S. H. et al. (2025) found that packaging quality plays a vital role in minimizing damage and improving service performance in air freight logistics. In line with this, Ricardianto P. et al. (2023) highlighted that digital information systems, particularly real-time tracking and accurate communication, significantly enhance customer perceptions of service quality. Meanwhile, Rehman M. and Ahmer Z. (2025) demonstrated that pricing strategies, including tariff transparency and competitiveness, directly influence customer decisions in choosing logistics services. These studies indicate that operational factors such as packaging, information systems, and tariffs are important drivers of logistics service quality.

However, despite the growing body of literature, there remains a research gap that needs to be addressed. Most previous studies tend to examine these variables separately or focus on specific aspects such as service quality and customer satisfaction without integrating operational variables simultaneously within a comprehensive model. In addition, limited research has explored the mediating role of logistics service quality in linking operational variables such as air cargo packaging, digital information, and tariffs to customer retention, particularly in the context of air cargo services in Indonesia. Moreover, empirical studies focusing on logistics companies at the regional level, such as SIL Kargo Cikarang, are still scarce, even though local operational characteristics may significantly influence service quality and customer behavior.

The problem formulation of this study focuses on examining whether there is a positive and significant influence of air cargo packaging, digital information, and air cargo tariff on logistics service quality, as well as the effect of logistics service quality on logistics customer retention. In addition, this study also investigates whether air cargo packaging, digital information, and air cargo tariff indirectly influence logistics customer retention through logistics service quality as a mediating variable. Based on this formulation, the purpose of this research is to analyze and provide empirical evidence regarding the direct and indirect relationships among these variables in the context of logistics services at SIL Kargo Cikarang.

The novelty of this research lies in its integrative approach that simultaneously examines the influence of air cargo packaging, digital information, and air cargo tariff on logistics customer retention through logistics service quality as a mediating variable. This study not only analyzes direct effects but also explores indirect relationships using Structural Equation Modeling–Partial Least Square (SEM-PLS), providing a more comprehensive understanding of how operational factors contribute to customer retention. Additionally, this research offers a contextual contribution by focusing on the air cargo logistics sector in Cikarang, an important industrial area in Indonesia,

thereby providing practical insights that are relevant to real-world logistics operations.

This research is expected to provide several important benefits. Theoretically, this study contributes to the development of logistics and supply chain management literature, particularly in understanding the role of service quality as a mediating variable between operational factors and customer retention. Practically, the results of this study can serve as a reference for management at SIL Kargo Cikarang in formulating strategies to improve logistics service quality through better packaging standards, more accurate and real-time digital information systems, and more competitive tariff structures. Furthermore, for policymakers and logistics industry practitioners, this study offers insights into improving customer retention strategies in an increasingly competitive air cargo industry. For future researchers, this study can be used as a foundation for further research by exploring additional variables that influence logistics service quality and customer retention.

RESEARCH METHODS

This research used a quantitative approach with descriptive and verifiable methods. The research population is all customers of SIL Kargo Cikarang as many as 182 people, with a sample of 125 respondents determined using the Slovin formula and stratified random sampling techniques. Data collection was carried out through questionnaires, interviews, observations, literature studies, and documentation. Data analysis uses SEM-PLS to test the validity, reliability, and direct and indirect influences between variables.

RESULTS AND DISCUSSION

Profile Responden.

Table 1. Profile Respondents

No	Types of Customer Jobs	Number (People)	Percentage (%)
1	Logistics / Supply Chain Manager	19	15.38
2	Logistics/Operations Staff	32	25.27
3	Export–Import Manager	12	9.89
4	Export–Import Staff	22	17.58
5	Purchasing / Procurement	16	13.19
6	Business Owner / Director	10	7.69
7	Administration / Customer Service	14	10.99
	TOTAL	125	100.00

Source: Primary data processed by the researchers (2025)

Descriptive Test Results

Table 2. Results of Descriptive Test of the Variables Studied

No	Variable	Average Score	Interpretation	Verdict
1	Air Cargo Packaging	3,256	Pretty good	Ideal for research
2	Digital Information	3,328	Pretty good	Ideal for research
3	Air Cargo Tariff	3,254	Pretty good	Ideal for research
4	Logistics Service Quality	3,236	Pretty good	Ideal for research
5	Logistics Customer Retention	3,347	Pretty good	Ideal for research

Source: Questionnaire processed with Excel (2025)

The average value of variables based on the Likert sakla that is worth studying is between 0.10 and 3.3999 and is classified as a very bad variable, or not good or good enough. Because the average score that is very bad, or not good or good enough is an average score that is not good, so it provides an opportunity for researchers to conduct research and improve the average of the variables studied. (Waskito, 2023). The information in Table 2 explains that all variables have an average value that is grouped as a fairly good variable, so it is eligible for research, in order to increase the average value of each variable

Validity Test Results

Table 3. Validity Test Results

No	Variable	Outer Loadings Value Range	Validity Standards	Verdict
1	Air Cargo Packaging	0,816-0,871	0,700	Valid
2	Digital Information	0,805-0,904	0,700	Valid
3	Air Cargo Tariff	0,777-0,847	0,700	Valid
4	Logistics Service Quality	0,757-0,874	0,700	Valid
5	Logistics Customer Retention	0,702-0,795	0,700	Valid

Source: Questionnaire processed with Smart PLS (2025).

The information in Table 3 explains that the range of *outer loading values* of all variables is above 0.700. Paying attention to the range of outer loading values and paying attention to the opinion of Hasnita (2021), it can be explained that the data filled in by the respondents on the questionnaire was declared valid. Data that was declared valid proved that the questionnaire was stated as a quality data collection tool from respondents (Waskito, 2023).

Reliability Test Results

Table 4. Reliability Test Results

No	Variable	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
1	Air Cargo Packaging	0.930	0.933	0.943	0.704
2	Digital Information	0.918	0.925	0.934	0.669
3	Air Cargo Tariff	0.940	0.945	0.951	0.734
4	Logistics Service Quality	0.942	0.945	0.950	0.636
5	Logistics Customer Retention	0.884	0.886	0.906	0.520

Source :Questionnaire processed with Smart PLS (2025)

The information in Table 4 explains that *Cronbach's Alpha, Rho_A, Composite Reliability values* are all variables above 0.700 and *the Average Variance Extracted (AVE) values* are above 0.500. Paying attention to the information in Table 4 and paying attention to the opinion of Hasnita (2021), it can be explained that the data collected on all variables is declared reliable. Data that is declared reliable proves that the Questionnaire is stated as a qualified tool to collect data from the questionnaire. Data that is declared valid, reliable, and the questionnaire that is declared to be of quality meets the requirements to be obtained with Simple Linear Regression, Multiple Liner Regression, *Path Analysis* and *Structural Equation*

Verifiable Test Results

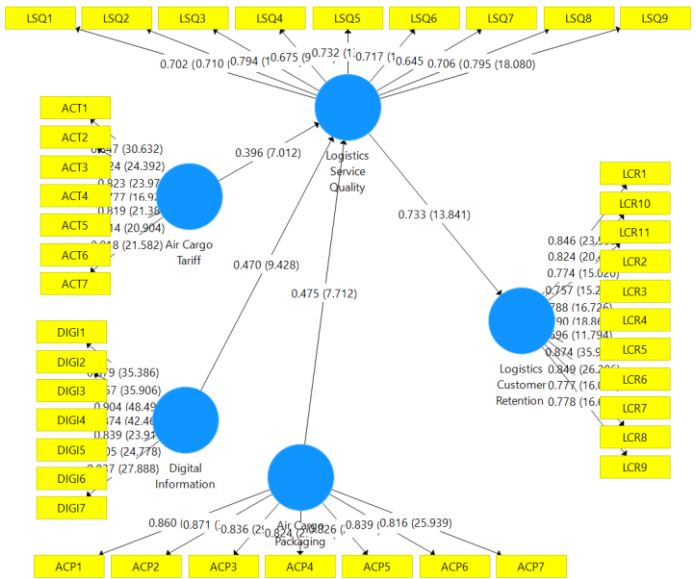

Figure 1. Jalaur Coefficient Value and T Value Calculate the Influence of Each Variable

Source: Questionnaire data processed using SmartPLS (2025)

Path Coefficient Values

Table 5. Path Coefficient Values

Effect of Exogenous Variables on Intervening Variables	Nilai Koefisin Jalur
Air Cago Packaging Towards Logistics Service Quality	0,475
Digital Information on Logistics Service Quality	0.396
Air Cargo Traffic on Logistics Service Quality	0,470
The Influence of Intervening Variables on Endogenous Variables	
Logistics Service Quality on Logistics Customer Retention	0,733
The Influence of Exogenous Variables on Exogenous Variables through Intervening Variables	
Air Cargo Packaging on Logistics Customer Retention through Logistics Service Quality	0,348
Digital Information on Logistics Customer Retention through Logistics Service Quality	0,344
Air Cago Traffic on Logistics Customer Retention through Logistics Service Quality	0,291

Source : Smart PLS Questionnaire (2025)

The author uses the data in Table 5 to create a Path Analysis Equation of the Influence of Air Cargo Packaging, Digital Information on Logitics Service Quality as follows:

$Y = \beta1X1 + \beta2X2 + \beta3X3$

Description:

Y= Logistics Service Quality

β1 = Cargo Packaging Waterway Coefficient

X1 = Variabel Air Cargo Packaging

β2 = Digital Information Path Coefficient

x2= Variable digital information

β3= Air Line Coefficient Cargo Tariff

X3 = Variabel Air Cargo Tariff

$Y = \beta1X1 + \beta2X2 + \beta3X3$

$Y = 0.475\ X1 + 0.476\ X2 + 0.396\ X3$

The meaning of the Path Analysis Equation is as follows:

Without exogenous variables, the Logistics Service Quality value is = 0, but if added with one unit of Air Cargo Packaging, Digital Information, and Air Cargo tariff and the analysis is carried out simultaneously, then the Logistics Service Quality value of 0 will change to 0.475 +0.470+0.396= 1.341

Equation of Logistics Service Quality Path Analysis to Logistics Customer Retention

The Equation of Path Analysis of the Influence of Logistics Service Quality on Logistics Customer Retention is as follows:

$Z = \beta_4 Y$

Description :
Z = Logistics Customer Retention
β4 = Logistics Service Quality Line Coefficient
Y = Logistics Customer Retention

The information in Table 4 explains that the value of the Logistics Service Quality line coefficient to Logistics Customer Retention is 0.733, so that the Analysis Equation of the Influence of Logistics Service Quality on Logistics Customer Retention

$Z = \beta 4Y$

Z = 0.733 Y. The meaning of the Path Analysis Equation of 0.733 is that without Logistics Service Quality, then Logistics Customer Retention = 0, but if Logistics Service Quality is added, then the Logistics Customer Retention which was originally 0 will increase to 0.733.

Hypothesis Test Value

In order to make it easier to understand the hypothesis test, the author uses the table below to conduct the Hypothesis Test in this study.

Table 6. Results of the T Calculation Test and P Values

Hypothesis	T Statistics (|O/STDEV)	P Values	Verdict
There is an Influence of Air Cargo Packaging on Logistics Service Quality	7,340	0,00	There is a Positive and significant Influence
There is an Influence of Digital Information on Logistics Service Quality	9,760	0,00	There is a Positive and significant Influence
There is an Influence of Air Cargo Tariff on Logistics Service Quality	6,948	0,00	There is a Positive and significant Influence
There is an influence of Logistics Service Quality on Logistics Customer Retention	15,109	0,00	There is a Positive and significant Influence
There is an Influence of Air Cargo Packaging on Logistics Customer Retention through Logistics Service Quality	6,965	0,00	There is a Positive and significant Influence
There is an Influence of Digital Information on Logistics Customer Retention through Logistics Service Quality	7,194	0,00	There is a Positive and significant Influence
There is an Influence of Air Cargo Tariff on Logistics Customer Retention through Logistics Service Quality	6,097	0,00	There is a Positive and significant Influence

Source : Questionnaire processed with Smart Pls(2025)

The table t-value for 125 respondents was 0.676. (Waskito, 2021) The determination of the existence of a Positive and Significant Influence of a variable on another variable because the calculated t-value is greater than the t-value of the table and the p-value significance value is less than 0.05The test results in the table above are used as proof that:

1. There is a positive and significant influence of Air Cargo Packaging on Logistics Service Quality with a T value of 7.540 greater than the Ttable value of 0.676 and a p value of 0.000 smaller than 0.005.
2. There is a positive and significant influence of Digital Information on Logistics Service Quality with a T value of 9.760 greater than a Ttable value of 0.676 and a p value of 0.000 smaller than 0.005.
3. There is a positive and significant influence of Air Cargo Tariff on Logistics Service Quality with a T value of 6.948 greater than the Ttable value of 0.676 and a p value of 0.000 smaller than 0.005.
4. There is a positive and significant influence of Logistics Service Quality on Logistics Customer Retention with a T value of 15.109 greater than the Ttable value of 0.676 and a p value of 0.000 less than 0.005.
5. There is a positive and significant influence of Air Cargo Packaging on Logistics Customer Retention through Logistics Service Quality with a T value of 6.965 greater than the Ttable value of 0.676 and a p value of 0.000 smaller than 0.005.
6. There is a positive and significant influence of Digital Information on Logistics Customer Retention through Logistics Service Quality with a T value of 7.194 greater than the Ttable value of 0.676 and a p value of 0.000 smaller than 0.005.
1. There is a positive and significant influence of Air Cargo Tariff on Logistics Customer Retention through Logistics Service Quality with a T value of 6.097 greater than the Ttable value of 0.676 and a p value of 0.000 smaller than 0.005.

Descriptive Discussion

Descriptive discussion explains the cause of the variables being studied to obtain a low average score by discussing one indicator with the lowest average value, looking for the cause and giving recommendations.

a. Air Cargo Packaging. The ACP2 Stack Load Resistant indicator obtained an average value of 3.23 and the lowest average value means that it is perceived that the packaging is not resistant to stack loads. Main CausesPackaging standards do not follow the characteristics of air cargoMany customers use general packaging (thin carton) instead of air cargo–grade packaging.There are no clear stacking & load limit guidelinesGround handling officers carry out stacking without load *bearing capacity* labels.Time pressureA fast sorting process causes packaging arrangement to pay less attention to load distribution.Lack of customer educationCustomers do not understand the risks of stacking in aircraft & transit warehouses. The best solution in the field of Operations needs to Implement Air Cargo Packaging Standards (IATA LAR / AHM), Require stacking strength & orientation labels, Use palletization & unit load devices (ULD) consistently. Educate customers through SIL Kargo packaging guides. Provide a paid repacking service (value-added service).
b. Digital InformationThe DIGI5 indicator of the Status of the Location of Goods in real time obtained an average value of 3.32 and is the smallest average value so that it is perceived as the Status of the location of the goods is not presented in real-time. The main cause of the tracking

system is still batch updates. Updates are only on *handover*, not actual movements.Not integrated with ground handling & airline system.Minimal use of IoT/GPS tagging.Limited access to information for customers (call center only). SolutionTechnologyImplementation of Real-Time Tracking System (RFID/GPS/IoT). Integration of Cargo Management System – Airline – Warehouse.Customer ServiceWeb-based tracking dashboard & mobile app. Automatic notifications (*push notifications / WhatsApp)*

c. *Air Cargo Tariff.*The ACT6 Indicator of Pick Up Service Fees obtained an average value of 3.25 and was the smallest average value so that it was perceived that customers were charged Pick Up Service fees.. Lack of price transparency at the beginning of the transaction.Customers compare with competitors who are free pick-up.Last-mile logistics costs are increasing (fuel, labor).SolutionPrice StrategyImplement price bundling for loyal/contract customers. Free pick-up for a minimum of certain volumes.CommunicationThe pick-up fee information is clear from the beginning of the booking. Show value justification (speed, security, insurance).
d. *Logistics Service Quality* Indicator LSQ3. Goods Without Damage obtained an average value of 3.21 and was the smallest average value. This means that customer goods are often damaged. Main CauseLow packaging quality (ACP2-related).,Non-standard handling (throw, press, wrong position).Minimal SOP quality control at transit points.There is no damage accountability system.Operational Solution: SOP *zero damage handling*. Quality check in inbound–outbound–transit. Use the shock & tilt indicator.Quality ManagementDamage reporting & penalty system. Quick claims + transparent compensation.
e. *Logistics Customer Retention.*The LCR1 indicator of increased service usage frequency obtained an average value of 3.32 and was the smallest value.meaning that SIL Kargo Cikarang customers did not increase the use of SIL Kargo Cikarang's logistics services, but used logistics services owned by competitors. Main CausesAccumulation of negative customer experiences: Damaged goodsInformation is not real time, Additional costsCustomer trust decreases.There is no retention & loyalty program.Low switching cost → customers easy to move. SolutionRetention StrategyVolume- & frequency-based customer loyalty program. Long-term contract (corporate account).Customer ExperienceAfter-sales follow up. Proactive compensation in the event of service outages.

Verifiable Discussion.

1. The Effect of Air Cargo Packaging on Logistics Service Quality. In order to increase the influence of Air Cargo Packaging, what must be improved first is Air Cargo Packaging in the way suggested in the discussion of the description point 1. Furthermore, improve Logistics Service Quality in the manner suggested in the discussion of the description point 4
2. The Influence of Digital Information on Logistics Service Quality In order to increase the influence of Digital Information, what must be improved first is Digital Information in the way suggested in the discussion of the description of point 2. Furthermore, improve Logistics Service Quality in the manner suggested in the discussion of the description point 4

3. The Effect of Air Cargo Tariff on Logistics Service Quality. In order to increase the influence of Air Cargo Tariff, what must be improved first is the Air Cargo Tariff in the manner suggested in the discussion of the description of point 3. Furthermore, improve Logistics Service Quality in the manner suggested in the discussion of the description point 4
4. The Effect of Logistics Service Quality on Logistics Customer Retention. In order to increase the influence of Logistics Service Quality, what must be improved first is Logistics Service Quality as explained in the description of point 4., then improve Logistics Customer Retention in the way as explained in the descriptive discussion of point 5.
5. The Effect of Air Cargo Packaging on Logistics Customer Retention through Logistics Service Quality. In order to fix it, what needs to be improved is Air Cargo Pakaging first, then Logistics Service Quality and finally improving Logistics Customer Retention.
6. The Influence of Digital Information on Logistics Customer Retention through Logistics Service Quality. In order to improve it, what needs to be improved is Digital Information first, then Logistics Service Quality and finally improving Logistics Customer Retention.

a. The Effect of Air Cargo Tariff on Logistics Service Quality through Logistics Service Quality. In order to improve it, what needs to be improved is Air Cargo Tariff first, then Logistics Service Quality and finally improving Logistics Customer Retention

CONCLUSION

In this study there are several conclusions: a.) There is a positive and significant influence of Air Cargo Packaging, Digital Information, AirCargo Tariff on Logistics Service Quality. B.) There is a positive and significant influence of Logistics Service Quality on Logistics Customer Retention. C.) There is a positive and significant influence of Air Cargo Packaging, Digital Information, AirCargo Tariff on Logistics Customer Retention through Logistics Service Quality. Based on these conclusions, several recommendations can be proposed. First, the management of SIL Kargo Cikarang is advised to improve packaging standards by implementing international air cargo handling guidelines, providing clear labeling, and offering repackaging services to minimize damage to goods. Second, the company should enhance its digital information system by developing real-time tracking features, integrating systems with airline and warehouse operations, and improving communication channels with customers. Third, tariff strategies need to be more transparent and competitive, including the implementation of bundled pricing or loyalty-based incentives to increase customer satisfaction and retention. Fourth, the company should strengthen logistics service quality through standardized operational procedures, regular monitoring, and quality control systems to reduce service failures. Finally, for future researchers, it is recommended to examine additional variables such as customer satisfaction, trust, and technological capability, as well as to expand the research scope to different logistics sectors or regions in order to obtain more comprehensive findings.

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