



THE EFFECTS OF PROCESS AGILITY AND CUSTOMER RETENTION ON LOGISTICS PERFORMANCE IN THE EXPORT DIVISION (CASE STUDY OF PT. NIPPON EXPRESS INDONESIA)

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Accepted: June 1, 2026	Reviewed: June 20, 2026	Published: June 30, 2026
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Abstract

The freight forwarding industry in Indonesia is expanding rapidly, yet research on the factors shaping logistics performance in this sector remains limited. This study examines the effects of Process Agility and Customer Retention on Logistics Performance in the export division of PT. Nippon Express Indonesia. Data were collected from 68 active customers using a 40-item questionnaire on a five-point Likert scale and analysed with variance-based Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS 3.0. The measurement model showed adequate convergent and discriminant validity, with the majority of factor loadings above 0.70, AVE values above 0.50, and both the Fornell–Larcker and Heterotrait–Monotrait (HTMT) criteria satisfied. The structural model produced an R^2 of 0.435 for Logistics Performance, indicating moderate explanatory power. Both Customer Retention ($\beta = 0.479$) and Process Agility ($\beta = 0.292$) had positive, significant effects, with Customer Retention emerging as the stronger predictor. These findings extend the freight forwarding literature and offer practical guidance for strengthening logistics performance in competitive export markets.

Keywords: Customer Retention; Freight Forwarding; Logistics Performance; Process Agility; SmartPLS



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1. Introduction

The capacity to move goods through the export process quickly and reliably has become increasingly important in the logistics industry, as companies must adapt their operations to rapidly changing market conditions. This capacity, commonly referred to as

process agility, reflects how effectively a company can adjust its shipping processes and manage its supply chain in a more efficient and responsive manner (Sharma et al., 2017). Prior research indicates that such agility improves logistics performance through more timely deliveries, more accurate documentation, and stronger coordination among the parties involved in the logistics system. Strong logistics performance, in turn, enhances operational effectiveness and provides a competitive advantage in a fast-changing market (Ha & Lee, 2024).

The significance of efficiency in logistics performance cannot be understated, particularly within the freight forwarding sector, which continues to expand in Indonesia. Efficient logistics performance strengthens customer satisfaction and, in turn, reinforces customer retention the sustained relationship between a service provider and its clientele (Aqabneh, 2025). In freight forwarding contexts specifically, responsiveness, transparent information management, and adept problem-solving constitute foundational elements for cultivating durable customer relationships (Mentzer et al., 2001).

PT. Nippon Express Indonesia serves as a pertinent empirical case that reflects the broader growth trajectory of freight forwarders operating in Indonesia. As export and import volumes continue to rise, demand for freight forwarding services has grown substantially; however, PT. Nippon Express Indonesia confronts pressing challenges in retaining its customer base amid heightened competitive pressures in the freight forwarding sector. A discernible gap exists between customer expectations and the logistics service performance actually delivered, and this discrepancy has been identified as a significant source of customer dissatisfaction with long-term relational consequences (Mentzer et al., 2001).

Although prior studies have examined process agility (Alfalla-Luque et al., 2023; Ha & Lee, 2024) and customer retention (Nasrudin et al., 2025; Wahyuni et al., 2026) separately in relation to organisational or service performance, few studies have tested these two capabilities simultaneously as antecedents of logistics performance within the export operations of a freight forwarding company. This gap is particularly relevant for PT. Nippon Express Indonesia, whose export process has yet to operate optimally and whose customer retention strategies remain underdeveloped, both of which may constrain its logistics performance. Examining Process Agility and Customer Retention together is therefore important, as it enables the relative contribution of an internal operational capability and an external relational capability to be compared within a single empirical model. Accordingly, this study aims to examine and explain the extent to which Process Agility and Customer Retention affect Logistics Performance at PT. Nippon Express Indonesia's export division. By clarifying how operational flexibility and customer-relationship capabilities jointly shape logistics performance, this research is expected to offer theoretical contributions to the freight forwarding literature and practical guidance for logistics professionals and freight forwarders seeking to strengthen their operational performance.

2. Literature Review

2.1 Process Agility and Logistics Performance

Process agility is a critical organisational capability that enables firms to respond quickly to changes in customer needs, unexpected disruptions, and market uncertainty. Within the logistics industry, this capability enhances performance by accelerating information flow, increasing operational flexibility, improving delivery accuracy, and enabling more efficient use of resources.

According to Alfalla-Luque et al. (2023), agility within supply chains represents an organisation's ability to react to market changes rapidly and effectively, and this capacity exerts a significantly positive influence across multiple performance dimensions, including operational and logistics outcomes.

Coşkun and Erturgut (2021) developed a logistics performance scale comprising five dimensions: efficiency, competitive differentiation, adaptability, flexibility, and effectiveness. Process Agility is theorised to improve Logistics Performance by enabling organisations to respond more quickly, operate more flexibly, make better-informed decisions, and use resources more efficiently. Firms with greater process flexibility and information-sharing capability can adapt more readily to disruptions, which in turn supports operational efficiency, timely delivery, and higher service quality (Sharma et al., 2017).

H1: Process agility has a positive and direct impact on logistics performance.

2.2 Customer Retention and Logistics Performance

Nasrudin et al. (2025), examining the e-commerce logistics industry, established that customer retention is shaped by logistics performance sustained through technological capabilities and service quality. Their findings indicate that organisations capable of retaining customers through consistent service delivery achieve improvements in logistics performance, attributable to continuity of service utilisation and gains in operational process efficiency.

Studies in the freight forwarding industry show that good logistics service, flexibility in logistics, and a positive experience for customers all help to build customer loyalty. Strong customer loyalty means that customers keep coming back, which helps businesses have more steady sales and makes managing their logistics more efficient (Wahyuni et al. , 2026). Within the modern logistics industry, customer retention is also contingent upon a firm's ability to deliver services punctually, maintain accurate shipment tracking systems, and provide robust delivery security assurances. These factors reinforce customer loyalty, thereby generating demand stability that supports sustained improvements in logistics performance over time (Hasibuan et al., 2026).

Theoretically, Customer Retention is positioned in this study as an antecedent, rather than a consequence, of Logistics Performance. Retained customers generate more predictable and stable demand patterns, which allow freight forwarders to plan shipment

schedules, allocate transport capacity, and coordinate customs documentation more efficiently (Nugroho et al., 2020). Long-standing customer relationships also reduce the frequency of last-minute order changes and re-bookings, lower coordination costs between internal divisions and external partners, and generate continuous feedback that helps refine operational procedures (Burity, 2021). Through these mechanisms demand stability, reduced re-ordering, and closer operational coordination Customer Retention is theorised to function as a driver rather than merely an outcome of Logistics Performance.

The indicators used to operationalise the three constructs in this study were adapted from established logistics and marketing scales and refined to fit the export freight forwarding context of PT. Nippon Express Indonesia. The five Process Agility indicators were adapted from the supply chain agility and logistics performance literature of Sharma et al. (2017) and Coşkun and Erturgut (2021); the eight Customer Retention indicators were adapted from customer loyalty and retention constructs used in freight forwarding and logistics service research (Wahyuni et al., 2026; Hasibuan et al., 2026); and the five Logistics Performance indicators were adapted from the logistics performance scale of Coşkun and Erturgut (2021). Item wording was reviewed and adjusted through expert judgement to ensure relevance to PT. Nippon Express Indonesia's export operations before the indicators were administered to respondents.

H2: Customer Retention has a positive and direct impact on logistics performance.

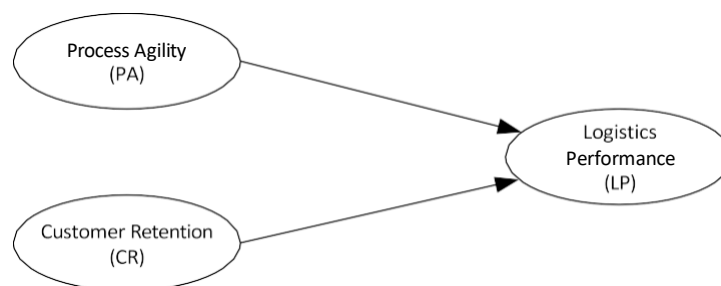


Figure 1: Theoretical Framework

3. Research Method

This study employed an explanatory quantitative survey design to examine the causal relationships among Process Agility, Customer Retention, and Logistics Performance (Sari et al., 2022). A cross-sectional design was adopted, whereby data were collected from respondents at a single point in time (Abduh et al., 2022).

The population of this study consisted of the active export customers of PT. Nippon Express Indonesia. Respondents were selected using purposive sampling, based on two criteria: (1) having used the company's export freight forwarding services within the preceding twelve months, and (2) having direct involvement in, or responsibility for, managing their organisation's export shipment process, so that they were able to evaluate

the company's logistics performance from first-hand experience. A structured questionnaire comprising 40 items, with each indicator of the three constructs measured by multiple items on a five-point Likert scale, was distributed online to 100 customers meeting these criteria; 68 of them provided complete and usable responses, yielding a response rate of 68%. This sample size exceeds the minimum requirement for PLS-SEM estimation under the ten-times rule, which, given the two structural paths directed at Logistics Performance in this model, implies a minimum of 20 respondents, and is consistent with more conservative sample-size guidelines for PLS-SEM (Hair et al., 2021).

Data were analysed using variance-based Partial Least Squares Structural Equation Modelling (PLS-SEM) with SmartPLS 3.0 to test the measurement and structural models simultaneously. PLS-SEM was selected because it is well suited to prediction-oriented research and does not require multivariate normality of the data (Hair et al., 2021). Because both hypotheses in this study specify a directional (positive) relationship, hypothesis testing was conducted using a one-tailed significance test at the 5% level, for which the corresponding critical t-value is 1.65 (compared with 1.96 for a two-tailed test). Because Process Agility, Customer Retention, and Logistics Performance were all measured through the same self-reported survey administered at a single point in time, the data may be subject to common method bias. To address this concern procedurally, respondent anonymity was assured, items for each construct were separated within the questionnaire, and neutral, non-leading item wording was used; a statistical single-source bias test (e.g., Harman's single-factor test) was not performed in this study, and this is acknowledged as a limitation in the Conclusion section.

4. Results and Discussion

4.1 Outer Model

The PLS-SEM approach evaluates two components of the research model: the outer (measurement) model, which assesses how well each indicator represents its underlying construct, and the inner (structural) model, which represents the relationships among constructs. Evaluation of the outer model focused on convergent validity, the extent to which indicators of a construct correlate with one another, and discriminant validity, the extent to which a construct is empirically distinct from other constructs in the model. Convergent validity was confirmed using a minimum factor loading of 0.70 and an AVE value of at least 0.50, while discriminant validity was assessed using the Fornell–Larcker criterion.

This criterion requires that the correlation between any two constructs be lower than the square root of the AVE of each respective construct. Reliability was assessed using composite reliability and Cronbach's alpha, both of which were required to reach a minimum of 0.70. The inner (structural) model was evaluated using R^2 values, T-statistics, and P-values. Following Hair et al. (2021), R^2 values of 0.75, 0.50, and 0.25 indicate that exogenous constructs exert a strong, moderate, or weak influence on an

endogenous construct, respectively, and hypotheses were considered supported when T-statistics exceeded 1.65 and P-values were below 0.05 under a one-tailed 5% significance test.

Table 1. Validity and Realibility of Constructs

Variable/ Indicator	Description	Factor Loading	Cronbach's α	Composite Reliability	AVE
Process Agility			0.870	0.903	0.653
X1.1	Market Demand Responsiveness	0.675			
X1.2	Technological Adaptability	0.843			
X1.3	Information Transparency	0.878			
X1.4	Communication Effectiveness	0.840			
X1.5	Process and Operations Flexibility	0.789			
Customer Retention			0.918	0.933	0.636
X2.1	Positive Evaluation	0.864			
X2.2	Service Recommendation	0.755			
X2.3	Priority Choice	0.772			
X2.4	Order Reduction Resistance	0.757			
X2.5	Price Competition Tolerance	0.815			
X2.6	Customer Loyalty	0.842			
X2.7	External Complaint Minimisation	0.873			
X2.8	Internal Complaint Minimisation	0.685			
Logistics Performance			0.862	0.900	0.642
Y1	Delivery Lead Time	0.782			
Y2	Shipping Cost Efficiency	0.854			
Y3	On-Time Delivery Accuracy	0.834			
Y4	Customer Satisfaction	0.800			
Y5	Problem Resolution Capability	0.731			

Note. Vbl = Variable; Idt = Indicator; FaLo = Factor Loading; Crb_α = Cronbach's alpha; Cps_Re = Composite Reliability; AVE = AVE.

As shown in Table 1, sixteen of the eighteen indicators across the three constructs exhibited factor loadings above the 0.70 threshold recommended by Hair et al. (2021). Two indicators fell slightly below this threshold: X1.1 (Market Demand Responsiveness), with a loading of 0.675, and X2.8 (Internal Complaint Minimisation), with a loading of 0.685. Both values still exceed the more lenient 0.50 cut-off applied in exploratory measurement contexts, and both indicators were retained for two reasons. First, the Average Variance Extracted for Process Agility (0.653) and Customer Retention (0.636) both comfortably exceed the 0.50 threshold with these indicators included, so their retention does not compromise convergent validity at the construct level. Second, removing either indicator would narrow the conceptual coverage of its construct: Market Demand Responsiveness captures how quickly the export process reacts to shifts in customer demand, a facet of agility not fully represented by the other four Process Agility

indicators, while Internal Complaint Minimisation captures the extent to which complaints are resolved internally before escalating to the customer, a facet of retention not represented by the other seven Customer Retention indicators. The Composite Reliability and Cronbach's alpha for both constructs (0.903 and 0.870 for Process Agility; 0.933 and 0.918 for Customer Retention) remain well above 0.70 with these indicators included, confirming that their retention does not compromise overall construct reliability.

Table 2. Fornell-Larcker Criterion (Discriminant Validity)

Construct	Customer Retention	Logistics Performance	Process Agility
Customer Retention	0.798		
Logistics Performance	0.604	0.801	
Process Agility	0.428	0.497	0.808

Note. Diagonal values represent the square root of AVE for each construct.

Table 2 shows that the Fornell–Larcker criterion is satisfied for all three construct pairs: the correlation between any two constructs (0.428 to 0.604) is lower than the square root of the AVE for each respective construct (0.798 to 0.808). This indicates that each construct shares more variance with its own indicators than with the other constructs in the model. As an additional, more sensitive check, this study also examined the Heterotrait–Monotrait (HTMT) ratio of correlations (Henseler et al., 2015), reported in Table 2a. All three HTMT ratios, 0.442 (Customer Retention–Process Agility), 0.505 (Process Agility–Logistics Performance), and 0.643 (Customer Retention–Logistics Performance), fall well below both the conservative 0.90 threshold and the more lenient 0.85 threshold recommended by Henseler et al. (2015). Taken together, the Fornell–Larcker and HTMT results provide consistent evidence that Process Agility, Customer Retention, and Logistics Performance are empirically distinct constructs in this dataset.

Table 2a. Heterotrait–Monotrait Ratio (HTMT)

Construct	Customer Retention	Logistics Performance	Process Agility
Customer Retention			
Logistics Performance	0.643		
Process Agility	0.442	0.505	

Note. All HTMT ratios fall below both the conservative 0.90 threshold and the more lenient 0.85 threshold (Henseler et al., 2015), supporting discriminant validity among the three constructs.

4.2 Inner Model

The inner model was evaluated using three measures: the R^2 value, T-statistics, and P-values. Table 3 shows that the R^2 value for Logistics Performance is 0.435 (R^2 adjusted = 0.417), which, following the 0.75/0.50/0.25 thresholds for strong, moderate, and weak explanatory power proposed by Hair et al. (2021), falls between the weak and

moderate thresholds and is closer to a moderate degree of explanatory power. This indicates that Process Agility and Customer Retention jointly account for a meaningful, but not exhaustive, share of the variation in Logistics Performance; the remaining variance is attributable to factors outside the scope of this model, such as macro-level market conditions, workforce capability, or technology infrastructure. Effect-size analysis (f^2) further indicates that Customer Retention ($f^2 = 0.332$) has a medium-to-large individual contribution to this explanatory power, while Process Agility ($f^2 = 0.123$) has a small-to-medium individual contribution (Cohen, 1988). As with any R^2 value, this figure should be interpreted as evidence of the model's explanatory power rather than as direct evidence of the strength of the causal relationships between the constructs; the latter is assessed separately through the path coefficients and their statistical significance, reported below.

Table 3. R-Squared (Coefficient of Determination)

Construct	R^2	R^2 Adjusted
Logistics Performance	0.435	0.417

Consistent with the one-tailed 5% significance criterion described in the Research Method section, hypotheses were considered supported if T-statistics exceeded 1.65 and P-values were below 0.05. As shown in Table 4 and Figure 2, both hypotheses were supported, indicating positive and statistically significant relationships between the exogenous and endogenous constructs.

Table 4. Hypothesis Results

Hypothesis	β	Original		T-Statistic	P-Value	Decision
		Sample (O)	Std. Dev.			
H ₁ : PA → LP	0.292	0.292	0.079	3.712	0.000	Accepted
H ₂ : CR → LP	0.479	0.479	0.070	6.881	0.000	Accepted

Note. PA = Process Agility; CR = Customer Retention; LP = Logistics Performance; β = Path Coefficient; Std. Dev. = Standard Deviation.

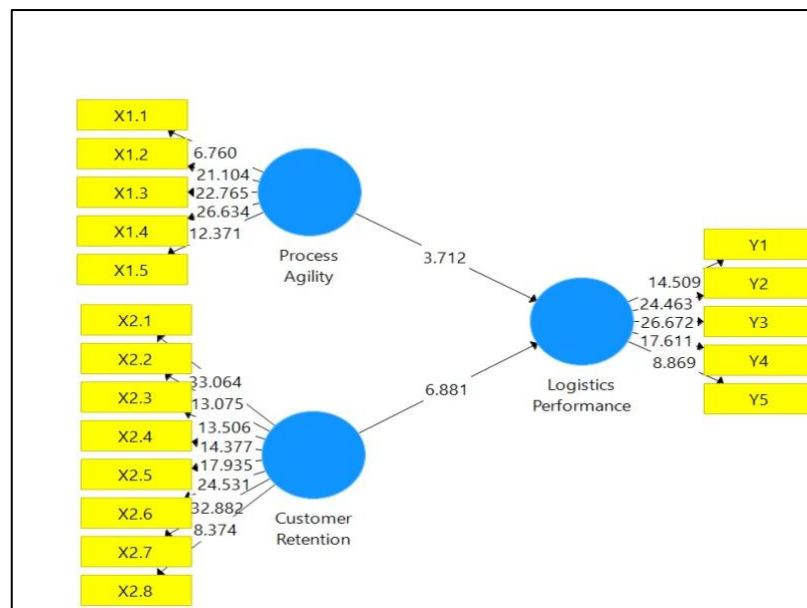


Figure 2: Bootstrapping Model Summary

4.3 Discussion

This section discusses the empirical findings in relation to the two hypotheses tested, Process Agility (H1) and Customer Retention (H2), and situates them within the broader literature on logistics and freight forwarding performance.

The results support H1, confirming that Logistics Performance is positively and directly influenced by Process Agility ($\beta = 0.292$, $p < 0.001$), even though this effect is smaller than that of Customer Retention. By promoting workflow flexibility, cross-functional collaboration, and faster service cycles, Process Agility shapes customers' perceptions of service reliability, delivery accuracy, and overall logistics quality. Even amid volatile market conditions and competitive pressure, these improvements increase the likelihood that clients will continue using the company's services (Wilson et al., 2020). Process agility can be understood as an internal process system's capacity to recognise shifts in demand and operational conditions and to match consumer expectations with operational capacity quickly, adaptably, and precisely (Mulyono & Syamsuri, 2023).

The results also support H2, confirming that Customer Retention exerts a positive and, in this study, the strongest effect on Logistics Performance ($\beta = 0.479$, $p < 0.001$). Customer loyalty not only generates sustained revenue streams but also drives continuous service improvement through customer feedback mechanisms, a deepened understanding of customer needs, and enhanced operational satisfaction (Sekarwati, 2023).

Although both hypotheses were supported, the larger path coefficient for Customer Retention ($\beta = 0.479$) compared with Process Agility ($\beta = 0.292$) warrants further explanation, particularly since it runs counter to the assumption, common in the operations-management literature, that internal process capabilities exert the most immediate influence on logistics outcomes. One plausible explanation lies in the nature of PT. Nippon Express Indonesia's customer base: in export freight forwarding, retained

customers are typically repeat exporters with established shipment routines, documentation practices, and communication channels. This familiarity reduces coordination friction, reduces the likelihood of last-minute changes and re-bookings, and provides more predictable and stable demand patterns that allow the company to plan shipment schedules, allocate transport capacity, and coordinate customs documentation more efficiently (Nugroho et al., 2020; Burity, 2021). In this sense, Customer Retention may function less as a distal, relationship-based outcome and more as an operationally consequential input that directly eases the planning and execution of logistics activities. Process Agility, while still a significant and meaningful contributor, may exert a comparatively smaller effect in this context because the export process at PT. Nippon Express Indonesia is already relatively standardised, so incremental gains in flexibility yield smaller marginal improvements in logistics performance than the stability contributed by a loyal, familiar customer base. This finding suggests that, at least in this operational context, sustaining long-term customer relationships may be as important as, or more important than, internal process flexibility for achieving strong logistics performance.

5. Conclusion and Suggestion

This study examined the effects of Process Agility and Customer Retention on Logistics Performance at PT. Nippon Express Indonesia's export division. The results confirm that both Customer Retention (H2) and Process Agility (H1) exert positive and statistically significant effects on Logistics Performance, with Customer Retention emerging as the stronger predictor ($\beta = 0.479$) compared with Process Agility ($\beta = 0.292$). Together, the two constructs account for a moderate proportion of the variance in Logistics Performance ($R^2 = 0.435$), underscoring the importance of both customer-relationship management and operational flexibility, while also indicating that other factors beyond these two constructs meaningfully shape logistics performance in this context.

For managerial practice, these findings suggest several concrete steps that PT. Nippon Express Indonesia's export division can take to strengthen its logistics performance. First, because Customer Retention exerts the strongest effect, the company should prioritise structured relationship-management activities, such as periodic service-satisfaction reviews, dedicated account management for high-value exporters, and proactive complaint-handling procedures, given that Internal Complaint Minimisation was identified in this study as a comparatively weaker but still relevant dimension of retention. Second, because Process Agility also contributes significantly, the company should continue improving the flexibility of its export process, for example by simplifying document-handling procedures, cross-training staff to cover multiple stages of the export process, and accelerating communication between the export, customs, and warehousing units so that disruptions can be addressed with minimal delay. Third, improving the transparency of shipment-status information available to customers, such

as through real-time tracking updates, would reinforce both the Information Transparency dimension of Process Agility and the service-reliability perceptions that underpin Customer Retention. Taken together, these recommendations link the study's empirical results directly to actionable steps for improving export logistics performance, with relationship management as the leading priority.

This research is subject to several limitations that should be considered when interpreting the results. First, the study was conducted within a single freight forwarding company, PT. Nippon Express Indonesia, and the organisation's specific culture and operational practices may limit the generalisability of the findings to other logistics companies, both in Indonesia and internationally. Second, the relatively limited sample size of 68 respondents may not fully represent the broader range of customer perspectives in the logistics sector. These conclusions should therefore be interpreted in relation to the specific organisational and business context from which they originated.

A further limitation concerns the model's explanatory power. Although Process Agility and Customer Retention were both significant predictors, the R^2 value of 0.435 indicates that a substantial share of the variance in Logistics Performance, approximately 57%, remains unexplained by these two constructs. This suggests that other factors not included in this model, such as technology adoption, workforce competence, supplier reliability, or macroeconomic conditions affecting export volumes, may also meaningfully influence logistics performance at PT. Nippon Express Indonesia, and future research should consider incorporating such factors to build a more complete explanatory model.

From a methodological perspective, the cross-sectional design used in this study allows relationships between variables to be identified but does not capture how customer behaviour or organisational capabilities may change over time. In addition, because all constructs were measured through perception-based survey responses collected from a single source at a single point in time, the data may be subject to common method bias; as noted in the Research Method section, this was addressed only procedurally and was not tested statistically, which is itself a limitation. Perceptual measures may also not fully correspond to objective operational indicators, such as actual delivery-accuracy percentages, logistics cost efficiency, or problem-resolution speed as captured through objective measurement techniques.

Future research could extend these findings by examining multiple freight forwarding companies rather than a single organisation, employing larger and more heterogeneous samples, and adopting a longitudinal design capable of capturing how customer behaviour and organisational agility evolve over time. Future studies may also consider incorporating objective operational metrics, such as recorded delivery-accuracy rates or logistics cost data, alongside perception-based measures, and formally testing for common method bias (e.g., using Harman's single-factor test or a marker-variable approach), to strengthen the robustness of the conclusions drawn.

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