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Digitalization Technology and Promotion Strategy on Customer Satisfaction and Its Implications for Customer Lifetime Value in Ship Agency Business

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Abstract: The Indonesian ship agency business is at the heart of the country's archipelagic trade connectivity, yet their ability to translate the service digitalization and promotional communication into long-lasting customer relationship is empirically under-explored, especially through the lens of Customer Lifetime Value (CLV). This research aims to analyze the effect of Digitalization Technology and Promotion Strategy on Customer Satisfaction and its implications for CLV, with Customer Satisfaction as a mediating variable, in the setting of a foreign ship agency service provider, PT Pelayaran Karana Line. A cross-sectional approach was used in a quantitative explanatory research design. The primary data was collected through an online structured questionnaire to 150 respondents which were determined using Slovin's formula from 240 shipping principals' principal representatives from 24 shipping principals with a purposive sampling technique. Data were analyzed using Partial Least Square Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0. The measurement model showed acceptable convergent validity (AVE 0.637-0.693), discriminant validity and reliability (composite reliability 0.953-0.970) for all constructs. The structural model showed good explanatory power (R^2 of 0.727 for Customer Satisfaction and 0.909 for CLV; $Q^2 = 0.975$). All seven hypothesized relationships were statistically supported ($p < 0.05$). Digitalization Technology and Promotion Strategy have a significant and positive effect on Customer Satisfaction and CLV, both directly and indirectly through Customer Satisfaction, which is the strongest direct predictor of CLV ($\beta = 0.654$). These findings extend the nomological network between digitalization and marketing communication to customer value in a business-to-business maritime service context and offer practical guidance to ship agencies for reinforcing automation, promotional value communication and relationship-continuity management.

Keywords: Digitalization Technology, Promotion Strategy, Customer Satisfaction, Customer Lifetime Value, Ship Agency, PLS-SEM.

Indonesian Abstract: *Bisnis keagenan kapal di Indonesia merupakan tulang punggung konektivitas perdagangan antar-pulau, namun kemampuan pelaku bisnis dalam mengubah digitalisasi layanan dan komunikasi promosi menjadi hubungan pelanggan yang langgeng masih kurang dikaji secara empiris, khususnya dari perspektif Customer Lifetime Value (CLV). Penelitian ini bertujuan untuk menganalisis pengaruh Teknologi Digitalisasi dan Strategi Promosi terhadap Kepuasan Pelanggan serta implikasinya bagi CLV, dengan Kepuasan Pelanggan sebagai variabel mediasi, pada penyedia jasa keagenan kapal asing, PT Pelayaran Karana Line. Pendekatan cross-sectional digunakan dalam desain penelitian kuantitatif eksplanatori. Data primer dikumpulkan melalui kuesioner terstruktur daring yang melibatkan 150 responden—yang ditentukan menggunakan rumus Slovin dari populasi 240 perwakilan prinsipal pelayaran (yang berasal dari 24 prinsipal)—melalui teknik purposive sampling. Data dianalisis menggunakan Partial Least Square Structural Equation Modeling (PLS-SEM) dengan perangkat lunak SmartPLS 4.0. Model pengukuran menunjukkan validitas konvergen (AVE 0,637–0,693), validitas diskriminan, dan reliabilitas (composite reliability 0,953–0,970) yang dapat diterima untuk semua konstruk. Model struktural menunjukkan daya penjelas yang baik (nilai R^2 sebesar 0,727 untuk Kepuasan Pelanggan dan 0,909 untuk CLV; $Q^2 = 0,975$). Ketujuh hubungan yang dihipotesiskan terbukti secara statistik ($p < 0,05$). Teknologi Digitalisasi dan Strategi Promosi memiliki pengaruh positif dan signifikan terhadap Kepuasan Pelanggan dan CLV, baik secara langsung maupun tidak langsung melalui Kepuasan Pelanggan, yang merupakan prediktor langsung terkuat bagi CLV ($\beta = 0,654$). Temuan ini memperluas jaringan nomologis antara digitalisasi dan komunikasi pemasaran terhadap nilai pelanggan dalam konteks layanan maritim business-to-business, serta memberikan panduan praktis bagi agen kapal untuk memperkuat otomatisasi, komunikasi nilai promosi, dan manajemen keberlanjutan hubungan.*

Keywords: *Teknologi Digitalisasi; Strategi Promosi, Kepuasan Pelanggan, Nilai Seumur Hidup Pelanggan, Keagenan Kapal, PLS-SEM.*

INTRODUCTION

Indonesia is an archipelagic country with more than 17,000 islands, relying heavily on maritime transportation to support trade and logistical connectivity. Ship agency services have a strategic role in this system in handling operational, documentary, and administrative requirements of foreign shipping principals calling at Indonesian ports (Lasse, 2018; Santoso & Wibowo, 2022). With the growing competition among agency service providers nationally and internationally, firms are increasingly expected to build long-term, economically valuable relationships with their principals over transactional gains. Customer lifetime value (CLV) is an important strategic lens through which agency performance can be assessed (Kumar, 2020).

This challenge is empirically described by PT Pelayaran Karana Line, a foreign ship agency service provider operating from Jakarta. A preliminary survey of 30 users of the company's agency services showed that the dominant pattern of response across the dimensions of repurchase intention, usage intensity and relationship continuity was to disagree, which meant that CLV had not yet reached an optimal level. This trend was also seen in the company's financial performance, with revenue growing from IDR 20.47 billion in 2021 to IDR 121.67 billion in 2024, but saw a significant drop in 2023. Net profit after tax grew from IDR 5.22 billion in 2021 to IDR 13.62 billion in 2022 and then decreased for two consecutive years to IDR 7.52 billion in 2024. Because CLV is not only about the size of transactions but also about the frequency, depth of engagement, and duration of the relationship, this volatility suggests an incomplete alignment between the company's digital service capabilities, its promotional communication, and the value it ultimately retains from its customer base.

Two common management levers for building stronger customer relationships in services are digitalization technology and promotion strategy. Digitalization technology, defined as the incorporation of digital infrastructure, automated workflows and secure information management into service delivery, has been shown to affect customer perceptions and satisfaction in container shipping and international shipping platforms (Balci, 2021; Loh et al., 2024). Promotion strategy, including the clarity, consistency and perceived value of marketing communication, has long been recognized as a driver of customer perception and relationship continuity in service marketing at the same time (Kotler & Keller, 2021; Chaffey & Ellis-Chadwick, 2022). However, the pathway through which these two levers together translate into long-term customer value, and the mediating role that customer satisfaction plays in that pathway, have rarely been empirically tested within a single structural model for maritime agency services.

A review of recent literature bolsters this gap. Research on CLV has explored its association with sustainability and search-engine metrics (Segarra-Moliner, 2025), strategic marketing practice and financial performance (Ali & Shabn, 2024), and customer relationship management (Brando et al., 2025; Herlinton et al., 2025; Mahendra & Indriani, 2025), while research on digitalization in shipping has focused on customer satisfaction and trust but not extended the analysis to CLV (Balci, 2021; Wu et al., 2023; Loh et al., 2024; Zeng et al., 2025). Meanwhile, studies on Indonesian ship agency services have more or less discussed service quality and operational barriers but not the combined effect of digitalization and promotion on customer value (Haryanta et al., 2024; Sianipar & Ginting, 2024; Kusuma & Prasetya, 2022; Imaduddiin et al., 2025). To the best of the authors' knowledge, no prior study has investigated Digitalization Technology and Promotion Strategy simultaneously as antecedents of Customer Satisfaction and CLV by using a full mediation model in the setting of a business-to-business foreign ship agency in Indonesia. This study fills that gap and, in doing so, provides both a theoretical extension of the CLV nomological network to B2B maritime services, and practical guidance for shipping agencies looking to turn digital and promotional investment into lasting customer relationships.

Based on this background, the research examines seven questions regarding the direct effect of Digitalization Technology and Promotion Strategy on Customer Satisfaction and CLV, the direct effect of Customer Satisfaction on CLV, and the indirect effect of Digitalization Technology and Promotion Strategy on CLV through Customer Satisfaction. Correspondingly, this study aims to empirically analyze each of these seven relationships by using data collected from the principal representatives of a foreign ship agency service provider in Jakarta.

Digital infrastructure, automated processes and information security reduce friction and increase trust in the delivery of service, which prior research has linked to higher customer satisfaction in shipping related services (Balci, 2021; Loh et al., 2024). The regular digitalization of services further enhances customers' willingness to sustain and deepen the relationship over time (Zeng et al., 2025; Wu et al., 2023). This indicates:

H1: Digitalization Technology has an effect positively and significantly to Customer Satisfaction.

H3: Digitalization Technology positively and significantly affects Customer Lifetime Value.

Clear and consistent promotional communication helps form customer expectations and when service delivery meets these expectations, it increases customer satisfaction and leads to long-term commitment (Kotler & Armstrong, 2021; Farris et al., 2021; Justavino-Castillo et al., 2023). This line of thought leads to:

H2: Promotion Strategy has positive and significant impact on Customer Satisfaction.

H4: Promotion Strategy has a positive and significant impact on Customer Lifetime Value.

Customer satisfaction is a close driver of long-term customer value, as satisfied customers are more likely to repurchase, deepen usage, and sustain the relationship (Zeithaml et al., 2021; Herlinton et al., 2025; Mahendra & Indriani, 2025). Thus:

H5: Customer Satisfaction has a positive and significant impact on Customer Lifetime Value.

As satisfaction is, in theory, a mediator of the effect of service and marketing inputs on relational outcomes (Lovelock & Wirtz, 2021), Digitalization Technology and Promotion Strategy should also have an indirect effect on CLV via Customer Satisfaction:

H6: Digitalization Technology has a positive and significant influence on Customer Lifetime Value through Customer Satisfaction.

H7: The mediating variable of the effect of Promotion Strategy on Customer Lifetime Value is Customer Satisfaction.

The framework concept of the relationship between Digitalization Technology (X1) and Promotion Strategy (X2) to Customer Lifetime Value (Y) with Customer Satisfaction (Z) as the mediating variable is displayed in Figure 1. This is in accordance with hypotheses H1-H7.

H6, H7: indirect effects of X1 and X2 on Y through Z (mediation)

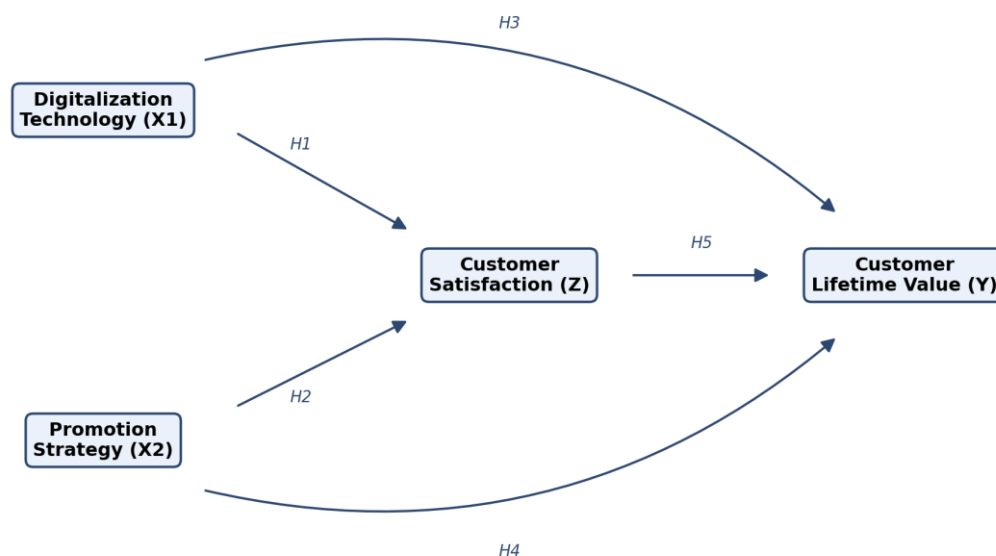


Figure 1. Conceptual Framework

METHODS

Research Design

The research design used in this study is a quantitative explanatory research design with a cross-sectional approach, where the independent variables and the dependent variables are measured simultaneously. The variables studied were the effect of Digitalization Technology (X1) and Promotion Strategy (X2) on Customer Lifetime Value (Y) through Customer Satisfaction (Z) as an intervening variable.

Population and Sample

The population was all of the principals/customers of foreign ship agency services at PT Pelayaran Karana Line in 2025. The population consisted of 24 shipping principal with an

average of 10 relevant staff per principal (Director/General Manager, Operations/Fleet Manager, Chartering/Commercial Manager, Shipping Manager, Port Captain/Marine Superintendent, Finance Manager, Accounting Staff, Documentation/Shipping Administration Staff, Logistics/Cargo Officer, and Operational Staff/Liaison Officer) with a total population of 240. The sample size was determined by using the Slovin's formula with 5% margin of error which resulted to a minimum sample of 150 respondents. The respondents were purposely sampled from the 24 principals in proportion to their level of direct involvement in the use and decision making of the company's foreign ship agency services.

Data Collection

Main data were collected through a structured online questionnaire using a four-point Likert scale with the endpoints of 1 (strongly disagree) and 4 (strongly agree) with no option for a neutral midpoint to prompt a definitive response bias. The instrument was pre tested on 50 respondents for validity and reliability before full scale distribution.

Variables and Operational Definitions

Four latent variables were measured through 15, 15, 15, and 9 reflective indicators, respectively, grouped into the dimensions summarized in Table 2.

Table 2. Research Variables and Dimensions

Variable	Dimensions	No. of Indicators
Digitalization Technology (X1)	IT infrastructure; digital systems integration; service process automation; information data management; digital information security	15
Promotion Strategy (X2)	Marketing perspective; expectation confirmation; relationship marketing; service quality communication; customer value	15
Customer Satisfaction (Z)	Expectation congruence; customer interest; willingness to recommend; perceived value; overall satisfaction	15
Customer Lifetime Value (Y)	Repurchase intention; usage factor; relationship continuity	9

Data Analysis Technique

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4.0 with a two-stage evaluation procedure (Hair et al, 2021; Ghozali & Latan, 2021). The measurement (outer) model was assessed for convergent validity (outer loading > 0.6, AVE > 0.5), discriminant validity (Fornell-Larcker criterion and cross-loadings) and reliability (Cronbach's alpha and composite reliability > 0.7). The structural (inner) model was assessed by the coefficient of determination (R^2), the predictive relevance (Q^2), and Goodness-of-Fit indices (SRMR, d_ULS), and the hypothesis testing was performed using a bootstrapping procedure (5,000 resamples, two-tailed test, $\alpha = 0.05$, t-table = 1.96).

RESULTS AND DISCUSSION

Respondent Profile

Of the 150 valid respondents, 88.7% (n = 133) were male and 11.3% (n = 17) were female. The majority were aged 21-30 years (78.0%), followed by 31-40 years (17.3%). Regarding position, 78.0% held clearing-agent roles and 22.0% were exporters. In terms of relationship tenure, 54.7% of respondents had been customers for less than one year, while the remainder had longer-standing relationships with the company, providing a respondent base directly engaged in the operational use of the company's agency services.

Measurement Model (Outer Model)

All 54 indicators across the four constructs produced outer loadings above the 0.6 threshold (range 0.701-0.957), and all constructs exceeded the AVE threshold of 0.5, confirming convergent validity. Table 3 presents the convergent validity and reliability results, and Table 4 presents the discriminant validity results using the Fornell-Larcker criterion, in which each construct's square-root AVE exceeds its correlation with any other construct - confirming adequate discriminant validity for all constructs.

Table 3. Convergent Validity and Reliability

Variable	AVE	Cronbach's Alpha	Composite Reliability	Conclusion
Digitalization Technology (X1)	0.680	0.966	0.969	Valid & Reliable
Promotion Strategy (X2)	0.683	0.967	0.970	Valid & Reliable
Customer Satisfaction (Z)	0.637	0.959	0.963	Valid & Reliable
Customer Lifetime Value (Y)	0.693	0.944	0.953	Valid & Reliable

Source: Processed primary data using SmartPLS 4.0 (2026)

Table 4. Discriminant Validity (Fornell-Larcker Criterion)

Construct	CLV (Y)	Satisfaction (Z)	Promotion (X2)	Digitalization (X1)
CLV (Y)	0.832	-	-	-
Customer Satisfaction (Z)	0.937	0.798	-	-
Promotion Strategy (X2)	0.768	0.715	0.827	-
Digitalization Technology (X1)	0.818	0.798	0.591	0.824

Source: Processed primary data using SmartPLS 4.0 (2026). Diagonal values (bold in original output) are the square root of AVE.

Structural Model (Inner Model)

The structural model shows strong explanatory power. Customer Satisfaction is explained by Digitalization Technology and Promotion Strategy at $R^2 = 0.727$ (strong), while CLV is explained by all three predictors at $R^2 = 0.909$ (strong). The predictive relevance value, $Q^2 = 0.975$, indicates very high predictive relevance for the endogenous constructs. Model fit indices (SRMR = 0.074 for the estimated model) fall within the acceptable range (< 0.08), supporting the overall adequacy of the structural model for hypothesis testing.

Table 5. Coefficient of Determination (R^2)

Endogenous Variable	R-Square	Criterion
Customer Satisfaction (Z)	0.727	Strong
Customer Lifetime Value (Y)	0.909	Strong

Hypothesis Testing

Table 6 presents the results of direct-effect hypothesis testing, and Table 7 presents the indirect (mediated) effects, both obtained via bootstrapping in SmartPLS 4.0 with a two-tailed significance level of 5% (t -table = 1.96).

Table 6. Hypothesis Testing - Direct Effects

Hyp.	Path	Coef. (O)	T-Statistics	P-Values	Decision
H1	Digitalization Technology -> Customer Satisfaction	0.577	7.222	0.000	Supported
H2	Promotion Strategy -> Customer Satisfaction	0.374	4.666	0.000	Supported
H3	Digitalization Technology -> CLV	0.182	3.143	0.002	Supported
H4	Promotion Strategy -> CLV	0.193	4.093	0.000	Supported
H5	Customer Satisfaction -> CLV	0.654	9.809	0.000	Supported

Table 7. Hypothesis Testing - Indirect Effects (Mediation)

Hyp.	Path	Coef. (O)	T-Statistics	P-Values	Decision
H6	Digitalization Technology -> Satisfaction -> CLV	0.377	5.937	0.000	Supported
H7	Promotion Strategy -> Satisfaction -> CLV	0.245	4.029	0.000	Supported

Source: Processed primary data using SmartPLS 4.0 bootstrapping, 5,000 resamples (2026)

All seven hypotheses were statistically significant at $p < 0.05$. Both direct and indirect effects of Digitalization Technology and Promotion Strategy on CLV are positive and significant, and Customer Satisfaction functions as a significant partial mediator in both pathways, as the direct effects of X1 and X2 on Y (H3, H4) remain significant as well as their indirect effects through Z (H6, H7).

Discussion

Digitalization Technology and Customer Satisfaction (H1, H3, H6). Out of the two exogenous variables, Digitalization Technology has the most direct impact on Customer Satisfaction ($\beta = 0.577$). This is consistent with the results that customer perception in shipping services is influenced by digital platforms and trust-enabling systems (Loh et al., 2024; Balci, 2021; Wu et al., 2023). Among the dimensions of the construct, the dimension with the highest loading was the Digital Information Security dimension, which means that data protection and system security are the most salient aspect of digitalization from the customer's perspective. The other dimension, process automation, was comparatively the weakest dimension, although it was highly loaded. This means that while PT Pelayaran Karana Line's customers already view the company's systems as secure and reliable, there is an immediate opportunity to improve the perception of digitalization by further automating documentation and service workflows, in line with the recommendations for maritime logistics providers to close existing automation gaps so that they can fully benefit from digitalization (Zeng et al., 2025).

Promotion Strategy and Customer Satisfaction (H2, H4, H7). Promotion Strategy has a significant effect on Customer Satisfaction ($\beta = 0.374$) and CLV both directly and indirectly via satisfaction. This study supports the view that consistent and credible marketing communication shapes customer expectations and thus satisfaction and relational commitment (Kotler & Armstrong, 2021; Farris et al., 2021). The most dominant dimension was the Marketing Perspective dimension, which captures clarity and consistency of promotional messaging, while Customer Value communication was comparatively weaker, but still strongly loaded, suggesting the need to more explicitly frame promotional messaging around the value-for-cost proposition of the company's services.

Customer Satisfaction and CLV (H5). The strongest predictor of CLV in the model is Customer Satisfaction ($\beta = 0.654$, $t = 9.809$) which confirms the central mediating role of satisfaction between service/marketing inputs and long-term customer value and is consistent with service-marketing theory (Lovelock & Wirtz, 2021) and with prior CLV studies in digital and financial services contexts (Herlinton et al., 2025; Mahendra & Indriani, 2025). Within Customer Satisfaction, Expectation Congruence dimension – specifically the alignment between promised service and delivered service – had the highest loading while Willingness to Recommend was relatively the lowest. This means that while customers are satisfied with the service delivered, the translation of that satisfaction into active promotion and referrals is still a work in progress.

Customer Satisfaction as Mediator (H6, H7) The results show a partial mediation, since the direct effects of Digitalization Technology and Promotion Strategy on CLV are still significant along with their significant indirect effects through Customer Satisfaction: Customer Satisfaction significantly improves the impact of digitalization and promotion on

CLV, but it does not fully explain it. Within CLV itself, the Usage Factor dimension was the most dominant, while Relationship Continuity, although still strongly loaded, had relatively more room for strengthening - especially customers' explicit intention to continue the partnership in the future - indicating the value of proactive relationship-management practices such as CRM-based follow-up and dedicated account management, consistent with the relational emphasis in CRM-CLV research (Brando et al., 2025).

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This study demonstrates that Digitalization Technology and Promotion Strategy each significantly and positively influence Customer Satisfaction and Customer Lifetime Value, both directly and indirectly through Customer Satisfaction, among customers of a foreign ship agency service provider in Indonesia. Customer Satisfaction was confirmed as a significant partial mediator, with its own direct effect on CLV being the strongest relationship in the model. All seven hypotheses were supported, with the structural model explaining 90.9% of the variance in CLV - a level of explanatory power that underscores the robustness of the proposed integrated framework for this service context.

Limitations

This study is limited by its cross-sectional design that enables us to only observe the relationships at a single point in time. Furthermore, this study is limited to a single company which may limit the generalizability to other ship agency providers or maritime service segments. Future studies are encouraged to test the model in longitudinal settings, in multiple agency companies or other maritime B2B service categories and to investigate further mediating or moderating variables such as digital trust, service quality or customer commitment to further enrich understanding of how digitalization and promotion translate to long-term customer value in the maritime sector.

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