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Operational Performance as a Mediating Mechanism Between Simkapel Digitalization, Port Facility Utilization, and Port User Satisfaction

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Abstract: This study aims to analyze the effect of the Digitalization of the Shipping and Seafarer Information System (SIMKAPEL) and port facility utilization on operational performance, as well as its implications for user satisfaction at the Class II Bintuni Port Authority Unit. This research employs a quantitative approach with an explanatory research design and a cross-sectional method. The study population consists of 300 port service users, and the sample size was determined using the Slovin formula with a 5% margin of error, resulting in 171 respondents. Data were collected through questionnaires using a five-point Likert scale distributed to port service users. The data analysis technique used is Structural Equation Modeling–Partial Least Square (SEM-PLS) to examine both direct and indirect relationships among variables. The results indicate that SIMKAPEL digitalization has a positive and significant effect on operational performance, while port facility utilization also shows a significant effect. Furthermore, operational performance has a significant impact on user satisfaction. In addition, SIMKAPEL digitalization and port facility utilization have indirect effects on user satisfaction through operational performance as a mediating variable. Based on these findings, it is recommended that port management enhance the integration of SIMKAPEL with other service systems, optimize the utilization of port facilities, particularly cargo handling equipment and storage capacity, and continuously improve operational service quality. These efforts are expected to increase operational efficiency while strengthening user satisfaction and loyalty in port services.

Keywords: SIMKAPEL Digitalization, Port Facility Utilization, Operational Performance, User Satisfaction

INTRODUCTION

Ports are essential infrastructures that support the smooth distribution of goods and passengers in Indonesia. As an archipelagic country, Indonesia relies heavily on maritime transportation to facilitate trade activities and community mobility across regions. Ports serve as critical gateways for economic development, connecting production centers, markets, and

communities. Therefore, improving port services and operational effectiveness has become a major priority in supporting national economic growth and maritime logistics systems.

One of the ports with a strategic role in maritime transportation is Bintuni Port, managed by the Class II Bintuni Port Authority Unit. According to the National Port Master Plan, Bintuni Port functions as a collecting port and supports various economic activities, including cargo handling, passenger transportation, and industrial logistics. The port also serves several operational regions and accommodates multiple special terminals related to natural gas, crude oil, fisheries, palm oil, forestry products, and other industrial sectors. This strategic role makes Bintuni Port an important contributor to regional development in West Papua.

In the context of port management, service user satisfaction is one of the main indicators used to evaluate the effectiveness and quality of services provided by a port authority. User satisfaction reflects users' perceptions and experiences regarding service quality, operational efficiency, and the adequacy of supporting facilities. A higher level of satisfaction generally indicates better service quality and stronger user trust. Therefore, maintaining and improving user satisfaction has become an essential goal for modern ports.

However, based on the Community Satisfaction Index (IKM) data of Bintuni Port from 2022 to 2024, several issues remain evident. Although the target IKM value was set at 85% annually, the realized values only reached 80% in 2022, 82% in 2023, and 84% in 2024. Although these figures indicate gradual improvement, the targets were still not fully achieved. This situation suggests that certain service aspects still require evaluation and improvement to meet user expectations more effectively.

Preliminary survey results regarding user satisfaction also reveal similar findings. While many respondents stated that the services received met their expectations and showed an intention to reuse and recommend the port services to others, several respondents still expressed dissatisfaction. These findings indicate that although the overall level of satisfaction is relatively good, gaps remain between user expectations and actual service experiences, suggesting opportunities for further enhancement in service quality and operational performance.

Operational performance is considered one of the important factors influencing user satisfaction in port services. Efficient cargo loading and unloading processes, optimal use of resources, and timely service delivery directly affect the experience of port users. Operational performance data at Bintuni Port during June–December 2024 indicate a significant increase in loading and unloading activities, particularly in energy and industrial sectors. However, variations in resource allocation and service efficiency across different sectors suggest that operational optimization is still needed.

To improve operational efficiency, many ports in Indonesia have implemented digital transformation initiatives. One of the key digital systems introduced at Bintuni Port is the Shipping and Seafarer Information System (SIMKAPEL). This system aims to accelerate administrative processes, improve data accuracy, enhance transparency, and reduce dependency on manual procedures that may lead to delays and document errors. Through digital certification and barcode integration, SIMKAPEL provides a more secure and efficient administrative process for shipping services.

Despite the advantages of SIMKAPEL implementation, several challenges have emerged during its adaptation process. Data from June to December 2024 indicate fluctuations in ship activities associated with the use of the SIMKAPEL system. In addition, many stakeholders initially experienced difficulties in adapting to online procedures, particularly in uploading required documents and understanding the technical aspects of the system. This situation indicates a gap between the expected benefits of digitalization and its practical implementation in the field.

Besides digitalization, facility utilization also plays a significant role in supporting port operational activities. The condition and effectiveness of facilities such as docks, warehouses, passenger terminals, loading equipment, and storage areas directly affect operational perfor-

mance and service quality. However, several facilities at Bintuni Port still require improvement, including concrete docks, LNG jetty structures, warehouse renovations, and terminal capacity expansion. Inadequate infrastructure conditions may create operational obstacles and potentially reduce service efficiency and customer satisfaction.

Although previous studies have examined digital systems such as SIMKAPEL and their effects on operational efficiency, limited research has investigated the simultaneous relationship between SIMKAPEL digitalization, port facility utilization, operational performance, and service user satisfaction, particularly at Class II Bintuni Port. Most previous studies focused mainly on administrative efficiency and transparency without comprehensively examining how digital transformation and facility conditions collectively influence operational outcomes and customer satisfaction. Therefore, this study aims to address this research gap by investigating the influence of SIMKAPEL digitalization and port facility utilization on user satisfaction through operational performance at Class II Bintuni Port.

METHOD

This chapter describes the research methodology used to achieve the objectives of the study systematically. The research applies a quantitative approach with an explanatory design and a cross-sectional method to examine the relationships among research variables. Primary data were collected directly from respondents through questionnaires distributed to port service users at the Class II Bintuni Port Authority Unit. The questionnaire was designed based on research indicators and variables using a Likert scale measurement. Data collection focused on obtaining respondents' perceptions regarding SIMKAPEL digitalization, port facility utilization, operational performance, and service user satisfaction. This methodology was selected to provide objective and measurable research findings.

This chapter also explains the research population, sampling procedures, and operational definitions of variables. The study population consisted of 300 port service users representing managers, supervisors, and operational staff from several companies operating at Bintuni Port. The sample selection applied purposive and simple random sampling techniques, resulting in 171 respondents. The study consists of independent variables, namely SIMKAPEL digitalization and port facility utilization, an intervening variable of operational performance, and a dependent variable of service user satisfaction. Operational definitions and indicators were developed to ensure that each variable could be measured consistently and accurately. This process helped establish a clear framework for data collection and analysis.

Furthermore, this chapter discusses research implementation, instrument testing, and data analysis techniques. The research instrument was tested through validity and reliability tests to ensure measurement accuracy and consistency. Data processing involved editing, coding, and tabulation procedures before statistical analysis was conducted. The study used Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS software to analyze relationships among variables and test the proposed hypotheses. Statistical analyses included descriptive analysis, outer model evaluation, inner model evaluation, and hypothesis testing. Through these procedures, the study is expected to produce valid and reliable findings that answer the research objectives.

RESULTS AND DISCUSSION

Results

The number of respondents in this study was 171 individuals, all of whom were port service users at the Class II Bintuni Port Authority Unit (UPP). The description of respondent characteristics was compiled based on primary data obtained through questionnaires and subsequently processed by the researcher. Based on the respondent characteristics data, in terms of gender, the majority of respondents were male, totaling 133 respondents (77.8%), while female respondents accounted for 38 individuals (22.2%). This distribution indicates that most

port service users at the Class II Bintuni Port Authority Unit are male. Based on age, the majority of respondents were between 21–30 years old, totaling 82 respondents (48.0%). In terms of educational background, most respondents held a bachelor's degree (S1), totaling 104 respondents (60.8%).

Measurement Model Evaluation (Outer Model)

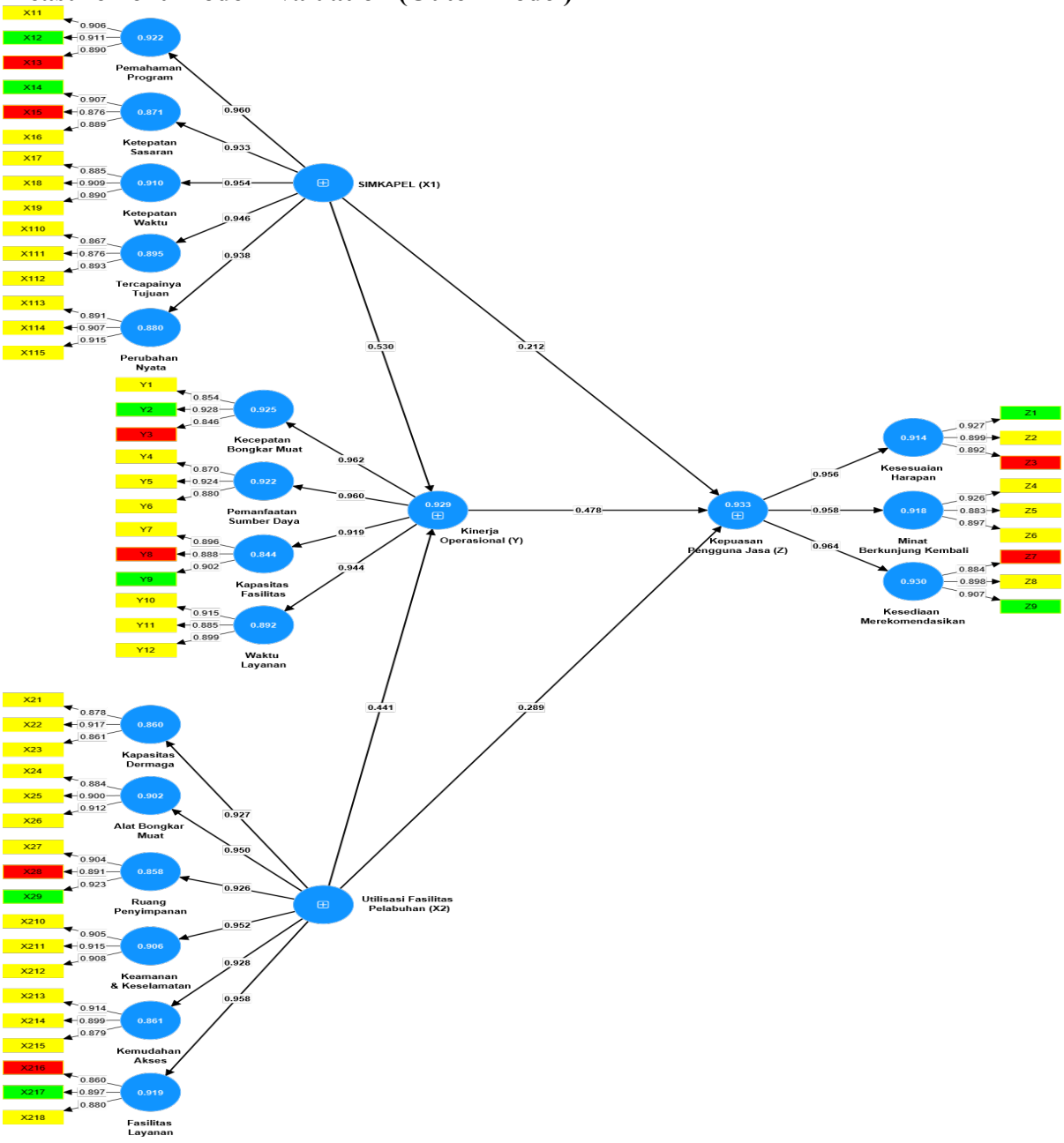


Figure 1. Outer Model Results

Based on the data processing results of the loading factor shown in the figure above, the indicators are considered valid because they meet the rule of thumb requirement, meaning that the loading factor values for each indicator are greater than 0.70. The following explanation describes the highest and lowest loading factor values for each indicator.

For the Digitalization of Shipping and Seafarer Information System (SIMKAPEL) variable, the highest loading factor value was found in item X12 with a value of 0.915, while the lowest value was found in item X110 with a value of 0.867. This indicates that all indicators of SIMKAPEL Digitalization are valid in measuring their construct and can therefore be used

in this research. For the Port Facility Utilization variable, the highest loading factor value was found in item X29 with a value of 0.923, while the lowest value was found in item X216 with a value of 0.860. This indicates that all indicators of Port Facility Utilization are valid in measuring their construct and can therefore be used in this study.

For the Port Operational Performance variable, the highest loading factor value was found in item Y2 with a value of 0.928, while the lowest value was found in item Y3 with a value of 0.846. This indicates that all indicators of Port Operational Performance are valid in measuring their construct and can therefore be used in this study. For the Service User Satisfaction variable, the highest loading factor value was found in item Z1 with a value of 0.927, while the lowest value was found in item Z5 with a value of 0.883. This indicates that all indicators of Service User Satisfaction are valid in measuring their construct and can therefore be used in this research.

Discriminant Validity

Discriminant validity is a test used to determine whether each item within a variable does not correlate highly with other variables. The method used to test discriminant validity in this study was by measuring the cross-loading values. The rule of thumb for analyzing cross-loading values is that the correlation between an item and its own variable must be greater than its correlation with other variables.

The cross-loading results among all latent variables and indicator variables showed that the loading value of each indicator was higher for its own construct compared to other constructs. Based on these findings, it can be concluded that each indicator possesses good discriminant validity in forming its respective variable.

Average Variance Extracted (AVE)

Table 1. Average Variance Extracted

Variables	Average Variance Extracted (AVE)	Cut-off Value	Description
SIMKAPEL Digitalization (X1)	0.716	>0.5	Valid
Port Facility Utilization (X2)	0.710	>0.5	Valid
Service User Satisfaction (Z)	0.748	>0.5	Valid
Port Operational Performance (Y)	0.710	>0.5	Valid

The results indicate that the AVE value for each construct is greater than 0.50. Therefore, the model does not have convergent validity issues, and the constructs in the model can be considered to have good discriminant validity.

Reliability Test

Table 2. Reliability Test Results

Variables	Composite Reliability	Cut-off Value	Cronbach's Alpha	Cut-off Value	Description
SIMKAPEL Digitalization (X1)	0.974	>0.70	0.972	>0.60	Valid and Reliable
Port Facility Utilization (X2)	0.978	>0.70	0.976	>0.60	Valid and Reliable
Service User Satisfaction (Z)	0.964	>0.70	0.958	>0.60	Valid and Reliable
Port Operational Performance (Y)	0.967	>0.70	0.963	>0.60	Valid and Reliable

The results above show that the composite reliability values for all constructs exceed 0.70. Based on these findings, it can be concluded that all constructs have good reliability according to the required minimum threshold (Ghozali, 2016:75). In addition, the outer model can also be evaluated using Cronbach's Alpha values to assess construct reliability. A construct is considered reliable if the Cronbach's Alpha value is above 0.60.

Based on the results above, it can be concluded that SIMKAPEL Digitalization (X1), Port Facility Utilization (X2), Service User Satisfaction (Z), and Port Operational Performance (Y) are considered reliable because their Cronbach's Alpha values exceed 0.60 (Ghozali, 2016:75). Therefore, all constructs can be concluded to have good reliability according to the required minimum standards.

Structural Model Analysis (Inner Model)

The structural model test was conducted to determine the relationships among constructs, significance values, and the R-square values of the research model. The structural model evaluation was performed using the R-square value for dependent constructs, t-test values, and the significance of structural parameter coefficients. The analysis stages conducted in evaluating the structural model were based on several indicators as follows:

Q-Square

Table 3. Blindfolding Results

Variables	SSO	SSE	Q^2 (=1-SSE/SSO)
SIMKAPEL Digitalization (X1)	2565.000	2565.000	0.000
Service User Satisfaction (Z)	1539.000	475.114	0.691
Port Operational Performance (Y)	2052.000	711.899	0.653
Port Facility Utilization (X2)	3078.000	3078.000	0.000

Based on the calculation results shown in the table above, the Q^2 values are 0.691 and 0.653. Since the Q^2 values are greater than zero, the model fulfills predictive relevance requirements, indicating that the model has been reconstructed properly.

R-Square (R^2)

Table 4. R-Square Results

Variables	R-Square
Port Operational Performance (Y)	0.929
Service User Satisfaction (Z)	0.933

Based on the table above, the R-square value for Port Operational Performance is 0.929. This value indicates that the contribution of SIMKAPEL Digitalization and Port Facility Utilization to Port Operational Performance is 92.9%, while the remaining 7.1% is influenced by other variables outside the research model. Therefore, the R^2 value can be categorized as very strong.

Meanwhile, the R-square value for Service User Satisfaction is 0.933. This indicates that SIMKAPEL Digitalization, Port Facility Utilization, and Port Operational Performance simultaneously contribute 93.3% to Service User Satisfaction, while the remaining 6.7% is influenced by other variables not examined in this study. Therefore, the R^2 value for this variable can also be categorized as very strong.

Hypothesis Testing Results (Bootstrapping)

Hypothesis testing was conducted to examine whether there is an influence of exogenous variables on endogenous variables. Hypothesis testing among constructs was performed using the bootstrapping calculation method with a significance level of 5% through SmartPLS 4.0 software. The reults of hypothesis testing can be identified through path coefficient values. The hypothesis testing results using SmartPLS 4.0 are presented in the figure below.

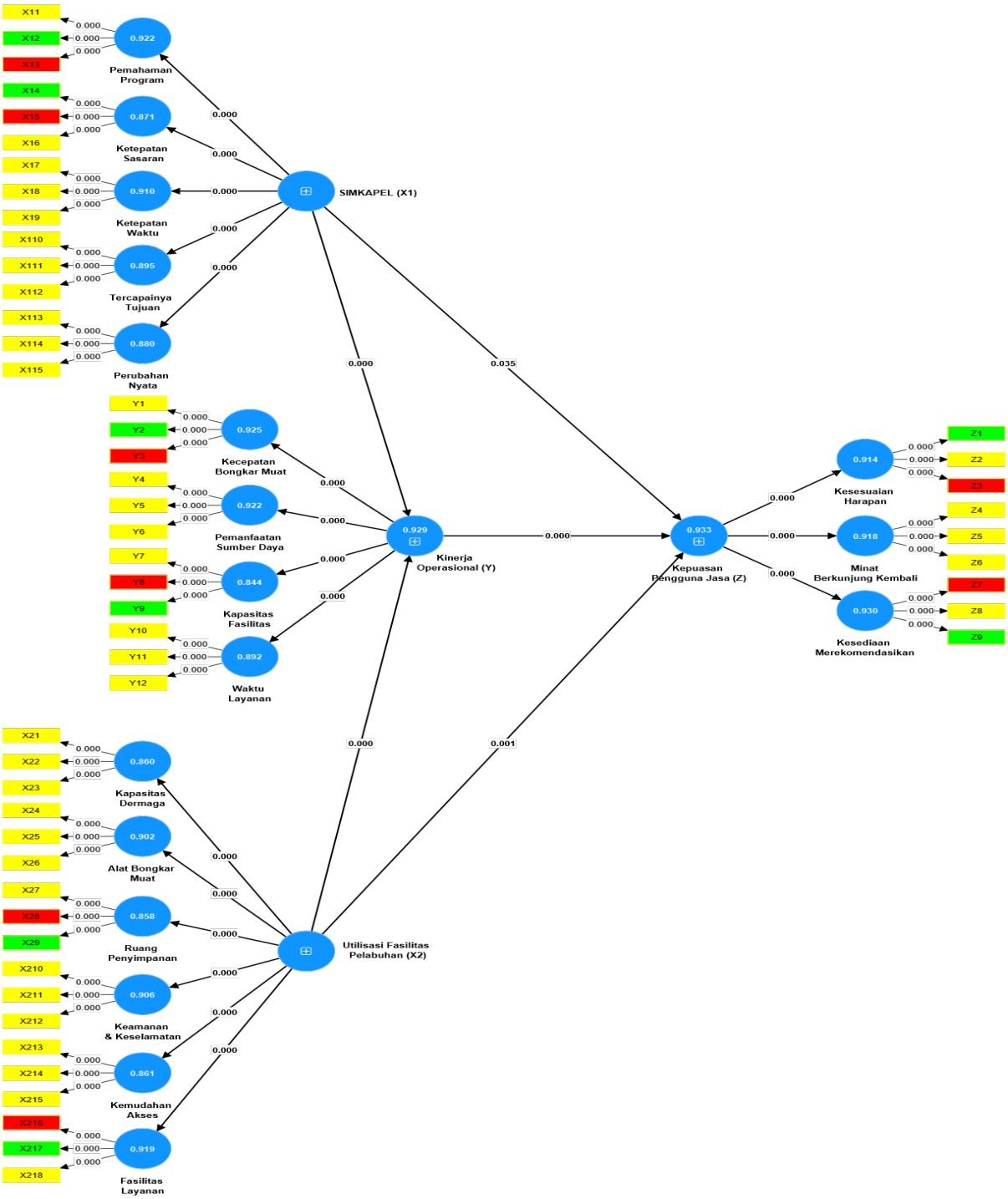


Figure 2 Inner Model Results

The results indicating whether there is an influence between exogenous and endogenous variables can be identified through p-values. The significance level is evaluated through t-statistic values, while the magnitude of influence between variables can be determined through original sample values. The t-statistic test using SmartPLS 4.0 compares the t-statistic value with the t-table value of 1.96 at a significance level (α) of 0.05.

Table 5. Direct and Indirect Effects

Hypothesis	Direct and Indirect Effects	**Original sample (O)**	**T statistics (|O/STDEV|)**	**P values**	Description
H1	SIMKAPEL Digitalization (X1) → Port Operational Performance (Y)	0.530	5.734	0.000	Significant
H2	Port Facility Utilization (X2) → Port Operational Performance (Y)	0.441	4.717	0.000	Significant
H3	SIMKAPEL Digitalization (X1) → Service User Satisfaction (Z)	0.212	2.108	0.035	Significant
H4	Port Facility Utilization (X2) → Service User Satisfaction (Z)	0.289	3.400	0.001	Significant
H5	Port Operational Performance (Y) → Service User Satisfaction (Z)	0.478	5.003	0.000	Significant
H6	SIMKAPEL Digitalization (X1) → Port Operational Performance (Y) → Service User Satisfaction (Z)	0.253	3.774	0.000	Significant
H7	Port Facility Utilization (X2) → Port Operational Performance (Y) → Service User Satisfaction (Z)	0.211	3.408	0.001	Significant

Discussion

H1: SIMKAPEL Digitalization → Port Operational Performance

The results of this study indicate that the Digitalization of the Shipping and Seafarer Information System (SIMKAPEL) has a positive and significant direct effect on port operational performance. This finding is evidenced by the original sample value of 0.530, indicating a positive and relatively strong relationship between the exogenous and endogenous variables in the research model. Furthermore, the t-statistic value of 5.734, which is greater than the t-table value of 1.96 at a significance level of 5%, confirms that the effect is statistically significant and does not occur by chance. In addition, the p-value of 0.000, which is lower than 0.05, further supports the acceptance of the alternative hypothesis and rejection of the null hypothesis. These findings suggest that improving digitalization implementation through SIMKAPEL directly contributes to enhancing port operational performance. Therefore, the first hypothesis in this study is accepted.

The findings reveal that SIMKAPEL implementation not only serves as an administrative digitalization tool but also functions as an integrated system that enhances coordination among stakeholders involved in port operations. The system enables real-time data integration, allowing management to make faster and more effective decisions related to vessel traffic and port service management. Additionally, SIMKAPEL reduces vessel waiting time and improves overall port productivity. Digitalization also promotes service transparency, which eventually increases user trust in port management. Automated processes simplify administrative procedures, making them faster and more efficient compared to previous manual systems. These findings are supported by previous studies conducted by Widiono et al. (2025), Khairllah et al. (2025), Sabila and Rahmah (2023), Sianturi and Sabila (2024), Daniswari et al. (2022), Saragih et al. (2024), and Sinaga et al. (2024), which found that digital systems significantly improve operational efficiency and service performance.

H2: Port Facility Utilization → Port Operational Performance

The results indicate that port facility utilization has a positive and significant direct effect on port operational performance. This result is reflected by the original sample value of 0.441, indicating a positive relationship between facility utilization and operational performance improvement. The t-statistic value of 4.717, which exceeds the t-table value of 1.96 at a significance level of 5%, demonstrates that the relationship is statistically significant. Additionally, the p-value of 0.000, which is below 0.05, further confirms that the second hypothe-

sis is accepted. These findings indicate that the more optimal the utilization of port facilities, the better the operational performance achieved. Therefore, the second hypothesis is accepted.

The findings suggest that the availability and utilization of facilities such as docks, loading and unloading equipment, and supporting infrastructure play an important role in ensuring smooth port operations. Optimal utilization of facilities can reduce bottlenecks that often occur due to infrastructure limitations. In addition, effective facility usage reflects efficient asset management within the port organization. Better facility utilization also improves service quality by reducing delays and increasing service efficiency. Furthermore, it increases port service capacity without requiring substantial investment in the short term. These findings are consistent with studies conducted by Selasdini et al. (2018), Maharani et al. (2023), Sabila and Rakawitan (2023), Purba et al. (2024), Rustina et al. (2024), Sinaga et al. (2024), and Rapika et al. (2025), which reported that facility optimization significantly improves operational performance.

H3: SIMKAPEL Digitalization → Service User Satisfaction

The results of this study demonstrate that SIMKAPEL Digitalization has a positive and significant direct effect on service user satisfaction. This is evidenced by the original sample value of 0.212, indicating a positive relationship with moderate influence strength. The t-statistic value of 2.108, which is greater than the t-table value of 1.96 at the 5% significance level, confirms the statistical significance of the relationship. In addition, the p-value of 0.035, which is lower than 0.05, supports the acceptance of the third hypothesis. These findings indicate that better implementation of SIMKAPEL digitalization leads to higher levels of service user satisfaction. Therefore, the third hypothesis is accepted.

The implementation of SIMKAPEL provides users with better service experiences through faster, more transparent, and more accurate processes than conventional manual systems. The system enables users to access real-time information regarding service activities and reduces the need for direct interactions that often consume time and create inconvenience. Furthermore, easier document processing and vessel service procedures increase user convenience and satisfaction. The integrated nature of the system allows users to access services more efficiently and flexibly. These findings are supported by previous studies conducted by Daniswari et al. (2022), Widiono et al. (2025), Khairllah et al. (2025), Sabila and Rahmah (2023), Sianturi and Sabila (2024), Saragih et al. (2024), and Rapika et al. (2025), which reported that digital systems improve service quality and user satisfaction.

H4: Port Facility Utilization → Service User Satisfaction

The results of this study indicate that port facility utilization has a positive and significant direct effect on service user satisfaction. This is evidenced by the original sample value of 0.289, which indicates a positive relationship with a relatively strong influence between the variables. The t-statistic value of 3.400, which is greater than the t-table value of 1.96, demonstrates that the relationship is statistically significant. In addition, the p-value of 0.001, which is lower than 0.05, further confirms that the fourth hypothesis is accepted. These findings indicate that the more optimal the utilization of port facilities, the higher the level of service user satisfaction. Therefore, the fourth hypothesis in this study is accepted.

The findings suggest that optimal port facilities, including docks, loading and unloading equipment, and supporting infrastructure, contribute significantly to improving service quality perceived by users. Service users tend to be more satisfied when available facilities support the smooth operation of their logistics activities. Modern and well-maintained facilities also enhance users' perceptions regarding the professionalism of port management. Adequate facilities reduce waiting times and improve operational efficiency, thereby creating a more positive service experience. These findings indicate that the physical aspects of facilities directly affect service user satisfaction. These results are supported by studies conducted by Maharani

et al. (2023), Selasdini et al. (2018), Sabila and Rakawitan (2023), Rustina et al. (2024), Purba et al. (2024), Sinaga et al. (2024), and Rapika et al. (2025), which reported that facility optimization significantly improves service quality and user satisfaction.

H5: Port Operational Performance → Service User Satisfaction

The results indicate that port operational performance has a positive and significant direct effect on service user satisfaction. This finding is evidenced by the original sample value of 0.478, indicating a strong and positive relationship between both variables. The t-statistic value of 5.003 exceeds the t-table value of 1.96, indicating statistical significance. Furthermore, the p-value of 0.000, which is lower than 0.05, confirms that the fifth hypothesis is accepted. These findings indicate that better operational performance leads to higher levels of service user satisfaction. Therefore, the fifth hypothesis in this study is accepted.

The findings demonstrate that high operational performance can provide better service experiences for users because service processes become faster, more accurate, and involve fewer operational obstacles that may disrupt logistics activities. Efficient operational performance includes timely services, process accuracy, and smooth cargo and vessel flow. Improvements in operational performance also reduce logistics costs for users. This finding indicates that operational quality has a direct relationship with user satisfaction. Users tend to be more satisfied when services are delivered efficiently and effectively. These findings are supported by previous studies conducted by Purba et al. (2024), Daniswari et al. (2022), Sabila and Rahmah (2023), Sianturi and Sabila (2024), Saragih et al. (2024), Rustina et al. (2024), and Widiono et al. (2025), which found that operational performance significantly influences service quality and user satisfaction.

H6: SIMKAPEL Digitalization → Port Operational Performance → Service User Satisfaction

The results indicate that SIMKAPEL Digitalization has a positive and significant indirect effect on service user satisfaction through port operational performance as a mediating variable. This finding is supported by the original sample value of 0.253, indicating a positive and relatively strong relationship in the mediation pathway. The t-statistic value of 3.774 is greater than the t-table value of 1.96 at a significance level of 5%, indicating that the indirect effect is statistically significant. In addition, the p-value of 0.000, which is lower than 0.05, further confirms that the sixth hypothesis is accepted. These findings suggest that SIMKAPEL digitalization not only directly affects service user satisfaction but also exerts stronger influence through improvements in operational performance. Therefore, the sixth hypothesis is accepted.

The findings indicate that the success of SIMKAPEL digitalization in improving service user satisfaction does not solely depend on technological aspects but is strongly influenced by the extent to which the system improves port operational performance effectively and sustainably. Effective digitalization enhances operational processes such as document management, vessel scheduling, and coordination among related stakeholders. Improved operational performance subsequently affects service quality perceived by users. This finding highlights the important role of operational performance as a bridge between digitalization and user satisfaction. These results are supported by previous studies conducted by Widiono et al. (2025), Khairllah et al. (2025), Daniswari et al. (2022), Sabila and Rahmah (2023), Sianturi and Sabila (2024), Saragih et al. (2024), and Purba et al. (2024), which concluded that digital transformation indirectly influences satisfaction through operational improvements.

H7: Port Facility Utilization → Port Operational Performance → Service User Satisfaction

The results show that port facility utilization has a positive and significant indirect effect on service user satisfaction through port operational performance as a mediating variable.

This is evidenced by the original sample value of 0.211, indicating a positive relationship within the mediation pathway. The t-statistic value of 3.408 is greater than the t-table value of 1.96 at the significance level of 5%, demonstrating statistical significance. Furthermore, the p-value of 0.001, which is lower than 0.05, confirms that the seventh hypothesis is accepted. These findings indicate that facility utilization does not only directly affect service user satisfaction but also indirectly influences satisfaction through improvements in operational performance. Therefore, the seventh hypothesis is accepted.

The findings indicate that optimal utilization of port facilities may not always be directly perceived by service users; however, its impact becomes more evident when these facilities significantly improve operational performance. Facilities such as docks, cargo handling equipment, and supporting infrastructure play important roles in facilitating operational processes. Improvements in operational performance subsequently enhance the quality of services received by users. This indicates that operational performance serves as an important mediating factor between facility utilization and user satisfaction. These findings are supported by previous studies conducted by Selasdini et al. (2018), Maharani et al. (2023), Sabila and Rakawitan (2023), Rustina et al. (2024), Purba et al. (2024), Sinaga et al. (2024), and Rapika et al. (2025), which found that facility optimization contributes to operational effectiveness and ultimately improves service user satisfaction.

CONCLUSION

The findings of this study indicate that SIMKAPEL Digitalization and Port Facility Utilization have positive and significant effects on Port Operational Performance. SIMKAPEL Digitalization, particularly the Program Understanding dimension (0.960), showed the highest contribution, indicating that users' understanding of the digital system plays an important role in improving operational performance. This was reflected by indicator X12 (0.911), which demonstrated that the SIMKAPEL service outcomes met user expectations. The hypothesis testing results showed a t-statistic value of 5.734 with a path coefficient of 0.530, indicating an influence contribution of 53.0%. Meanwhile, Port Facility Utilization also had a significant effect on operational performance, with the Safety and Security dimension (0.952) as the dominant factor and indicator X210 (0.905), which emphasized users' confidence in the port security monitoring system. The results revealed a t-statistic value of 4.717 and a path coefficient of 0.441, indicating that the optimization of facilities significantly contributes to improving port operational performance.

The study also found that SIMKAPEL Digitalization and Port Facility Utilization have positive and significant effects on Service User Satisfaction. SIMKAPEL Digitalization contributed to user satisfaction through the Program Understanding dimension (0.960), supported by indicator X12 (0.911), with a t-statistic value of 2.108 and a path coefficient of 0.212, indicating a contribution of 21.2%. This suggests that improved implementation of digital systems can enhance accessibility, transparency, and service quality. Similarly, Port Facility Utilization significantly influenced user satisfaction, with the Safety and Security dimension (0.952) being the strongest factor and indicator X210 (0.905) reflecting users' sense of security when using port facilities. The statistical results showed a t-statistic value of 3.400 and a path coefficient of 0.289, indicating that adequate and well-managed facilities improve users' comfort and service experiences. Furthermore, Port Operational Performance itself significantly influenced Service User Satisfaction through the Loading and Unloading Speed dimension (0.962), supported by indicator Y2 (0.928), with a t-statistic value of 5.003 and a path coefficient of 0.478, contributing 47.8%.

Furthermore, the study found that Port Operational Performance serves as a mediating variable in the relationship between SIMKAPEL Digitalization, Port Facility Utilization, and Service User Satisfaction. SIMKAPEL Digitalization indirectly affected Service User Satisfaction through Port Operational Performance, with a t-statistic value of 3.774 and a path co-

efficient of 0.253, indicating an influence contribution of 25.3%. Likewise, Port Facility Utilization indirectly affected Service User Satisfaction through Port Operational Performance, with a t-statistic value of 3.408 and a path coefficient of 0.211, indicating an influence contribution of 21.1%. These findings suggest that digital systems and facilities not only directly influence user satisfaction but also strengthen satisfaction through improvements in operational performance. The mediation results indicate that operational performance plays a crucial role in connecting technology implementation and facility optimization with service outcomes. Therefore, integrating digital transformation, effective facility utilization, and operational improvement strategies is essential for enhancing overall service user satisfaction in modern port management.

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