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Article

The Impact of Technology Acceptance Factors on Employee Performance (The Mediating Role of Customer Satisfaction in Maritime Traffic and Transportation)

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Abstract: The digital transformation of public services necessitates the adoption of technology that is not only functional but also aligned with user expectations and operational goals. In this context, this study investigates the influence of perceived usefulness (PU) and perceived ease of use (PEOU) of the Marine Traffic and Transportation Management Information System (SIMLALA) on employee performance at the Directorate of Marine Traffic and Transportation, with customer satisfaction serving as a mediating variable. As digital platforms become integral to public service delivery, understanding the user-centric aspects of system implementation is crucial. Adopting a quantitative research approach, data were collected through structured questionnaires distributed to 152 system users affiliated with marine transportation companies across Indonesia. The analytical method employed was Structural Equation Modeling with Partial Least Squares (SEM-PLS), enabling the examination of complex relationships between constructs. The results indicate that both PU and PEOU significantly and positively affect customer satisfaction. Furthermore, customer satisfaction is shown to have a substantial positive impact on employee performance. PU and PEOU also directly influence employee performance, indicating that the effectiveness and usability of SIMLALA contribute not only to external user satisfaction but also to internal organizational efficiency. Importantly, customer satisfaction acts as a strong mediating variable, bridging the effects of PU and PEOU on performance outcomes. This implies that improving the user experience through functional, intuitive systems can enhance service quality and employee productivity. The study contributes to the growing body of literature on technology acceptance and public sector digitalization, particularly in maritime transportation. It also provides practical recommendations for policymakers and system developers to prioritize usability and customer experience in designing and implementing digital public services, thereby ensuring both user satisfaction and enhanced institutional performance.

Keywords: Digital Transformation, Employee Performance, Maritime Transportation, Perceived Usefulness, SEM-PLS

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1. Introduction

The maritime transport sector constitutes a pivotal component of global economic infrastructure, facilitating international trade, supply chain integration, and regional connectivity. For archipelagic states such as Indonesia, where maritime activity underpins both domestic and cross-border commerce, the efficiency of shipping logistics and regulatory administration assumes heightened strategic significance. Within this context, the Directorate of Sea Traffic and Transportation (Ditlala) serves as the principal regulatory entity, tasked

with ensuring the seamless execution of maritime administrative processes—most critically, licensing operations that govern commercial shipping activities.

In response to the exigencies of modern governance, digital transformation has emerged as an indispensable instrument for enhancing public service delivery. The Sea Traffic and Transportation Management Information System (SIMLALA) exemplifies this shift, representing a state-led initiative to digitize licensing procedures, mitigate bureaucratic inefficiencies, and elevate service transparency. Nevertheless, empirical observations reveal a conspicuous misalignment between the system's intended utility and its operational uptake. Despite the proliferation of maritime enterprises, SIMLALA adoption rates have stagnated, with users reporting persistent deficiencies in system functionality, including suboptimal technical reliability, protracted processing durations, and compromised interface usability. These operational shortcomings risk undermining user perceptions of the system's (TAM) (Davis, 1989).

The ramifications of such technological impediments extend beyond mere usability concerns. Discrepancies between user expectations and system performance can engender dissatisfaction (Oliver, 1980), which may subsequently permeate evaluations of institutional efficacy. Within public service ecosystems, end-user discontent often manifests as diminished confidence in the employee performance of administrative personnel, thereby eroding trust in governance mechanisms (Bovens & Zouridis, 2002). While extant scholarship has extensively validated TAM's applicability in predicting technology adoption across diverse sectors (Venkatesh et al., 2003), its intersection with public sector performance particularly (e.g., Kelerey et al., 2020; Muhajirin & Ali, 2023), yet the intermediary function of user satisfaction in this causal chain necessitates further empirical interrogation.

This study seeks to redress this scholarly lacuna by interrogating the structural relationships between PU, PEOU, and employee performance within Ditlala's operational framework, with customer satisfaction posited as a critical mediating variable. By synthesizing TAM with service quality theory (Parasuraman et al., 1988), the research aims to elucidate the mechanisms through which digital service attributes translate into organizational performance outcomes. The resultant findings are anticipated to furnish policymakers with empirically grounded insights for optimizing e-governance platforms, aligning technological design with stakeholder expectations, and fortifying public service efficacy in Indonesia's maritime regulatory landscape.

2. Literature Review

If a system is perceived as complicated or non-intuitive, users tend to be reluctant to adopt it, regardless of the benefits offered (Jogiyanto, 2019). This concept encompasses various dimensions, from ease of learning the system and ease of operation to the clarity and

simplicity of the interface (Venkatesh & Davis, 2000; Febriyani, 2018). An application that is easy to use will accelerate the adoption process and minimize resistance from users.

The interaction between this usefulness and ease of use is then closely linked to User Satisfaction. Satisfaction (Tjiptono & Diana, 2015), is the feeling of pleasure . When the SIMLALA application is perceived as useful and easy to use, user expectations will be met or even exceeded, which ultimately results in a high level of satisfaction. User satisfaction with digital services encompasses not only technical aspects but also the quality of access, information quality, and the responsiveness of the service received (Pohan, 2016).

The culmination of this interaction is its impact on Employee Performance. In the context of public services, employee performance is often assessed from the perspective of service users. The satisfaction level of SIMLALA application users has direct implications for their perception of the effectiveness of Ditlala employees. Satisfied users, who feel the process is smooth and efficient thanks to the application, will tend to view employee performance positively. Conversely, technical difficulties or a complicated workflow in the application can lead to negative perceptions of the performance of the employees responsible for the service. Employee performance itself is a multidimensional concept that includes Task Performance (the ability to complete core tasks), Contextual Performance (behavior that supports the work environment), Adaptive Performance (the ability to adapt to change), and the minimization of Counterproductive Performance (detrimental behavior) (Koopman, 2011; Borman et al., 2014). Thus, an effective application can be a tool that empowers employees to demonstrate better performance across all these dimensions.

3. Method

The aims to explain and test the causal relationships between variables (Sugiyono, 2017). A cross-sectional design is applied, in which data for all variables—usefulness, ease of use, customer satisfaction, and employee performance—are collected at a single point in time to analyze the relationships among them.

The target population in this research consists of all shipping companies holding a Maritime Transport Company Business License (SIUPAL) that are registered as active users of the SIMLALA application, totaling 244 companies. To determine a representative sample size, the Taro Yamane formula was used with a precision level (d) of 5%, yielding a minimum sample size of 152 respondents. Sampling was conducted using a purposive sampling technique, where respondents were selected based on specific criteria, namely those who are directly involved in using the SIMLALA application for licensing purposes within their respective companies.

Primary data were collected through the distribution of a carefully designed questionnaire. This questionnaire utilizes a closed-ended question format with a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) to measure respondents' perceptions and attitudes toward each research construct.

Table 1. Linkert Scale

Answer Alternative	Weighted Value
Strongly Agree(SS)	5
Agree (S)	4
Netral (CS)	3
Disagree (TS)	2
Strongly Disagree (STS)	1

The data analysis to test complex relationship models simultaneously, even with data that are not normally distributed. The analysis was conducted in two main stages, in accordance with the guidelines of Ghozali (2016). First, the measurement model (outer model) was evaluated to test convergent validity (loading factors, AVE) and discriminant validity (Fornell-Larcker Criterion, HTMT), as well as construct reliability (Cronbach's Alpha, Composite Reliability). Second, the structural model (inner model) was evaluated to test the research hypotheses. The model's predictive power was assessed through the R-Square (R^2) value, while predictive relevance was measured using Stone-Geisser's Q-Square (Q^2). Hypothesis testing was performed using a bootstrapping procedure to obtain the t-statistic and p-values, which served as the basis for accepting or rejecting the formulated hypotheses.

4. Result and Discussion

This research successfully collected data from 152 respondents who met the criteria as active users of the SIMLALA application in maritime transport companies. Demographic analysis shows that the sample was dominated by male respondents (74.3%), with the largest age group being in the 31-40 year range (46.7%), indicating that the majority of respondents are in their productive years with relevant work experience. In terms of education, the majority of respondents (57.9%) hold a Bachelor's degree .suggesting an adequate level of conceptual understanding to evaluate the system in use. This diverse demographic distribution provides a strong foundation for the generalization of the findings. Detailed characteristics of the respondents are presented in Table 2.

Table 2. Respondent Distribution

Respondent Characteristic	Category	f	%
Gender	Male	113	74.3
	Female	39	25.7
Age	21-30	32	21.1
	31-40	71	46.7
	> 41	49	32.2
Education	D4	2	1.3
	Diploma	36	23.7

	S1	88	57.9
	S2	18	11.8
	SMU	8	5.3

Descriptive analysis was conducted to obtain a general overview of respondents' perceptions of each research variable.

Table 3. Usefulness Variable Descriptive Analysis

Indicator	Statement	Min	Max	Mean	Standard Deviation
X1.1	The SIMLALA application helps me complete my work faster.	3	5	4.401	0.555
X1.2	The SIMLALA application increases my work efficiency.	4	5	4.336	0.474
X1.3	The SIMLALA application helps me organize my work better.	4	5	4.316	0.466
X1.4	The SIMLALA application allows me to complete more work.	3	5	4.309	0.543
X1.5	The SIMLALA application reduces the manual effort I perform.	2	5	4.224	0.663
X1.6	The SIMLALA application allows me to focus more on my main tasks.	3	5	4.283	0.545
X1.7	The SIMLALA application supports the achievement of my goals more effectively.	3	5	4.283	0.545
X1.8	The SIMLALA application facilitates decision-making related to my work.	2	5	4.211	0.647
X1.9	The SIMLALA application improves the accuracy of my work results.	2	5	4.243	0.575
X1.10	The SIMLALA application provides solutions for my urgent needs.	2	5	4.145	0.704
X1.11	The SIMLALA application offers relevant solutions for my work.	2	5	4.132	0.638
X1.12	The SIMLALA application has become my mainstay in completing daily tasks.	2	5	4.007	0.759

In general, the Usefulness (X1) variable, as shown in Table 3, received a high average score, with the indicator "The SIMLALA application helps me complete my work faster" (X1.1) obtaining the highest mean (Mean = 4.401). This indicates that users generally perceive the time efficiency benefit from using the application.

Table 4. Ease of Use Variable Descriptive Analysis

Indicator	Statement	Min	Max	Mean	Standard Deviation
X2.1	I can understand the SIMLALA application quickly without special training.	1	5	4.250	0.654
X2.2	The user guide for the SIMLALA application is easy to follow.	2	5	4.211	0.725
X2.3	I find it easy to learn how to use the SIMLALA application.	3	5	4.322	0.571
X2.4	The interface of the SIMLALA application is simple and intuitive.	3	5	4.276	0.491
X2.5	I can complete tasks easily using the SIMLALA application.	3	5	4.276	0.578
X2.6	The functions within the SIMLALA application are easy to access and use.	3	5	4.355	0.557
X2.7	The information in the SIMLALA application is clear and simple to understand.	3	5	4.316	0.494

X2.8	The navigation within the SIMLALA application is easy to follow.	3	5	4.263	0.511
X2.9	The display of the SIMLALA application supports me in using the application well.	3	5	4.270	0.552
X2.10	The SIMLALA application can be run without problems.	2	5	3.980	0.809
X2.11	The SIMLALA application functions according to my needs.	2	5	4.191	0.678
X2.12	The SIMLALA application supports my goal of working efficiently.	2	5	4.237	0.572

On the Ease of Use (X2) variable in Table 4, respondent perceptions were also very positive. The indicator "The functions in the SIMLALA application are easy to access and use" (X2.6) received the highest mean score (Mean = 4.355), which suggests that in terms of functionality, the application is considered intuitive. However, it should be noted that the indicator "The SIMLALA application can be run without problems" (X2.10) had the lowest mean (Mean = 3.980) with the highest standard deviation (0.809), indicating a variation of experiences related to the application's technical stability.

Table 5. Customer Satisfaction Variable Descriptive Analysis

Indicator	Statement	Min	Max	Mean	Standard Deviation
Y1	The SIMLALA application is always available and easily accessible at any time.	2	5	4.441	0.628
Y2	The process of accessing the SIMLALA application is very easy for me.	3	5	4.467	0.586
Y3	The SIMLALA application provides fast and responsive service.	2	5	4.204	0.634
Y4	I feel the service provided through the SIMLALA application has a high level of competence.	3	5	4.257	0.508
Y5	The data provided by the SIMLALA application is very accurate and reliable.	3	5	4.289	0.605
Y6	The SIMLALA application can be relied upon to carry out the licensing process well.	3	5	4.388	0.576
Y7	The SIMLALA application provides complete information to finish the licensing process.	3	5	4.316	0.592
Y8	The SIMLALA application provides a quick response to my problems or questions.	2	5	4.039	0.736
Y9	The licensing process through the SIMLALA application is efficient and not time-consuming.	2	5	4.105	0.878
Y10	Tampilan aplikasi SIMLALA menarik dan mudah dipahami.	3	5	4.276	0.554
Y11	Fitur-fitur dalam aplikasi SIMLALA berfungsi dengan baik untuk mendukung proses perizinan.	3	5	4.336	0.501
Y12	Penggunaan aplikasi SIMLALA memberikan banyak keuntungan bagi saya dalam proses perizinan.	3	5	4.355	0.507

The User Satisfaction (Y) variable indicates a good level of satisfaction, where the indicator "The process of accessing the SIMLALA application is very easy for me" (Y2) was the highest (Mean = 4.467), as shown in Table 5. This reinforces the finding that ease of access is a key driver of satisfaction. Conversely, the indicator "The SIMLALA application provides a quick response to my problems or questions" (Y8) had the lowest score (Mean = 4.039), highlighting a potential area for improvement in terms of responsiveness and user support.

Table 6. Employee Performance Variable Descriptive Analysis

Indicator	Statement	Min	Max	Mean	Standard Deviation
Z1	Using the SIMLALA application increases my productivity.	4	5	4.474	0.501
Z2	My work output has improved since using the SIMLALA application.	4	5	4.395	0.490
Z3	I feel more proficient in using the SIMLALA application in my work.	4	5	4.408	0.493
Z4	The organization supports the use of the SIMLALA application in my work.	3	5	4.382	0.551
Z5	Using the SIMLALA application enhances my positive work behavior.	3	5	4.316	0.569
Z6	I can work better in a team thanks to the use of the SIMLALA application.	3	5	4.461	0.538
Z7	I can adapt quickly to changes in the SIMLALA application system.	2	5	4.349	0.683
Z8	I use the SIMLALA application to innovate in my work.	2	5	4.276	0.643
Z9	I feel flexible in using the SIMLALA application in various situations.	3	5	4.480	0.563
Z10	I tend to avoid using the SIMLALA application due to technical difficulties.	1	5	2.145	1.088
Z11	The use of the SIMLALA application does not increase my productivity.	1	5	2.145	1.026
Z12	I feel the SIMLALA application is detrimental to my work due to technical issues.	1	5	2.164	1.171

For the Employee Performance (Z) variable, as shown in Table 6, overall user perception was highly positive, particularly on the productive performance dimension. The indicator "I feel flexible in using the SIMLALA application in various situations" (Z9) obtained the highest mean (Mean = 4.480). However, on the counterproductive dimension, an indicator such as "I tend to avoid using the SIMLALA application because of technical difficulties" (Z10) had a low average score (Mean = 2.145), which methodologically (as a negative item) in fact confirms that technical issues are a primary driver of negative perceptions toward the application's performance, which can in turn impact the perception of employee performance. Convergent validity, which measures the extent to which the indicators of a construct are positively correlated, was tested through loading factor values.

Table 7. Convergent Validity

Variable	Dimension	Dimension Loading Factor	Item Indicator	Indicator Loading Factor	Description
Usefulness (X1)	Performance	0,924	X11	0,883	Valid
			X12	0,971	Valid
			X13	0,960	Valid
	Productivity	0,929	X14	0,887	Valid
			X15	0,809	Valid
			X16	0,947	Valid
	Effectiveness	0,943	X17	0,891	Valid
			X18	0,944	Valid
			X19	0,927	Valid

	Benefit	0,881	X110	0,951	Valid
			X111	0,927	Valid
			X112	0,941	Valid
Ease of Use (X2)	Learning	0,916	X21	0,889	Valid
			X22	0,938	Valid
			X23	0,913	Valid
	Usage	0,967	X24	0,797	Valid
			X25	0,852	Valid
			X26	0,922	Valid
	Understanding	0,918	X27	0,908	Valid
			X28	0,889	Valid
			X29	0,906	Valid
	Operation	0,939	X210	0,883	Valid
			X211	0,876	Valid
			X212	0,825	Valid
SIMLALA Application User Satisfaction (Y)	Service Access	0,882	Y1	0,962	Valid
			Y2	0,937	Valid
			Y3	0,889	Valid
	Service Quality	0,918	Y4	0,783	Valid
			Y5	0,915	Valid
			Y6	0,896	Valid
	Service Process	0,896	Y7	0,858	Valid
			Y8	0,934	Valid
			Y9	0,865	Valid
	Service System	0,893	Y10	0,929	Valid
			Y11	0,957	Valid
			Y12	0,922	Valid
SIMLALA Application Performance (Z)	Task Performance	0,926	Z1	0,949	Valid
			Z2	0,955	Valid
			Z3	0,915	Valid
	Contextual Performance	0,949	Z4	0,914	Valid
			Z5	0,882	Valid
			Z6	0,833	Valid
	Adaptive Performance	0,907	Z7	0,919	Valid
			Z8	0,931	Valid
			Z9	0,811	Valid
	Counterproductive Performance	0,913	Z10	0,863	Valid
			Z11	0,878	Valid
			Z12	0,831	Valid

Table 7 shows that all indicators have loading factor values (both first-order and second-order) above the 0.60 threshold, which indicates strong convergent validity.

For discriminant validity, which ensures that each construct is distinct from one another, several methods were used. First, the Average Variance Extracted (AVE) value of each construct, as presented in Table 8.

Table 8. Discriminant Validity Test

Variable	Average Variance Extracted (AVE)	Description
Usefulness (X1)	0.716	Valid
Ease of Use (X2)	0.682	Valid
SIMLALA Application User Satisfaction (Y)	0.658	Valid
SIMLALA Application Performance (Z)	0.677	Valid

The values are above 0.50 (Usefulness = 0.716; Ease of Use = 0.682; User Satisfaction = 0.658; Employee Performance = 0.677). This indicates that more than 50% of the variance in each construct is explained by its indicators.

Furthermore, Table 9 compares the square root of the AVE with the inter-construct correlations.

Tabel 1. Heterotrait-Monotrait Ratio

	Usefulness (X1)	Ease of Use (X2)	SIMLALA Application User Satisfaction (Y)	SIMLALA Application Performance (Z)
Usefulness (X1)	0.846			
Ease of Use (X2)	0.682	0.826		
SIMLALA Application User Satisfaction (Y)	0.653	0.732	0.811	
SIMLALA Application Performance (Z)	0.682	0.741	0.721	0.823

The results show that the square root of the AVE (diagonal) for each variable is higher than its correlation with other variables, which confirms discriminant validity. This is further reinforced by Table 10, where all values are below the 0.90 threshold.

Table 10. Fornell-Larcker Criterion between Variable

	Usefulness (X1)	Ease of Use (X2)	SIMLALA Application User Satisfaction (Y)	SIMLALA Application Performance (Z)
Usefulness (X1)				
Ease of Use (X2)	0.708			
SIMLALA Application User Satisfaction (Y)	0.677	0.763		
SIMLALA Application Performance (Z)	0.708	0.772	0.753	

To test the reliability of the instrument, the values for Cronbach's Alpha and Composite Reliability were used, as summarized in Table 11.

Table 11. Reliability Test

Variable	Cronbach's Alpha	Composite Reliability	Cut Off Value	Description
Usefulness (X1)	0.964	0.968	>0.70	Reliabel
Ease of Use (X2)	0.957	0.963		Reliabel
SIMLALA Application User Satisfaction (Y)	0.953	0.958		Reliabel
SIMLALA Application Performance (Z)	0.956	0.962		Reliabel

All constructs show Cronbach's Alpha and Composite Reliability values above 0.95, far exceeding the minimum threshold of 0.70. This confirms that the research instrument possesses a very high level of consistency and reliability.

Based on this series of tests, it can be concluded that the measurement model (outer model) in this research is valid and reliable. Thus, this model is suitable for further analysis of the structural model and for hypothesis testing.

After the measurement model was proven to be valid and reliable, the analysis proceeded with the evaluation of the structural model to test the causal relationships between variables. The bootstrapping results are shown in Figure 1.

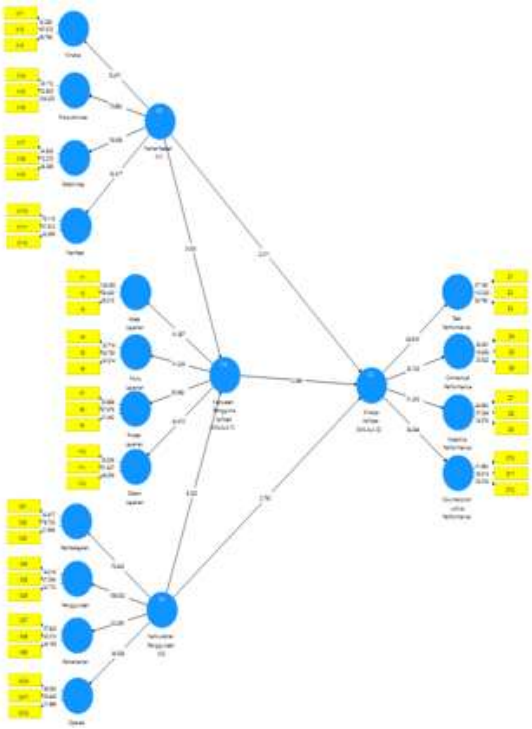

Figure 1. Boostrapping

Table 12. R-Squared

Variable	R Square
SIMLALA Application User Satisfaction (Y)	0.581
SIMLALA Application Performance (Z)	0.647

Based on the R-Square (R^2) results in Table 12, the Usefulness and Ease of Use variables collectively explain 58.1% of the variance in User Satisfaction. Furthermore, the three variables (Usefulness, Ease of Use, and User Satisfaction) explain 64.7% of the variance in Employee Performance. These R^2 values are categorized as moderate to strong, indicating that the model has good predictive power (Ghozali, 2016). The model's predictive relevance is also confirmed, with the Q-Square value being greater than zero, as shown in the Q-Squared results in Table 13.

Hypothesis testing was conducted by observing the T-statistic and P-values from the bootstrapping results, which are summarized in Table 14 Direct and Indirect Effects. With a 5% significance level (t-table > 1.64), the test results show that all research hypotheses were accepted.

Table 14. Hypothesis Test Result

Hypothesis	Influence	Original Sample (O)	T Statistics (O/STDEV)	P Values	Description
H1	Usefulness (X1) -> SIMLALA Application User Satisfaction (Y)	0.288	3.003	0.003	Significant
H2	Ease of Use (X2) -> SIMLALA Application User Satisfaction (Y)	0.536	6.220	0.000	Significant
H3	Usefulness (X1) -> SIMLALA Application Performance (Z)	0.243	2.211	0.027	Significant
H4	Ease of Use (X2) -> SIMLALA Application Performance (Z)	0.353	2.792	0.005	Significant
H5	SIMLALA Application User Satisfaction (Y) -> SIMLALA Application Performance (Z)	0.304	2.368	0.018	Significant
H6	Usefulness (X1) -> SIMLALA Application User Satisfaction (Y) -> SIMLALA Application Performance (Z)	0.087	1.702	0.010	Significant
H7	Ease of Use (X2) -> SIMLALA Application User Satisfaction (Y) -> SIMLALA Application Performance (Z)	0.163	2.072	0.039	Significant

The research findings confirm that Usefulness has a positive and significant effect on User Satisfaction (β = 0.288; T = 3.003; P < 0.05). This means that the more users perceive the SIMLALA application to be useful for their work, the higher their level of satisfaction. This finding is in line with previous research that positions usefulness as a primary predictor of satisfaction in technology adoption (Pratama, 2023; Warsono et al., 2022).

Similarly, Ease of Use shows a stronger, positive, and significant influence on User Satisfaction (β = 0.536; T = 6.220; P < 0.05). This finding confirms that a seamless and intuitive user experience is a crucial factor that shapes satisfaction in the use of digital services in the public sector (Alzahrani, 2023).

This research found that both Usefulness (β = 0.243; T = 2.211; P < 0.05) and Ease of Use (β = 0.353; T = 2.792; P < 0.05) have a direct, positive, and significant influence on Employee Performance. This means that an application that is useful and easy to use directly contributes to users' positive perception of the performance of the employees who provide the service.

More importantly, User Satisfaction was found to have a significant direct influence on Employee Performance (β = 0.304; T = 2.368; P < 0.05). This finding highlights the central role of satisfaction as a result of a positive user experience.

Mediation analysis also shows that User Satisfaction significantly mediates the influence of Usefulness (T = 1.702; P < 0.05) and Ease of Use (T = 2.072; P < 0.05) on Employee Performance. In other words, the usefulness and ease of use of the SIMLALA application increase user satisfaction, and it is this satisfaction that subsequently becomes the main driver for a better perception of employee performance. This finding strengthens the argument that investment in the quality of the user experience in government digital services not only increases public satisfaction but also effectively enhances the image and perceived performance of the state apparatus.

5. Summary

This research confirms that the usefulness and ease of use of the SIMLALA application significantly influence user satisfaction. The findings indicate that ease of use has a more dominant influence, suggesting that an intuitive and seamless user experience is a crucial factor in shaping satisfaction within a digital public service environment. Furthermore, user satisfaction is proven to act as a key mediator connecting the Technology Acceptance Model (TAM) variables with employee performance. An application perceived as useful and easy to use increases user satisfaction, which, in turn, significantly enhances the positive perception of the performance of Ditlala employees. Thus, the quality of the digital experience for public service users has direct implications for the image and effectiveness of the state apparatus.

Nevertheless, this research has several limitations, such as its cross-sectional design, which only captures a snapshot in time, and its reliance on quantitative data, which does not delve qualitatively into user motivations. Based on these findings, a practical recommendation for the Directorate of Sea Traffic and Transportation is to prioritize application enhancement with a focus on improving ease of use, for instance, by simplifying process workflows and increasing technical stability to reduce operational constraints. Given the importance of responsiveness, strengthening user support channels, such as a help desk, is also a strategic measure. For future research, the use of a mixed-methods approach is recommended to specifically explore technical constraints or unmet functional needs. Additionally, a longitudinal study could be conducted to track the impact of each system update on user satisfaction and perceptions of employee performance over time, thereby providing a more dynamic understanding.

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