Analysis of the Implementation of Electronic Measurable Fishing Information System (e-PIT) at Tegalsari Fishing Port

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Abstract

The Indonesian government, through the Ministry of Marine Affairs and Fisheries (KKP), is implementing a quota and zone-based Measurable Fishing program to ensure the sustainability of fisheries resources and optimize economic benefits in this sector. In its implementation, KKP provides an Android-based Electronic Measurable Fishing (e-PIT) application. It aims to support fishing or fish transportation operations, provide service efficiency, provide data access and monitoring, and improve data validity. The study aimed to analyze the successful implementation of the e-PIT information system at PPP Tegalsari. This research is a type of descriptive analysis research combined with survey research. Data collection techniques with purposive sampling of respondents who are fishing vessel captains, fishing vessel agents, or fishing vessel owners who use the e-PIT application at PPP Tegalsari with 100 respondents. The data analysis method uses PLS-SEM with the DeLone and McLean Information System Success Model approach. The results of hypothesis testing show a positive and significant effect on system quality on user satisfaction, information quality on usage, service quality on usage, usage on user satisfaction, usage on net benefits, and user satisfaction on net benefits. There is no positive or significant effect on system quality on usage, information quality on user satisfaction, and service quality on user satisfaction. The conclusion that can be drawn is that the implementation of the e-PIT information system at PPP Tegalsari is not empirically optimal based on the DeLone and McLean model approach, so it still has several challenges that need to be improved on system quality, information quality, and service quality.

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Introduction

Indonesia, the second largest maritime country in the world after Canada and Russia, has enormous fisheries potential, with marine capture fisheries production reaching 6.43 million tons in 2020 (FAO, 2022) [10]. This production value places Indonesia as the second largest marine fish-producing country after China. According to the FAO 2024 report [11], the world's capture fisheries produced 92.3 million tons in 2022, of which more than 50 percent came from the top 8 producing countries namely China (14.3 percent) followed by Indonesia (8.0 percent), India (6.0 percent), Peru (5.8 percent), the Russian Federation (5.4 percent), the United States (4.6 percent), Vietnam (3.9 percent) and Japan (3.2 percent). However, Indonesia still faces challenges maintaining employment in the marine capture fisheries sector, with 2.7 million fishers and 1 million workers in processing and marketing. This is due to the rampant practice of illegal fishing (IUU Fishing) (Cabral *et al.*, 2018) [5] as well as the overexploitation of marine fish resources (Philip *et al.*, 2015) [31].

Based on the Decree of the Minister of Marine Affairs and Fisheries Number 19/Kepmen-KP/2022 concerning Estimates of Fish Resource Potential, Allowable Catches, and Utilization Rates of Fish Resources in the State Fisheries Management Area of the

Republic of Indonesia [20], the level of overfishing in Indonesian waters is still relatively high. This condition is influenced by the input control policy and the granting of fishing licenses for fleets and fishing gear (Zaini, 2021) [42]. The fleet of fishing vessels that obtained permits to operate without strict control caused most of the potential fish resources in Indonesian waters to experience pressure that led to overfishing (Zulham *et al*., 2022) [44].

To ensure the sustainability of fisheries resources and optimize economic benefits in this sector, the Indonesian government, through the Ministry of Maritime Affairs and Fisheries (KKP), is developing a quota- and zone-based Measured Fishing (PIT) program. The Measurable Fishing policy is believed to improve fishermen's economy while preserving fish resources. This policy provides various benefits, including economic sustainability through maintaining fish stocks and the health of marine ecosystems, optimizing the number of vessels for maximum profit for business actors, and regional economic equity by adjusting landing ports based on fishing areas. In addition, this policy also improves the accuracy of fishing data, optimizes the industry at the landing port, creates certainty of long-term investment returns, and increases PNBP revenue. (Trenggono, 2023) [40].

The legal basis for implementing PIT is Government Regulation Number 11 of 2023 concerning Measurable Fishing [34] and Minister of Marine Affairs and Fisheries Regulation Number 28 of 2023 concerning Implementation Regulations of Government Regulation Number 11 of 2023 concerning Measurable Fishing [22]. The Ministry of Marine Affairs and Fisheries provides an Android-based application called the Electronic Measurable Fishing Application (e-PIT) to support PIT implementation. This application aims to support fishing or fish transportation operations, provide service efficiency, provide data access and monitoring, and improve data validity.

The e-PIT application offers integration of services in one application on an Android-based device, including submission of applications for Operational Licensing Standards, submission of applications for Approval to Sail at the fishing port, reporting of the Fishing Log Book, submission of applications for Proof of Arrival Reports of Fishing Vessels, calculation of PNBP PHP post-production, and monitoring of fishing quota utilization.

This application can be downloaded on the Google Play store and has been used by many captains, agents, and owners of fishing vessels. However, evaluation of the use of e-PIT has not been carried out, especially from the point of view of application users. This study aims to analyze the extent to which the successful implementation of e-PIT at Tegalsari Fishing Port has been running since the beginning of 2023. The model used in this research is ISSM (Information System Success Model), developed by DeLone and McLean in 2003, where the level of performance will be measured from several variables and indicators. This model is popularly used by many researchers who focus on the performance of information system implementation. The DeLone and McLean Model (2003) [9] is a refinement of the DeLone and McLean Model (1992) [8], so it is known as the DeLone and McLean Information System Succes Model. This model reflects the process and output of an information system that depends on six performance measures: system quality, information quality, service quality, user satisfaction, usage, and net benefits (DeLone & McLean, 2003) [9].

One of the fishing ports in Indonesia that is crowded with fishing vessels with central licenses is Tegalsari Fishing Port. According to the Annual Report of Tegalsari Fishing Port (2023) [30], the post-paid PNBP generated from vessels landing fish at PPP Tegalsari is the second largest in Indonesia after PPS Nizam Zachman Jakarta, which is worth Rp91,089,451,263.6. This shows that PPP Tegalsari is a potential and enjoyable location to conduct research related to the implementation of e-PIT.

Based on the description that has been explained, research on analyzing the implementation of the e-PIT information system needs to be carried out to identify factors that influence its success in supporting the Measured Fishing program at PPP Tegalsari. The results of this study are expected to provide input for developers in improving the performance of the e-PIT information system, which is still relatively new but has begun to be used by fishing vessels in various fishing ports in Indonesia.

Measurable Fishing

Indonesia has the advantage of having the highest sustainable product potential for fisheries worldwide. According to 2021 data, the catch in Indonesia reaches 9.7 million tons/year, where the potential worldwide ranges from 97 million tons/year. Thus, it can be said that about 10% of the world's fisheries' sustainable product potential is in Indonesia (Trenggono, 2023) [40]. As a common property resource, good management is a must. Otherwise, the open access nature of common property resources will lead to overfishing due to the interests of each individual in fishing in Indonesian seas (Zuhri, 2019) [43]. To mitigate this occurrence, the government initiated the Measurable Fishing (PIT) scheme to manage activities at sea by not fishing beyond the maximum sustainable potential or what is called Maximum Sustainable Yield (MSY). 11 WPPs have their own MSY limits according to the circumstances of each region. The PIT regulation is expected to provide welfare to local fishermen, improve the national economy, and preserve fisheries resources in Indonesia (Luthfia, 2023) [24].

The definition of measurable fishing is controlled, and proportional fishing carried out in measured fishing zones is based on fishing quotas to preserve fish resources and the environment and equalize national economic growth. The main things regulated in measured fishing are fishing zones, quotas, fishing seasons, and governance in one unit (KKP, 2023) [22].

e-PIT

The use of the e-PIT application is currently based on the Circular Letter of the Minister of Marine Affairs and Fisheries Number B.1337/MEN-KP/XII/2022 concerning the Use of Electronic Measurable Fishing Applications [21] issued on December 30, 2022. This application is used to prepare for the implementation of measured fishing and calculate post-production non-tax state revenue (PNBP) through a self-assessment mechanism.

The obligation to use the e-PIT application comes into effect on January 1, 2023, for fishing vessels and fish transport vessels that have permits in the fishing and fish transportation subsectors issued by the Minister of Maritime Affairs and Fisheries. The e-PIT application integrates various services for fishing vessels, such as SILAT, SIPALKA, SPB Friend, e-SLO, Simphoni, PIPP, and SILOPI (KKP, 2022) [21].

PLS-SEM

Regression evolved into Structural Equation Modeling (SEM) along with the development of statistical techniques. SEM is a combination of two methods: factor analysis and path analysis. Factor analysis is a mathematical technique for determining new variables from several variables based on correlations with these variables. The new variable formed from several variables is called a latent variable. Path analysis represents the correlation coefficient depicted in the form of an arrow. In path analysis, the relationship between two or more variables is described in the form of an arrow containing a correlation coefficient. Arrows in path analysis describe correlations that can present more complicated variable relationships, such as indirect and mediation relationships. SEM can test latent variables, thus overcoming the shortcomings of regression and allowing testing of the relationship of dependent variables in groups. In testing the ties of many variables and groups, SEM can provide precise estimates and is more efficient than regression (Purwanto *et al*., 2021) [32].

The use of SEM as an analytical tool has experienced a very rapid development. Two SEM models are widely used today, namely (1) Covariance-based SEM, represented by AMOS and LISREL software, and (2) Variance-based SEM, often called component-based SEM, represented by SmartPLS and PLS Graph software. In contrast to Covariance Based SEM (CB SEM), which requires various assumptions to be met, such as data must be multivariate normally distributed, the indicator model must be reflexive, the variable measurement scale must be continuous, and the sample size must be significant, Component-Based SEM ignores all of these things because it is non-parametric (Ghozali, 2006) [12].

Furthermore, Ghozali (2013) [14] states that Partial Least Squares (PLS), or its acronym "Projection to Latent Structures," is a type of variance-based SEM that was created to overcome the problems caused by covariance-based SEM. It is known that the use of Covariance Based SEM (CB SEM) requires a large number of samples, data must meet various parametric assumptions, construct indicators must be reflective, measurement scales must be continuous, and strong theoretical support often makes it difficult for researchers to meet these demands. For this reason, other SEM alternatives that are looser but powerful and do not require various assumptions are needed. The alternative SEM is variance-based SEM or Partial Least Square (PLS SEM).

DeLone & McLean information system success model

Information system success theory is an approach in information systems that aims to provide a comprehensive understanding of system success. This theory identifies, describes, and explains the relationship between the main dimensions determining factors in evaluating the success of information systems (Nguyen *et al*., 2015) [26]. To assess the level of success of an information system, a model is needed to analyze the factors that influence its success. One of the models used is the DeLone & McLean Information Systems Success Model (D&M IS Success Model), which was developed based on previous research by Shannon and Weaver (1949) and Mason (1978).

According to Jogiyanto (2007) [18], a good model is a complete but straightforward model called a parsimony model. Based on theory and previous research results, DeLone and McLean (1992) [8] developed a parsimony model called the DeLone and McLean Information Systems (IS) success model. Factors or components of measuring SI success from this model are system quality, information quality, use, user satisfaction, individual impact, and organizational impact.

Based on the criticism and the development of SI and its use environment, DeLone and McLean (2003) [9] updated their model to include service quality variables, change individual and organizational impact variables to net benefits, and improve and increase measurements. The DeLone and McLean SI success model is perfect for assessing system success based on information quality, system quality, and SI service quality, which affect user satisfaction and net benefits from using SI (Pamugar, 2014) [29].

According to Mastan and Winarno (2013) [25], DeLone and McLean updated their model. They called it the Updated DeLone and McLean Information System Success Model, or commonly the DeLone and McLean (2003) information system performance model (2003) [9], as presented in Figure 1 below.

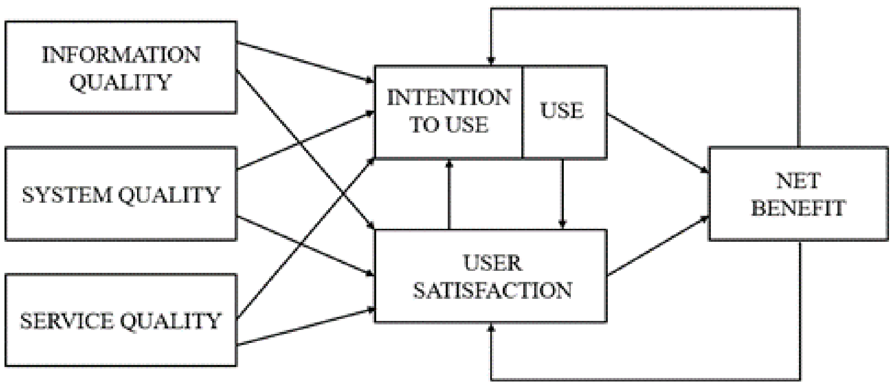

Fig 1: Delone dan McLean IS Success Model (2003)

Research Methods

This research is a type of descriptive analysis research combined with survey research. Descriptive analysis is used to interpret data that has been processed quantitatively in the form of frequency tables as a reference to see the characteristics of the data obtained. Researchers will try to describe the current situation through statistical numbers, which are then interpreted into a description. One of the objectives of this study is to determine user perceptions of e-PIT information performance. Therefore, the type of research used is survey research. The research was conducted at the Tegalsari Fishing Port, which is located at Jalan Blanak No.10C Tegal City, Central Java Province, for 3 (three) months from April to June 2024.

This study involved all fishing vessel captains, agents, or owners who used the e-PIT application at the Tegalsari Fishing Port population. The sampling technique used is purposive sampling. According to Sugiyono (2014) [38], purposive sampling is a sample selection method based on specific considerations or criteria. Meanwhile, Arikunto (2010) [1] explains that purposive sampling is carried out by considering particular criteria determined by the research objectives.

The sample selection in this study is based on the representation of fishing vessels, namely fishing vessel captains, agents, or owners, that use the e-PIT application at Tegalsari Fishing Port. According to Chin & Lee (2000) [7], the representative sample size in the analysis using the PLS-SEM technique ranges from 30 to 100 samples.

Ferdinand (2014) [12] revealed that PLS is an alternative method to Structural Equation Modeling (SEM), which can be used to analyze complex relationships between variables even though the sample size is relatively small, which is between 30 and 100. This statement is reinforced by Ningsi *et al*. (2018) [27], who stated that PLS is an alternative method that can overcome these problems because it is a flexible or soft model, so it does not require strict assumptions regarding the distribution of observational variables or large sample sizes. The same thing was also expressed by Hamid and Anwar (2019) [16], who explained that PLS-SEM does not require a large sample size and can be used with nominal, ordinal, or continuous measurement scales.

This study used closed and open-ended questionnaires as data collection instruments. Answers were given on a seven-level Likert scale to simplify the measurement process. The Likert scale combines four or more statements to produce a score representing individual characteristics, such as knowledge, attitudes, and behaviors. In addition, the Likert scale is also known as a psychometric scale often used in questionnaires and is one of the most common measurement methods in research.

In closed-ended statements, respondents are asked to choose from a series of alternatives the researcher provides, expressed on a measurement scale. The measurement scale in this study uses a Likert scale approach (Likert Scale) 1-7. Based on this study's characteristics, the Likert scale was chosen because it is commonly used to measure opinions and behavior (Sekaran & Bougie, 2016) [37].

Open-ended statements were used to obtain respondents' responses, opinions, or ideas freely. These were useful in supporting respondents' answers to closed-ended questions and would also be used as a basis for formulating managerial advice. The open-ended questions are analyzed by categorizing the answers into representative sentences.

This study will identify the factors that influence the successful implementation of the e-PIT application at PPP Tegalsari and determine the percentage of its success rate based on the variables in the DeLone and McLean model. Data analysis was conducted using SmartPLS software with a PLS-based SEM (Structural Equation Model) model approach (Partial Least Squares). This method produces information that is efficient and easy to interpret, especially in complex models or model hypotheses, can be used on small data sets, does not require assumptions of normality, linearity, and heteroscedasticity, and can be used on indicators that are reflective and formative of other variables. In addition, this method relatively does not face problems (crashing) in the process of running (iteration) of the model (Jogiyanto, 2011) [19].

There are several stages, according to Jaya (2008) [17], used to analyze SEM-PLS as follows:

- Structural model design (inner model)
- Design of measurement model (outer model)
- Designing the inner model and outer model in the form of a path diagram
- Converting the structural model and measurement model into an equation
- Evaluating measurement models and structural models
- Testing the hypothesis

Results and Discussion

Respondent Profile

The respondents consisted of 100 people, including 74 fishing vessel captains, 22 fishing vessel agents, and 4 fishing vessel owners who are users of the e-PIT application. Respondents with an age range of 41-50 years were the most respondents with 42 people, an age range of 31-40 years of 35 people, an age range of 51-60 years of 14 people, an age range of 21-30 years of 8 people and the least in the age range of 17-20 years of 1 person. Respondents with elementary school education were the most numerous at 57, with junior high school education at 22, high school education at 16, and the least with a bachelor's education at 5.

The characteristics of respondents based on the fishing gear operated/managed consisted of bagged drag nets with the highest number of 62 people, small pelagic purse seines with 13 people, drop nets with boats with 12 people, drift gill nets with 7 people, carriers with 4 people, squid fishing with 1 person and bouke ami with 1 person.

Research model and hypotheses

Figure 2 below presents the structural model (inner model) design of the relationship between latent variables in PLS using the DeLone and McLean Information System (IS) success model approach.

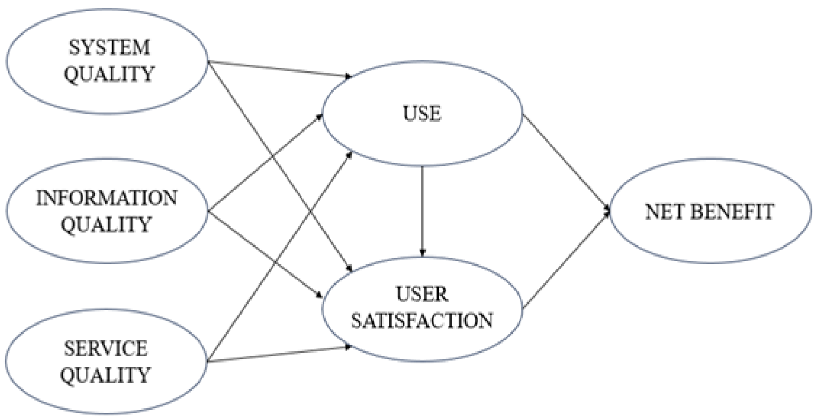

Fig 2: Research Model

Figure 2 shows that in this study, the variables measured are system quality, information quality, service quality, and factors affecting the use, user satisfaction, and net benefits of the e-PIT information system at PPP Tegalsari. This research will test the hypotheses based on the background and existing problems. Table 1 below shows that there are nine hypotheses to be tested.

Table 1: Hypotheses

Hypotheses	Description
H1	System Quality has a positive and significant effect on Use.
H2	System Quality has a positive and significant effect on User Satisfaction.
H3	Information Quality has a positive and significant effect on Use.
H4	Information Quality has a positive and significant effect on User Satisfaction.
H5	Service Quality has a positive and significant effect on Use.
H6	Service Quality has a positive and significant effect on User Satisfaction.
H7	Use has a positive and significant effect on User Satisfaction.
H8	Use has a positive and significant effect on Net Benefit.
H9	User Satisfaction has a positive and significant effect on Net Benefit.

Research variables and indicators

Research variables are attributes, characteristics, or values possessed by individuals, objects, or activities that experience certain variations and are determined by researchers to be studied and analyzed to reach conclusions (Sugiyono, 2014) [38]. This study analyzes two variables: the independent variable and the dependent variable. The independent variable (X) consists of system quality, information quality, and service quality. The dependent variable (Y) includes use, user satisfaction, and net benefits. The operational definition of each variable can be seen in Table 2 below.

Table 2: Operational Definition

Latent Variabel	Operational Definition
System Quality (exogenous)	User perception of the quality of software used in operating e-PIT
Information Quality (exogenous)	Perceptions of e-PIT users regarding the accuracy, completeness, format, understandability, and precision of the information generated by the system
Service Quality (exogenous)	User perceptions regarding responsiveness, assurance, tangibility, and empathy received/enjoyed by e-PIT information system users from managers (Tegalsari Fishing Port) and developers.
Use (endogenous)	Perceptions of the level of utilization of information systems by users, length of use, and responses to the use of information systems by end users on their awareness and desire
User Satisfaction (endogenous)	Perceptions of the response and feedback generated by users after using the information system
Net Benefit (endogenous)	User perception of the benefits gained from using e-PIT

Indicators are measured variables used to represent latent variables because latent variables cannot be measured directly. The variable indicators in the DeLone and McLean (2003) [9] model are different, and each researcher has his arguments. The indicators used to measure latent variables in this study come from various studies, including Bailey and Pearson (1983) [4], DeLone dan McLean (2003) [9], Rahayu *et al.* (2018) [33], serta Nusandari *et al.* (2022) [28]. The indicators used in each research variable are presented in Table 3 below.

Table 3: Variable indicators

	Latent Variable	Indicators	Code
1	System Quality	Ease of use	SYQ.1
		Flexibility	SYQ.2
		Reliability	SYQ.3
		Response time	SYQ.4
		Integration	SYQ.5
		Good menu features	SYQ.6
2	Information Quality	Completeness	INQ.1
		Relevance	INQ.2
		Format	INQ.3
		Accurate	INQ.4
3	Service Quality	Assurance	SEQ.1
		Empathy	SEQ.2
		Responsiveness	SEQ.3
4	Use	Frequency of use	USE.1
		Nature of use	USE.2
		Intention to reuse	USE.3
5	User Satisfaction	Expectation	SAT.1
		Service	SAT.2
		Efficiency	SAT.3

		Overall satisfaction	SAT.4
6	Net Benefit	Easier the task	NET.1
		Effectiveness	NET.2
		Problem solution	NET.3
		Performance improvement	NET.4

This study's structural model of DeLone and McLean's information system success includes six latent variables and 24 indicator variables. After several stages, such as designing structural models, measuring models, and preparing path diagrams, the analysis was carried out using SmartPLS v.3.2.9 software. The analysis results using the PLS Algorithm method, which describes the DeLone and McLean information system success model based on the hypothesis, can be seen in Figure 3 below.

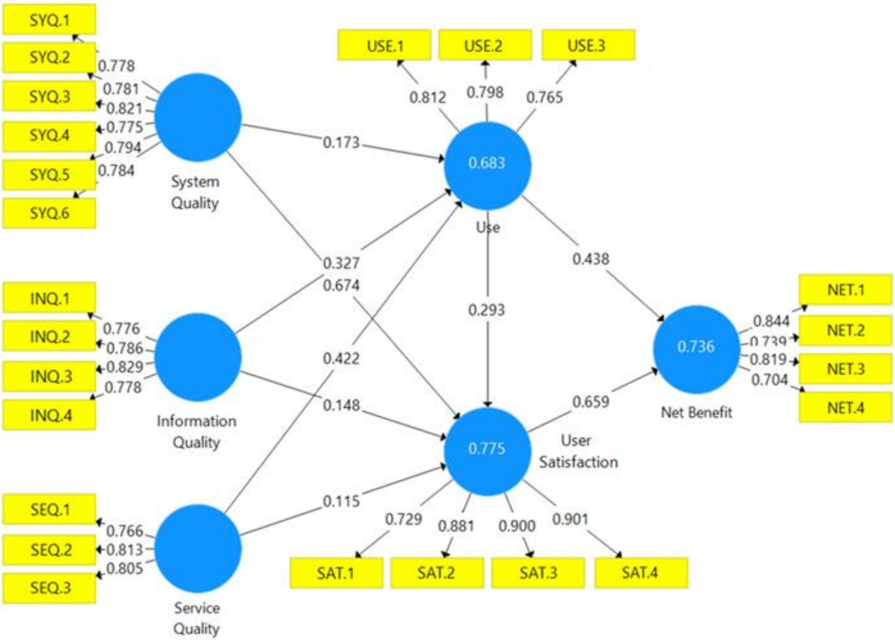

Fig 3: Output PLS algorithm

Evaluation of the measurement model

Convergent Validity

The convergent validity test aims to measure the extent to which the relationship between the indicator and the construct or latent variable being measured is valid. This test is carried out by evaluating the loading factor value of each indicator on its construct.

The higher the loading factor value, the better the indicator reflects the construct it represents. Ideally, the loading factor value should be more than 0.7, but the minimum value usually accepted is above 0.6. If the indicator loading factor value exceeds this limit, the indicator is considered to have met convergent validity. The loading factor value of each variable can be seen in Table 4 below.

Table 4: Loading Factor

Code	User Satisfaction	Information Quality	Service Quality	Sistem Quality	Net Benefit	Use
INQ.1		0,776				
INQ.2		0,786				
INQ.3		0,829				
INQ.4		0,778				
SEQ.1			0,766			
SEQ.2			0,813			
SEQ.3			0,805			
SAT.1	0,729					
SAT.2	0,881					
SAT.3	0,900					
SAT.4	0,901					
SYQ.1				0,778		
SYQ.2				0,781		
SYQ.3				0,821		
SYQ.4				0,775		
SYQ.5				0,794		
SYQ.6				0,784		
NET.1					0,844	
NET.2					0,739	

NET.3					0,819	
NET.4					0,704	
USE.1						0,812
USE.2						0,798
USE.3						0,765

Average Variance Extracted (AVE) analysis can also evaluate convergent validity. AVE ensures that each indicator used in measuring latent constructs truly reflects these constructs and does not contain too much measurement error. The standard AVE value that is considered reasonable is more than 0.5. If the AVE value of a construct exceeds this threshold, then the construct is categorized as meeting convergent validity. Thus, testing convergent validity helps ensure that the indicators used in measuring latent variables represent the construct under study, thereby increasing the accuracy and validity of the research results. The AVE values are presented in Table 5 below.

Table 5: Average Variance Extracted (AVE)

Latent Variable	Average Variance Extracted (AVE)
Sistem Quality	0,623
Information Quality	0,628
Service Quality	0,631
Use	0,627
User Satisfaction	0,732
Net Benefit	0,606

Discriminant Validity

A discriminant validity test assesses how much a latent construct can be distinguished from others. If a latent construct can show a clear difference from other constructs, then its discriminant validity is considered good. This study measures discriminant validity using the cross-loading value and the Fornell-Larcker criterion. The cross-loading value describes the level of correlation between an indicator and other constructs. If the loading value of an indicator on the primary construct is higher than the cross-loading value on other constructs, then the construct meets discriminant validity. As shown in Table 6 below, the loading value of each indicator on its respective construct is greater than the cross-loading value on other constructs.

Table 6: Cross Loading

Code	User Satisfaction	Information Quality	Service Quality	Sistem Quality	Net Benefit	Use
INQ.1	0,481	0,776	0,522	0,504	0,433	0,513
INQ.2	0,500	0,786	0,567	0,487	0,538	0,612
INQ.3	0,559	0,829	0,593	0,500	0,513	0,552
INQ.4	0,515	0,778	0,536	0,493	0,563	0,629
SEQ.1	0,548	0,548	0,766	0,539	0,553	0,579
SEQ.2	0,526	0,497	0,813	0,559	0,619	0,662
SEQ.3	0,596	0,625	0,805	0,607	0,564	0,604
SAT.1	0,729	0,502	0,653	0,557	0,611	0,569
SAT.2	0,881	0,553	0,580	0,737	0,751	0,649
SAT.3	0,900	0,644	0,634	0,802	0,763	0,700
SAT.4	0,901	0,520	0,553	0,783	0,747	0,636
SYQ.1	0,626	0,556	0,557	0,778	0,594	0,555
SYQ.2	0,660	0,515	0,579	0,781	0,601	0,510
SYQ.3	0,652	0,432	0,542	0,821	0,564	0,503
SYQ.4	0,724	0,431	0,484	0,775	0,656	0,482
SYQ.5	0,674	0,523	0,642	0,794	0,679	0,608
SYQ.6	0,676	0,501	0,580	0,784	0,627	0,551
NET.1	0,758	0,524	0,565	0,665	0,844	0,657
NET.2	0,588	0,479	0,563	0,576	0,739	0,460
NET.3	0,724	0,521	0,563	0,651	0,819	0,639
NET.4	0,517	0,505	0,604	0,554	0,704	0,515
USE.1	0,660	0,637	0,657	0,643	0,626	0,812
USE.2	0,555	0,594	0,629	0,519	0,554	0,798
USE.3	0,552	0,494	0,548	0,434	0,567	0,765

Another method used is the Fornell-Larcker criterion, which compares the Average Variance Extracted (AVE) value with the correlation between latent constructs. In this method, the square root of the AVE value must be higher than the correlation between a latent construct and other constructs. As shown in Table 7 below, the square root value of AVE for each construct is greater than the correlation between different constructs, thus fulfilling discriminant validity.

Table 7: Fornell Larcker Criterion

	User Satisfaction	Information Quality	Service Quality	Sistem Quality	Net Benefit	Use
User Satisfaction	0,856					
Information Quality	0,650	0,793				
Service Quality	0,701	0,701	0,795			
Sistem Quality	0,848	0,625	0,716	0,789		
Net Benefit	0,842	0,649	0,729	0,788	0,779	
Use	0,748	0,730	0,775	0,679	0,738	0,792

Based on the analysis of the cross-loading value and the Fornell-Larcker criteria, it can be concluded that each indicator used has fulfilled discriminant validity well in forming its respective variables.

Composite Reliability

Structural Equation Modeling (SEM) measures construct reliability using Cronbach's alpha and composite reliability. Cronbach's alpha assesses internal consistency reliability, namely the extent to which indicators can consistently measure the latent construct under study. The Cronbach's alpha value that is considered reasonable is above 0.7. Meanwhile, composite reliability measures the extent to which the indicators used accurately represent the measured latent construct, with the recommended value being more than 0.7. In this study, the Cronbach's alpha and composite reliability values for all constructs are above 0.7, as shown in Table 8 below. Therefore, it can be concluded that all variables have met the criteria for good reliability.

Table 8: Composite Reliability

Latent Variabel	Cronbach's Alpha	Composite Reliability
User Satisfaction	0,876	0,916
Sistem Quality	0,879	0,908
Information Quality	0,803	0,871
Net Benefit	0,784	0,860
Service Quality	0,708	0,837
Use	0,703	0,834

Structural Model Evaluation

After the measurement model is verified, the next step is to evaluate the structural model (inner model) by calculating the R-square value. R-square is a measure that shows the extent to which the independent variables (exogenous variables) can explain the variation in the dependent variable (endogenous variable) in the structural model. This value represents the coefficient of determination on the dependent construct. The interpretation of the R-square value is generally categorized as strong if it is above 0.67, moderate if it is around 0.33, and weak if it is 0.19. The results of the R-square calculation are shown in Table 9 below.

Table 9: R-square

Dependent Variable	R-square
User Satisfaction	0,775
Net Benefit	0,736
Use	0,683

User satisfaction has an R-square value of 0.775, which is included in the strong category. This means that system, information, and service quality determine 77.5% of the construct of user satisfaction. Other factors outside this study influence the remaining 22.5%.

Net benefits have an R-square value of 0.736, so they are included in the strong category. This means that 73.6% of the net benefit construct can be determined by the construct of use and user satisfaction, while other factors outside this study influence the remaining 26.4%.

Use has an R-square value of 0.683, which is also included in the strong category. This means that the use construct can be determined by the constructs of system quality, information quality, and service quality by 68.3%, while other factors outside this study influence the remaining 31.7%.

Hypothesis testing

Hypothesis testing is carried out to determine the significance of the relationship between variables by looking at the coefficient and direction of the relationship indicated by the original sample value. The hypothesis considers the relationship if the t-statistic value is more than 1.96 and the probability value is less than 0.05 in the path coefficient. Suppose the path coefficient value is more than 0. In that case, the relationship is interpreted as a positive influence, while if the value is less than 0, it is interpreted as a negative influence (Ghozali, 2014) [15]. This hypothesis testing was carried out through the bootstrapping method using SmartPLS software, and the results are presented in Table 10 below.

Table 10: Hypothesis Testing

	Original Sample	T Statistics (|O/STDEV|)	P Values	Result
Sistem Quality → Use	0,173	1,890	0,059	Rejected
Sistem Quality → User Satisfaction	0,623	5,230	0,000	Accepted
Information Quality → Use	0,327	3,710	0,000	Accepted
Information Quality → User Satisfaction	0,052	0,848	0,397	Rejected
Service Quality → Use	0,422	4,004	0,000	Accepted
Service Quality → User Satisfaction	-0,009	0,091	0,928	Rejected
Use → User Satisfaction	0,293	2,970	0,003	Accepted
Use → Net Benefit	0,245	3,252	0,001	Accepted
User Satisfaction → Net Benefit	0,659	9,218	0,000	Accepted

Hypothesis has a positive and significant effect

The hypothesis test results in the table above show that system quality positively and significantly affects user satisfaction. Thus, if the system quality increases, user satisfaction will also increase, and vice versa; if the system quality decreases, user satisfaction will also decrease. The results of this test support the DeLone and McLean information system success model and are in line with the research of Wara *et al*. (2021) [41] and Sasmita *et al*. (2022) [36]. According to Afnan (2018) [2], system quality is closely related to user satisfaction. System quality affects user satisfaction in various ways; in this study, system quality is measured from the elements of ease of use, ease of access, system reliability, access speed, integration, and good menu features. Good system quality in the e-PIT application will increase user satisfaction, such as that of fishing vessel captains, agents, or owners.

Information quality has a positive and significant effect on usage. This means that if the quality of information increases, usage will also increase, and vice versa; if the quality of information decreases, usage can also decrease. The results of this test support the DeLone and McLean information system success model and are in line with the research of Sari *et al*. (2023) [35] and Sasmita *et al*. (2022) [36]. The output of e-PIT is in the form of information related to data on fishing vessel activities, which is used as a requirement for the arrival and departure of fishing vessels. Thus, the fishing vessel captain, vessel agent, or owner needs good quality information generated by the e-PIT application to operate within the corridor of measured fishing.

Service quality has a positive and significant effect on usage. It can be interpreted that when service quality increases, usage will also increase, and vice versa. When service quality decreases, it can cause a decrease in usage. The results of this test support the DeLone and McLean information system success model and are in line with the research of Nusandari *et al*. (2022) [28] and Sari *et al*. (2023) [35]. This study measures service quality from system assurance, empathy, and responsiveness. According to Wara *et al*. (2021) [41], a developer who quickly resolves problems when errors occur and responsively responds to all user complaints can encourage users to continue using. This form of concern for the needs of system users by developers makes the developer section continue to update the system according to needs. If the desired needs have been met, it can encourage users to use so that the usage rate increases.

Usage has a positive and significant effect on user satisfaction. When usage increases, user satisfaction will also increase, and vice versa; if usage decreases, user satisfaction will also decrease. The results of this test support the DeLone and McLean information system success model and are in line with the research of Sari *et al*. (2023) [35] and Wara *et al*. (2021) [41], which concluded that usage has a positive effect on user satisfaction. The more often system users use information systems, the more satisfied users are with the system. The more often system users use information systems in their work, the more information will be obtained. Fulfilling the information needed and expected will provide convenience in work and cause satisfaction for system users.

Usage has a positive and significant effect on net benefits. This means that if usage increases, net benefits will also increase. Moreover, vice versa, if usage decreases, net benefits will decrease. The results of this test support the DeLone and McLean information system success model and are in line with the research of Bahrudin *et al*. (2023) [3], Sari *et al*. (2023) [35] and Sasmita *et al*. (2022) [36] which states that use has a positive effect on net benefits. This study measures the usage variable in frequency, nature of use, and intention to reuse. This means that the more often the fishing vessel captain, fishing vessel agent, or fishing vessel owner uses the e-PIT application, the more benefits will be obtained.

User satisfaction has a positive and significant effect on net benefits. This means that as user satisfaction increases, net benefits will also increase, and vice versa; if user satisfaction decreases, net benefits will also decrease. The results of this test support the DeLone and McLean information system success model and are in line with the research of Sari *et al*. (2023) [35], Sasmita *et al*. (2022) [36] and Wara *et al*. (2021) [41] which states that user satisfaction has a positive effect on net benefits. High user satisfaction will increase the net benefits obtained. The more satisfied the fishing vessel captain, fishing vessel agent, or fishing vessel owners are with the e-PIT application, the more valuable the application will be in supporting the fisheries activities. The net benefits in this study are measured based on aspects of task ease, effectiveness, problem-solving, and performance improvement.

Hypothesis no significant effect

System quality has no significant effect on usage. The results of this test contradict the DeLone and McLean information system success model and contradict the results of research by Nusandari *et al*. (2022) [28], Sasmita *et al*. (2022) [36] and Sari *et al*. (2023) [35] which states that system quality has a positive and significant effect on usage. This can occur because the e-PIT application is an information system that is mandatory or required for fishing vessel captain, fishing vessel agent, or fishing vessel owners to be able to get services for fishing vessel activities. Although system quality is a significant variable in an information system, in mandatory cases, it does not necessarily make system quality have a direct influence on usage variables. Research by Chatterjee *et al*. (2018) [6] states that in some contexts, especially for systems whose use is mandatory, the relationship between system quality and usage is not always significant. Afnan (2018) [2], in his research on KAI e-ticketing, states that system quality is related to the technical aspects of a system, such as ease of use, response time, reliability, and availability. In the context of KAI e-ticketing, because the system in e-ticketing is not too complicated, the results show that system quality does not affect usage. This indicates that the system's quality does not always significantly affect usage under certain conditions. In the e-PIT application, although there are many constraints on the system's quality, its use is relatively high because it is mandatory.

Information quality has no positive and significant effect on user satisfaction. The results of this test contradict the DeLone and McLean information system success model and differ from the results of research by Sasmita *et al*. (2022) [36] and Sari *et al*. (2023) [35] which states that information quality has a positive and significant effect on user satisfaction. However, this result is in line with the research of Bahrudin *et al*. (2023) [3], which states that information quality has no positive or significant effect on user satisfaction. In mandatory information systems, compliance with usage is one of the essential things that makes system users use the information system. Hence, usage satisfaction is more influenced by other factors, such as ease of use or technical support, which are system quality variables. In addition, users focus on basic functions; when the system can fulfill these essential functions, users do not pay too much attention to the quality of the information presented, so it does not significantly affect user satisfaction.

Like information quality, the test results show that service quality has no positive or significant effect on user satisfaction. The results of this test also contradict the DeLone and McLean information system success model and differ from the results of research by Sasmita *et al*. (2022) [36], Sari *et al*. (2023) [35], and Suranto (2022) [39] which state that service quality has a positive and significant effect on user satisfaction. However, this is in line with the research of Bahrudin *et al*. (2023) [3] and Wara *et al*. (2021) [41], which states that service quality does not have a positive and significant effect on user satisfaction. In this study, the quality of service measured by system assurance, empathy, and responsiveness is not enough to affect system user satisfaction. Of the three latent variables, namely system quality, information quality, and service quality, only system quality positively and significantly affects user satisfaction. This means that the satisfaction of system users in this study is more influenced by system quality than information quality and service quality. The system quality variable has a dominant influence over other latent variables; system quality is a fundamental/primary consideration for system users, which can determine system user satisfaction.

Based on the discussion of the results of the hypothesis testing above, implementing the e-PIT information system at PPP Tegalsari is not empirically optimal based on the approach using the DeLone and McLean information system success model. The application of the e-PIT information system, which is still relatively new, still has challenges or things that need to be improved in terms of both system quality, information quality, and service quality. Improvements to system quality are in line with mandatory use, as well as improvements to information quality and service quality so that they can contribute to user satisfaction. The system reliability indicator (SQ.3) has an average value (mean) of 3.98, as presented in Appendix 2, which is the lowest value among the six indicators in the latent variable system quality, even being the lowest value of a total of 24 indicators in the overall latent variable. This shows that system reliability in e-PIT information tends to be less reliable based on user perceptions. The results of interviews with skippers, administrators, and ship owners support this finding, where they report that they often experience problems related to system reliability when using the e-PIT application. The obstacle that usually arises is that the e-PIT application experiences errors when used, especially when the usage traffic is high, thus impacting the service process of arrival and departure of fishing vessels.

Conclusions and Recommendations

Implementing the e-PIT information system at Tegalsari Fishing Port is not empirically optimal based on an approach using the DeLone and McLean information system success model. In this study, there are six accepted hypotheses. Namely, there is a positive and significant effect on system quality on user satisfaction, information quality on usage, service quality on usage, usage on user satisfaction, usage on net benefits, and user satisfaction on net benefits. On the other hand, there are three rejected hypotheses: no positive and significant effect on system quality on usage, information quality on user satisfaction, and service quality on user satisfaction.

Recommendations that can be given include improving aspects of system quality to minimize errors when used; this relates to system reliability and access speed (response time) and the need for regular software updates to adapt to current needs and fix bugs or errors found in previous versions to increase system and application stability. Improving information quality by providing system users access to data that has been inputted in the e-PIT application so that it can be used for evaluation and as a consideration for planning the next fisheries activity. Improving aspects of service quality by providing better system assurance, especially when there are problems with the e-PIT application, system users will get a guarantee of problem resolution. In addition, what is no less important is that socialization regarding the use of the e-PIT application offline can be carried out regularly, especially for the captain of fishing vessels given the limitations of human resources in terms of age and education, so that the obstacles and difficulties faced by the captain can be overcome and solutions found.

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