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Assessment of the Success of Digital Signature and Stamp Implementation in the National Economic Rescue (PEN) Application System at Credit Insurance Companies in Indonesia

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ABSTRACT

Utilization technology in sector industry non-bank finance in Indonesia is increasingly widespread, including in the guarantee credit of state-owned companies. The company uses System Application Guarantee for transaction guarantee credit with produce Certificate Guarantee as proof of approval. The request can be active in the context of the COVID-19 pandemic and the Indonesian government's efforts to implement the company's National Economic Recovery (PEN) program guarantee. Implementation feature sign hand and digital stamp on the System Application PEN underwriting allows provision of document Guarantee Certificate in the form of legal and supportive softcopy restrictions contact physique during a pandemic. Study This aim is to measure the successful implementation features of the success models by Delone and McLean and analyze the connection between variables in research. The benefits cover assessment, evaluation, and strategy-based results evaluation using feature sign hand and digital stamp. Delone and McLean's original model was modified to eliminate variable intention to use. The research was conducted by analyzing the results of questionnaires from 108 officials' user systems throughout Indonesia. Process of data analysis using the method of Partial Least Square with device SMARTPLS software. Research results prove that quality systems will influence the satisfaction of future users who will be influential to benefit clean from the feature sign hand and digital stamp on the System Application PEN Guarante.

Introduction

The use of technology in the non-bank financial sector is expanding, especially in credit guarantee companies in Indonesia (Fidhayanti, 2020). They implement a Guarantee Application System to manage credit guarantee transactions, which generate Guarantee

Certificates as valid proof. During the COVID-19 pandemic, the government has taken extraordinary measures to support the economy, including engaging credit guarantee companies (Kurniawan & Solihin, 2022). Rules such as PP RI Number 43 of 2020 were issued to allow the use of digital signatures and stamps. Indonesia Electronic Certification Providers (PSrE) collaborate with credit guarantee companies to verify electronic signatures. Implementation of this feature needs to be measured to evaluate its impact and help companies improve guarantee services (Amang, 2015). This study evaluates the implementation of digital signature and stamp features in the PEN Product Guarantee Application System as part of the National Economic Recovery (PEN) program. The research questions focus on the success rate of implementation and the relationship between the variables in the model (Nurhidayah, 2020). The main objective is to measure implementation success by utilizing the DeLone and McLean models and to analyze the correlation of variables in the research context. The advantages of this research include evaluating the use of digital signature and stamp features, developing improvement strategies, and evaluating cooperation with electronic certification providers. Although this research is limited to credit guarantee companies that involve active users of application systems, the focus is on evaluating and measuring the implementation of digital signature and stamp features on the system application. Lastly, this research aims to support companies in improving the quality of underwriting services within the framework of the PEN program run by the Indonesian government.

Digital Signature

Digital signatures have existed since the beginning of information and communication technology development. The article "New Directions in Cryptography" (Firmanesa, 2016) introduced the concept of digital signatures to maintain document confidentiality. The concept of a digital signature involves a hash function, a one-way mathematical function that generates a unique value for each input data. The electronic document signing process involves processing the document as input in a hash function, generating a unique value based on the data. In the running, PDF documents use standard DSA (Digital Signature Algorithm) hash signatures and secure X.509 format, associating public keys with identities such as websites or organizations (Kara, Arifin, & IIswahyudi, 2021). Digital signatures are essential in ensuring the integrity and authentication of electronic documents in the modern technological era.

Digital Stamp

Although stamps and seals share similar meanings, their usage differs. "Stamp" refers to marking using a stamp, and a stamp is the result of an image or writing printed on an object. Stamps, just like postage stamps, are attached to important documents like agreements and receipts. All three are symbols of individual identity, officials, or groups in human history. Stamps function as identification and provide more substantial assurance of approval in documents. In the context of this study, credit guarantee companies in Indonesia replace manual stamps with digital stamps on Guarantee Certificate documents. Creating digital stamps is a modern, practical, and secure method involving digital technology. Credit guarantee companies comply with the X.509 format

standard for digital stamps through a recognized Electronic Certification Agency. Digital stamps are part of a legitimate digital signature solution, supporting the National Economic Recovery program by using documents in softcopy form.

Digital Documents

Digital documents are physical records scanned or inputted into a computer and then saved in an electronic format that can be modified. Another term is an electronic document. In Indonesia, digital documents must comply with various regulations, including Law Number 11 of 2008 concerning Information & Electronic Transactions and Government Regulation Number 71 of 2019, which regulates the use of Electronic Certificates issued by Indonesian Electronic Certification Operators (PSrE). Article 42, paragraph 1, and articles 51, 55, and 57 of these regulations also regulate procedures for using and administering Electronic Certification in Indonesia.

Models of DeLone and McLean

According to the DeLone and McLean model (1992), the quality of information and systems affects user satisfaction, intended use, and organizational and individual impact, influencing information systems' success.

Guarantee Certificate

According to the Regulation of the Minister of Finance of the Republic of Indonesia Number 99/PMK. 010/2011, which amended the Regulation of the Minister of Finance Number 222/PMK. 010/2008, Guarantee Certificate is a sign of approval given by a credit guarantee company in Indonesia to Guarantee Recipients related to Guaranteed obligations. This rule regulates the roles and procedures related to Guarantee Certificates.

PEN (National Economic Recovery) Guarantee Application System

According to (Frisdayanti, 2019), an application system is a computer-based platform that processes data and provides information to support an organization's decision-making, coordination, and control. Meanwhile, according to (Surya & Apriyanti, 2021), an application system is a set of connected components to collect, process, store, and distribute information to achieve organizational goals. In this context, the PEN Guarantee Application system is a digital solution used by a credit guarantee company in Indonesia to support the National Economic Recovery (PEN) program. The primary function of this system is to simplify the credit guarantee process by producing a valid Certificate of Guarantee as proof of approval (Khoer & Atnawi, 2022).

Partial Least Square - Structural Equation Modeling (PLS-SEM)

The PLS-SEM (Partial Least Squares - Structural Equation Modeling) method is an approach to modeling complex causal relationships in path models with latent variables [10]. In SEM (Structural Equation Model) analysis (LUBIS & Shara, 2021), this technique combines factor analysis and regression analysis to examine the relationships between variables in the model. PLS (Partial Least Squares) is a structural equation model focusing on a component or variant-based approach (Maghfiroh, 2018). Compared to the covariance-based SEM approach, PLS is more prediction-oriented. Recommendations for using PLS-SEM include testing theoretical frameworks from a prediction perspective when structural models are complex or when the research objective is to understand

increasing complexity or extend existing theory, especially with financial ratio data or similar.

SmartPLS

SmartPLS is software with a graphical interface for modeling structural equations based on variance with the partial least squares (PLS) path modeling method. It is prevalent in management, marketing, and information systems. "SmartPLS" stands for "Partial Least Squares Structural Equation Modeling." The Partial Least Squares (PLS) method is a statistical approach to analyzing complex data models. With a user-friendly graphical interface, SmartPLS allows researchers to define models and analyze results quickly. SmartPLS is also affordable, making it suitable for researchers on a budget.

Likert Scale

The Likert scale is a psychometric method used in social and psychological research to measure agreement or disagreement with certain statements or statements. Called after the Rensis Likert, this scale allows respondents to rank statements with answer choices in a range of five to seven choices. Typically, this scale consists of options such as "Strongly Agree," "Agree," "Neutral," "Disagree," and "Strongly Disagree." The Likert scale helps describe the attitudes or opinions of respondents to the topic under study, and the results can be analyzed statistically to identify trends or patterns in the data.

Research Methods

This research method uses a quantitative approach. Research begins by referring to the theories that then form a framework. The researchers collect data through questionnaires about the system's quality, information, use, user satisfaction, and net profit. The questionnaire uses a five-point Likert scale to measure respondents' responses. This study analyzes the suitability of developing digital signatures and stamps in the Credit Guarantee Application System at a credit guarantee company in Indonesia. In this context, the researchers use the DeLone and McLean Information Success model to evaluate the implementation and recommend improvement. We will analyze data that meet the requirements using the Partial Least Square (PLS) method in Structural Equation Modeling (SEM), and we will process the data using SmartPLS version 3 software.

Theoretical Framework

The research conducted by the researchers has several stages, as shown in Figure 3 below:

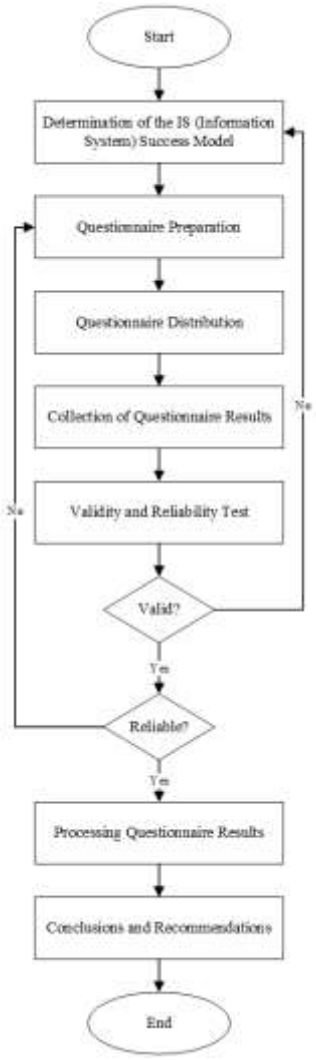

Figure 3. Stage Study

1) Determination of the IS (Information System) Success Model

This study applies the DeLone and McLean methods in measuring the success of information systems, mainly through customer satisfaction.

2) Questionnaire Preparation

Before compiling the questionnaire, we identified variables from the DeLone and McLean models. The questions within the questionnaire serve the purpose of assessing the information system's success.

3) Questionnaire Distribution

Questionnaires were distributed via digital forms to users of digital signature and stamp features on credit guarantee applications in all company branch offices in Indonesia.

4) Collection of Questionnaire Results

Researchers collect complete questionnaires within a predetermined time limit.

5) Validity and Reliability Test

Questionnaire result data were tested for validity and reliability using SmartPLS software.

6) Data Analysis

After validating and ensuring the reliability of the data, the researchers analyzed it to identify the variables that influence the success of the application's signature and digital stamp features.

7) Conclusions and Recommendations

The final stage of this research is to draw conclusions and provide recommendations for further research or the practical application of the results.

Model

This research employs (DeLone & McLean, 2003) information system success model, but previous studies have shown a relationship between the dimensions in the model. Therefore, a formation hypothesis is needed to explain this linkage. Based on previous research, the most significant relationship in this model is between system quality and end-user satisfaction, as well as other relationships such as information quality with user satisfaction, system use with user satisfaction, and quality system with system usage.

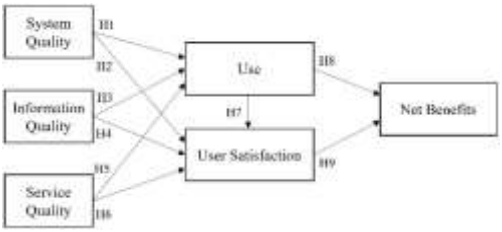

Figure 4. DeLone & McLane Information Success Model (2003)

Variables

This study applies an information system success model, which involves six main variables: System Quality, Information Quality, Service Quality, Use, User Satisfaction, and Net Benefits. These variables are aligned with the research hypotheses and follow the DeLone and McLean model.

Hypothesis

This study applies the information system success model, but previous research has identified a relationship between the dimensions in the model. Therefore, we formulated a hypothesis to describe this correlation. According to (Urbach, Smolnik, & Riempp, 2008), the most significant associative relationship in establishing a success model using the DeLone and McLean method is between system quality and user satisfaction. Other relationships described involve information quality with user satisfaction, system use with user satisfaction, and system quality with system use. However, the interest in using variables (Intention to Use) is irrelevant because users with related roles must use the PEN Guarantee Application's digital signature and stamp features. The image of the model accompanies the relevant references. The hypothesis of this study reflects previous

research and includes variables such as System Quality, Information Quality, Service Quality, Use, User Satisfaction, and Net Benefits. The variables used are:
H1: System quality has a positive influence on Use.
H2: System quality has a positive influence on User Satisfaction.
H3: The quality of information (Information Quality) positively influences the use (Use).
H4: Information quality has a positive influence on User Satisfaction.
H5: Service Quality has a positive influence on Use.
H6: Service Quality has a positive influence on User Satisfaction.
H7: Use has a positive influence on User Satisfaction.
H8: Use has a positive effect on Net Benefits.
H9: User Satisfaction has a positive influence on Net Benefits.

Population and Sample

Population is the totality of analysis units with similar characteristics, including the research object and its attributes. The population is the area of generalization tested to reach study conclusions. This study focuses on the population of Branch Managers and Business Managers at credit guarantee companies in Indonesia who use the PEN Guarantee application. The sample, as a representation of the population with similar attributes, is selected using the Saturated Sampling method, in which the entire population is sampled without selection. The study took a sample of 108 employees who use the PEN Guarantee application system, representing the entire population.

Data Collection Methods

Researchers use the data collection method to gather information in a study. The study design and report provide a detailed description of the data collection techniques. Questionnaires are a standard collection method for presenting written questions or statements to respondents. The questionnaire should be pertinent to the research problem and operational definition. In order to reduce the amount of paper used, we chose to use an online questionnaire for this study. The Microsoft Forms platform allows respondents from over Indonesia to complete the questionnaire through the provided link. This approach has speed, low cost, and better response quality advantages. Making a questionnaire refers to the model proposed by (Iivari, 2005) by separating variables into categories of independent and dependent variables. The independent variables include System Quality, Information Quality, and service quality, while the dependent variable includes Use and Net Benefits.

Data Analysis Methods

The study uses inferential statistical analysis with the Partial Least Squares (PLS) technique to examine relationships and influences of variables in complex models. Evaluation includes R-square, F-square, and Q-square to measure model quality. PLS evaluation involves Measurement Model Evaluation and Structural Model Evaluation, which includes analyzing the outer model to measure the validity and reliability of indicators in the model and calculating factors like convergent and discriminant validity, composite reliability, average variance extracted (AVE), and Cronbach's alpha. Evaluation of the Structural Model involves an analysis of the inner model to assess the

relationship between latent variables according to the proposed hypothesis. The parameters evaluated include the path coefficient (path coefficient), coefficient of determination (R-Square), T-test, effect size (F-square), and prediction relevance (Q-square) [21], [22]. This evaluation helps researchers ensure the quality and validity of the resulting model and identify the contribution of variables to the research model [21], [22].

Results and Discussion

After collecting data, the next step is to process it using the Partial Least Squares (PLS) method via SmartPLS 3 software. The PLS method in structural equation analysis involves building a measurement model and evaluating a structural model to test previously proposed models and the relationship between variables.

Testing the Measurement Model (Outer Model Analysis)

1. Convergent Validity Testing

The data testing results show a loading factor below 0.7. The results indicate that indicators meet convergent validity and are valid for construct dimensions. See Table 1 for loading factor results.

Table 1
Results of Factor Loading

Variable Components	Indicator	*Outer Loading*	Validity
System Quality (SQ)	SQ1	0.727	Valid
	SQ2	0.767	Valid
	SQ3	0.859	Valid
	SQ4	0.765	Valid
	SQ5	0.902	Valid
	SQ6	0.892	Valid
Information Quality (IQ)	IQ1	0.815	Valid
	IQ2	0.942	Valid
	IQ3	0.920	Valid
	IQ4	0.835	Valid
	IQ5	0.931	Valid
Service Quality (SQ)	SEQ1	0.958	Valid
	SEQ2	0.915	Valid

	SEQ3	0.942	Valid
Use (U)	U1	0.871	Valid
	U2	0.905	Valid
User Satisfaction (US)	US1	0.968	Valid
	US2	0.968	Valid
Net Benefits (NB)	NB1	0.939	Valid
	NB2	0.949	Valid
	NB3	0.962	Valid

Average Variance Extracted (AVE) Test

After conducting the tests, we can conclude that all variables exhibit a construct validity level exceeding 0.50.

Discriminant Validity Testing

The results of the Cross Loading test show that the indicators have a higher correlation with the construct itself than with other constructs. The results indicate that each indicator is part of the appropriate construct. Furthermore, when looking at Fornell-Lacker's Cross Loading value, the test results show that the AVE root of each construct is more significant than its correlation with other constructs. The results show that this model has good Discriminant Validity based on the AVE root test.

Composite Reliability Testing

The test results show that each variable has a value above 0.60. The results mean that the variables in this study are very reliable. These results confirm that the data collected is consistent and reliable. Therefore, the analysis carried out has a high level of confidence. The reliability of the variables also shows that the measurements and indicators used are suitable. In other words, these results support that the measuring instrument used in this study effectively measures the concept in question.

Structural Model Testing (Inner Model Analysis)

When testing the Inner Model, there are steps to evaluate the relationship between latent variables. There are five main stages with their respective roles to ensure the integrity and validity of the hypothesized relationship. These stages form the basis of analyzing variable relationships in research, helping to understand interactions and their impacts.

1. Path Coefficient Testing (β)

Based on the following table, out of 9 paths in the research model, four paths are without statistical significance because the values are below the threshold of 0.1. These

results show that the relationship between these paths is not significant. Special attention is needed to understand why and what factors influence its significance.

Table 2
Path Coefficient Test Results

Correlation (Relationship)	Path Coefficient (β)
Information Quality) → Use	-0,055
Information Quality) → User Satisfaction	0,014
Service Quality) → Use	0,471
Service Quality → User Satisfaction	0,083
System Quality → Use	0,164
System Quality → User Satisfaction	0,527
Use → Net Benefits	0,042
Use → User Satisfaction	0,341
User Satisfaction → Net Benefits	0,641

2. Testing the Coefficient of Determination (R-Square)

Based on the data in Table 3 below, the results show that the research model used has a moderate level.

Table 3
Coefficient of Determination (R Square) Test Results

Component Variable	*R Square*	Results
Net Benefits	0,447	Moderate
Use	0,311	Moderate
User Satisfaction	0,690	Good

3. Testing the T-test (T-Statistics)

Based on the results in Table 4, this study only obtains the accepted hypothesis path Y from 9 existing hypotheses. The path has been rejected as the T-test value falls below the threshold of 1.96.

Table 4
T-test results (T-Statistics)

Hypothesis		T Statistics (|O/STDEV|)	Analysis
H1	System Quality → Use	1,339	Rejected
H2	System Quality →	4,321	Accepted

Hypothesis		T Statistics (|O/STDEV|)	Analysis
	User Satisfaction		
H3	Information Quality → Use	0,413	Rejected
H4	Information Quality → User Satisfaction	0,122	Rejected
H5	Service Quality → Use	3,051	Accepted
H6	Service Quality → User Satisfaction	0,645	Rejected
H7	Use → User Satisfaction	3,294	Accepted
H8	Use → Net Benefits	0,267	Rejected
H9	User Satisfaction → Net Benefits	4,262	Accepted

4. Effect Size Test (f2)

Based on the test results, it was found that User Satisfaction has the most considerable effect size value on the hypothetical path of Net Benefits, with a value of 0.431. System Quality and Use both have a medium effect on User Satisfaction. The remaining hypotheses have little effect on the model structure, with an effect size value (f2) below 0.15.

5. Predictive Relevance Testing (Q2)

This testing process uses the blindfolding method. Where the results obtained show that the Q2 value of the dependent variable has a value above zero, these results can be interpreted that these variables have a predictive relationship.

Hypothesis Testing Results

The following results are based on data measurements for associated hypotheses.

H1: System Quality has a positive influence on Use.

The results of the T-test on the structural model analysis in Table 4 reveal a T-test value of 1.339, below the critical limit of the T-test of 1.96. Therefore, we can conclude that the relationship is invalidated. The results indicate no significant positive impact of system quality on usage. The results imply that the system quality hypothesis might play a minor role in explaining the extent of application or system use under investigation.

H2: System quality (System Quality) has a positive influence on user satisfaction (User Satisfaction)

Derived from the outcomes of the T-test in Table 4 during the structural model analysis, we identified a T-test value of 4.321, signifying that the value surpassed the threshold of 1.96. The results indicate that the relationship between the two variables is accepted. This finding also shows that the system's quality (System Quality) positively impacts user satisfaction. This finding is reinforced by the path coefficient in Table 2 of 0.527, indicating that the hypothesis regarding System Quality → User Satisfaction has a positive and significant effect.

H3: The quality of information (Information Quality) has a positive influence on the use (Use)

Derived from the findings of the T-test in Table 4 during the structural model analysis, we determined a T-test value of 0.413. This value suggests that it falls below the threshold of 1.96. Consequently, the connection between the two variables is invalidated. Furthermore, these outcomes imply that the quality of information (Information Quality) does not positively impact usage (Use). This result is reinforced by the path coefficient in Table 2, which is -0.055, indicating that this hypothesis has no positive influence.

H4: The quality of information (Information Quality) positively influences user satisfaction (User Satisfaction).

The T-test results in the structural model analysis, as presented in Table 4, reveal a T-test value of 0.122. This value signifies that the figure falls below the threshold of 1.96. These outcomes suggest the rejection of the relationship between the two variables. These findings also reveal that the quality of information (Information Quality) does not positively impact user satisfaction (User Satisfaction). The path coefficient in Table 2 further strengthens this discovery, as it holds a value of 0.014. This value indicates that this hypothesis lacks a positive influence.

H5: Service Quality has a positive influence on Use.

Derived from the results of the T-test in the structural model analysis presented in Table 4, we identified a T-test value of 3.051, indicating that this figure surpassed the threshold of 1.96. These results indicate that the relationship between the two variables is accepted. These findings also indicate that service quality (Service Quality) positively affects usage (Use). The path coefficient in Table 2 further confirms this discovery, with a value of 0.471. This value suggests that the Service Quality → Use hypothesis holds a meaningful and positive influence.

H6: Service quality has a positive influence on user satisfaction.

The results of the T-test in the structural model analysis recorded in Table 4 reveal a T-test value of 0.645, which illustrates that this value is below the threshold value of 1.96. This finding suggests the rejection of the relationship between the two variables. These findings also reflect that service quality (Service Quality) does not positively affect user satisfaction (User Satisfaction). The path coefficient in Table 2 further strengthens this finding, with a value of 0.083. This value indicates the lack of a positive impact on this hypothesis.

H7: Use has a positive influence on User Satisfaction.

The results of the T-test in the structural model analysis presented in Table 4 reveal a T-test value of 3.294. This value indicates that the figure surpassed the threshold of 1.96. This result indicates that the relationship between the two variables is accepted. These results also show that the use (Use) positively impacts user satisfaction (User Satisfaction). The path coefficient in Table 2 further reinforces this finding, standing at 0.341. This value indicates a significant positive impact on the Use → User Satisfaction hypothesis.

H8: Use has a positive effect on Net Benefits.

Based on the results of the T-test in the structural model analysis shown in Table 4, a T-test value of 0.267 was found, which indicates that this figure is below the threshold of 1.96. This result signifies the rejection of the relationship between the two variables. This finding also shows that the quality of use (Use) does not positively impact net benefits (Net Benefits). The path coefficient in Table 2 further strengthens this finding, registering at 0.042. This value implies that this hypothesis lacks a positive effect.

H9: User Satisfaction has a positive influence on Net Benefits.

The results of the T-test on the structural model analysis in Table 4 indicate a T-test value of 4.262, which exceeds the limit of 1.96. This result shows that the relationship between the two variables is accepted. This finding also reveals that user satisfaction (User Satisfaction) positively impacts net benefits (Net Benefits). The path coefficient in Table 2 of 0.641 further confirms this finding. This value indicates a significant and positive influence on the hypothesis User Satisfaction → Net Benefits.

Conclusion

The results of the conducted data analysis and testing concerning the implementation of digital signature and stamp features in the PEN Guarantee Application System led to the conclusion that the model derived from the DeLone and McLean information system success model needs comprehensive empirical validation in this study. Among the nine proposed hypotheses, only four were approved. These include the correlations between system quality, service quality, usage, and user satisfaction with net benefits. These findings highlight that the outcomes of the information system success model framework could differ based on the context and characteristics of the application examined in subsequent research.

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