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Assessing User Acceptance And System Development Priorities Of An Asset Disposal System: A TAM And QFD-Based Study At A State-Owned Electricity Company

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Abstract - *As part of its ongoing digital transformation, PT PLN (Persero) is streamlining operational processes through the adoption of integrated information systems. One of these initiatives is the Asset Decommissioning Information and Monitoring System (SIMPUS), a web-based platform integrated with SAP to manage the disposal of Non-Operational Fixed Assets (ATTB). SIMPUS was developed to replace a manual process plagued by data errors, low transparency, with delays of up to five years. While SIMPUS 1.0 successfully reducing disposal cycle times from years to months, a pre-survey revealed user resistance due to a complex interface and technical limitations. This study integrates Technology Acceptance Model 2 (TAM2) and Quality Function Deployment (QFD) in two stages. First, a census survey of all active SIMPUS users (N=610) yielded 150 valid responses, analyzed with SEM-PLS to test TAM2 hypotheses. Second, SEM-PLS path coefficients were applied as weights in QFD to prioritize user needs based on their influence on behavioral intention. Results show perceived ease of use and organizational support as the main drivers of adoption, while subjective norm was excluded due to PLN's hierarchical, procedure-driven culture. QFD identified three priorities for SIMPUS 2.0: role-based UI/UX improvements, new features (bulk upload, digital signatures), and streamlined verification workflows—forming a strategic roadmap for a more adaptive and user-focused system.*

Keywords - *SIMPUS, TAM2, QFD, SEM-PLS, digital transformation*

I. INTRODUCTION

In the era of digital transformation, public-sector organizations are increasingly leveraging technology to streamline operations, enhance transparency, and reduce inefficiencies [1]. PT PLN (Persero), Indonesia's largest state-owned electricity provider, is undergoing a comprehensive digitalization initiative to improve operational performance across various domains. One persistent challenge in this process is the management of Non-Operational Fixed Assets (ATTB)—assets that are no longer in use, occupy warehouse space, incur maintenance costs, and must be continuously monitored until formally disposed of [2].

To address inefficiencies in ATTB disposal, PLN developed the SIMPUS (Sistem Informasi dan Monitoring Penghapusan), a digital asset disposal system designed to integrate monitoring and approval workflows. Pilot implementations of SIMPUS have shown promising operational outcomes, reducing disposal cycle times from years to months and increasing realization rates from 30% to 70% based on internal report. However, despite these improvements, preliminary user feedback indicates that acceptance of the system remains suboptimal. Issues such as low ease of use, interface complexity, and technical barriers suggest a misalignment between operational utility and user experience.

Understanding user acceptance is crucial for ensuring the long-term success and sustainability of digital systems in large hierarchical public organizations. To explore the underlying factors influencing system adoption, this study adopts the Technology Acceptance Model 2 (TAM2), which expands the original TAM by incorporating social and organizational variables such as subjective norm and organizational support [3], [4]. In parallel, the study applies the Quality Function Deployment (QFD) approach to translate Voice of Customer (VoC) data into prioritized technical improvements, allowing for a user-centered development roadmap [5].

Accordingly, this study aims to answer two research questions:

1. How do users perceive the asset disposal system in supporting the ATTB elimination process?
2. What improvements are needed to enhance system effectiveness and support the digital transformation objectives of the organization?

The contributions of this research are threefold: (1) providing empirical evidence on technology acceptance within a public-sector digital transformation context, (2) identifying key system improvement priorities based on user needs, and (3)

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offering a practical roadmap for enhancing the effectiveness of digital asset disposal systems in state-owned enterprises.

II. LITERATURE REVIEW

A. Digital Transformation and Asset Management at PLN

PLN's digital transformation began in April 2020 under the "Green, Lean, Innovative, and Customer Focused" framework, aiming to enhance operational efficiency and customer service through technology. The initiative includes the development of integrated platforms, such as SIMPUS, to improve transparency and streamline asset disposal processes.

Non-Operational Fixed Assets (Aset Tetap Tidak Beroperasi, ATTB) refer to physical assets that are no longer used in operations and whose economic value has depreciated significantly [2]. Improper handling of ATTB can inflate maintenance costs, reduce warehouse efficiency, and distort asset reporting. According to Bakri (2020), ATTB must be carefully managed to avoid financial and operational inefficiencies [6]. Additionally, Wuisang (2023) emphasized the importance of accurate reporting in compliance with public accountability standards [7].

As a state-owned enterprise, PLN's ATTB disposal process follows a multi-level verification guided by internal policies and national regulations (e.g., Permendagri No. 19/2016), involving field inspections, administrative documentation (AE1–AE5), and SAP record adjustments before physical sale or write-off [2].

B. SIMPUS: Digital Platform for Asset Disposal

SIMPUS is a web-based application integrated with SAP and warehouse inventory systems. It standardizes and digitizes the ATTB disposal workflow, allowing monitoring, documentation, and approval processes to be conducted online with predefined Service Level Agreements (SLA). Through SIMPUS, the average processing time for ATTB disposal has been reduced significantly, and data traceability has improved. However, early evaluations revealed barriers in usability and system complexity, leading to low user confidence despite operational gains.

C. Technology Acceptance Model (TAM2)

The Technology Acceptance Model (TAM), developed by Davis (1989), posits that two main beliefs—Perceived Usefulness (PU) and Perceived Ease of Use (PEOU)—predict users' intention to adopt a system [3]. TAM has since been extended into TAM2 to incorporate additional constructs like subjective norm, image, job relevance, training, and organizational support, making it suitable for organizational contexts [4], [8].

In public sector environments such as PLN, where hierarchical decision-making and formalized procedures dominate, TAM2 offers a more context-sensitive approach. Studies by Venkatesh et al. (2003) show that organizational support and task relevance significantly influence PU, while user experience and compatibility contribute to PEOU [8].

Recent empirical studies have validated TAM2's relevance in assessing technology acceptance in similar contexts. For instance, Burhan & Nadjib (2023) found that support from management and system compatibility are critical to adoption success in government organizations [9].

D. Quality Function Deployment (QFD)

QFD is a structured method for translating customer needs (Voice of Customer) into prioritized technical requirements [5]. The core of QFD is the House of Quality (HoQ), a matrix that aligns user expectations with engineering specifications. Originally developed by Akao in 1990, QFD is widely used in system design to ensure that development is responsive to user demands [5].

In the context of SIMPUS, QFD enables prioritization of feature enhancements based on actual user input. This dual-method approach—TAM2 for behavioral assessment and QFD for design improvement—ensures both theoretical and practical contributions to technology implementation in public infrastructure.

III. METHODOLOGY

This study adopts a quantitative explanatory approach to assess user acceptance and development priorities for the SIMPUS application. The study uses TAM2 to evaluate actual use of the system and QFD to translate user feedback into prioritized technical improvements.

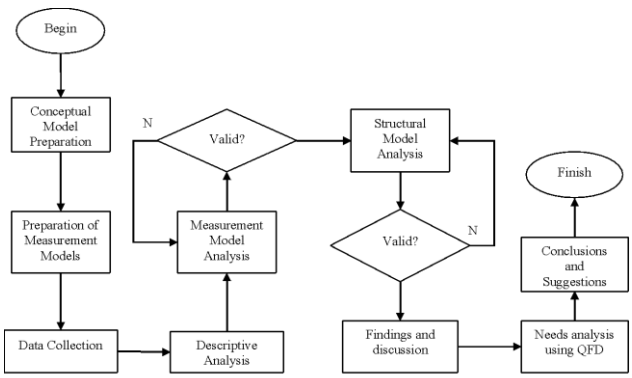

Figure 1 Research flowchart

A. Research Framework and Model

The conceptual model is adapted from TAM2 Venkatesh & Davis (2000), extended with additional external variables relevant to SIMPUS: training, system reliability, compatibility, process efficiency, job relevance, subjective norm, and organizational support. These variables influence key TAM2 constructs—Perceived Ease of Use (PEOU), Perceived Usefulness (PU), and Behavioral Intention (BI)—which ultimately predict system use (Figure 2) [3], [4].

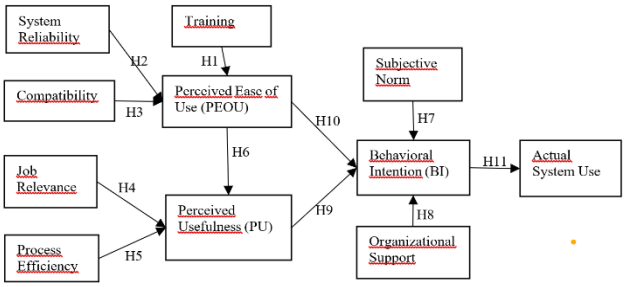

Figure 2 Research model and hypothesis

B. Data Collection

Data were collected through an online structured questionnaire administered to SIMPUS users across multiple PLN units to ensure broad geographic coverage and accessibility. The total population of SIMPUS users is 610, and a census approach was applied. A minimum threshold of 128 respondents was determined through G*Power analysis with parameters effect size $f^2 = 0.15$, significance level $\alpha = 0.05$, and statistical power = 80% to ensure adequate statistical validity. The study successfully obtained 150 valid responses, exceeding this requirement and meeting recommended criteria for Structural Equation Modeling–Partial Least Squares (SEM-PLS) analysis [10]. The Likert-scale questionnaire measured indicators across all constructs using validated items from prior TAM research [11]. Content validity was confirmed through expert review by BPO and IT Division at PLN. Prior to statistical analysis, all responses underwent a multi-stage validation process. Completeness was verified by screening for unanswered items and inconsistent response patterns, with incomplete submissions excluded. Data were screened for outliers and atypical responses using standard diagnostic checks and manual review.

Given PLN's nature as a state-owned enterprise with a formal and hierarchical culture, the possibility of respondent bias was carefully considered. Employees may demonstrate social desirability bias, expressing favorable opinions to align with organizational expectations, or may hesitate to criticize official systems such as SIMPUS. To mitigate this, the survey was conducted anonymously, with no personally identifiable information collected. Participation was voluntary, and respondents were assured that their feedback would be used exclusively for research purposes and reported in aggregate form. The questionnaire was distributed across multiple regional units to capture diverse perspectives and reduce location-based homogeneity.

C. SEM-PLS Analysis

SEM-PLS was employed to test the measurement and structural models due to its robustness with complex models and small-to-medium sample sizes [12]. The analysis was conducted using SmartPLS version 4.0, based on Hair et al. (2021) [10]:

- Outer Model Assessment: Validity (convergent and discriminant, indicator loadings > 0.7, AVE >0.5) and reliability (Cronbach's Alpha and Composite Reliability both >0.7). Discriminant validity was examined through the Fornell–Larcker criterion and HTMT, ensuring inter-construct correlations remained below 0.85.
- Inner Model Assessment: Effect sizes (f^2 = 0.02 - 0.35), predictive relevance ($Q^2 > 0$), coefficient of determination (R^2 = 0.25 – 0.75), and path coefficient.

Significance of relationships was evaluated using bootstrapping with 5000 resamples. Constructs with p-values < 0.05 and t-values > 1.96 at the 95% confidence level were considered statistically significant [13].

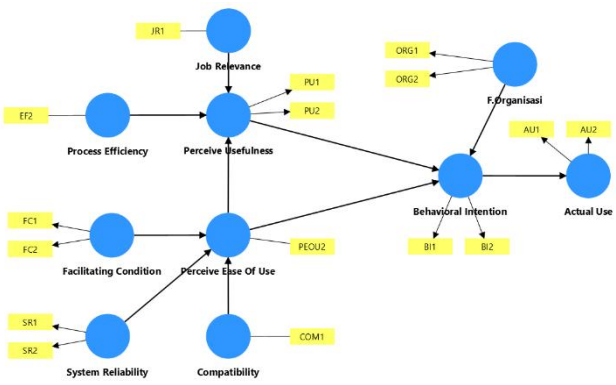

Figure 3 Final model

D. Voice of Customer and QFD

In parallel, user needs were captured through open-ended responses in the questionnaire and systematically mapped into the QFD framework. Nine key customer requirements (What) were identified: (1) complex verification/approval procedures, (2) features that do not meet operational needs, (3) poor synchronization with SAP, (4) slow loading and

response times, (5) unresponsive technical support, (6) confusing user interface, (7) manual and burdensome document uploads, (8) lack of digital signature functionality, and (9) no mobile access. These needs were then paired with corresponding technical solutions (How) and prioritized using the House of Quality (HoQ) matrix [5]. The relationship strength matrix, combined with importance weights, guided the identification of high-priority development areas.

IV. FINDINGS AND DISCUSSION

A. *Respondent Profile*

The demographic analysis reveals that most SIMPUS users are male (76.67%) and in the 31–40 age group (50%), suggesting a workforce in their mid-career phase with moderate digital adaptability. Educationally, 73.33% hold a bachelor's degree, indicating strong intellectual readiness to engage with enterprise systems. Notably, 56.67% have worked at PLN for over 11 years, underscoring that the respondents are experienced personnel whose perspectives are critical in evaluating SIMPUS effectiveness.

B. *Instrument Validity and Reliability*

The outer model assessment confirmed that all indicators met convergent validity (AVE > 0.5) and demonstrated high internal consistency (CR and Cronbach's Alpha > 0.7), aligning with measurement standards in SEM-PLS literature [10], [14], [15]. Thus, the instrument is deemed both valid and reliable for analyzing construct relationships.

Table I Demographic Information

Characteristic		n	%
Gender	Male	115	76.67%
	Female	35	23.33%
Age	25-30	10	6.67%
	31-40	75	50%
	41-50	50	33.33%
	51-50	15	10%
Background	Highschool	10	6.66%
	Undergraduate	110	73.33%
	Graduate/higher	30	20%
Years of service	<5	5	3.33%
	5-10	20	13.33%
	11-15	45	30%
	16-20	40	26.67%
	>20	40	26.67%

Table II Outer Model Test Result

Construct	AVE	Cronbach's Alpha	CR
Actual Use	0.933	0.928	0.965
Behavioral Intention	0.914	0.906	0.955
Organization Support	0.926	0.920	0.961
Training	0.688	0.788	0.807
Perceived Usefulness	0.872	0.853	0.931
Subjective Norm	0.883	0.868	0.938
System Reliability	0.854	0.845	0.921

C. *Model Accuracy (R^2 and Q^2)*

The structural model demonstrated high explanatory power, with $R^2 = 0.800$ for Behavioral Intention (substantial) and $R^2 = 0.504$ for Actual Use (moderate) [10]. Predictive relevance was also strong, with $Q^2 = 0.524$ (BI) and $Q^2 = 0.474$ (AU), confirming the model's predictive adequacy across key constructs. These values indicate that the extended TAM2 model, enriched with organizational and system-related variables, effectively explains SIMPUS user behavior.

Table III Inner Model Test Result

Construct	R^2	Q^2
Actual Use	0.504	0.474
Behavioral Intention	0.800	0.524
Perceived Ease of Use	0.367	0.319
Perceived Usefulness	0.695	0.503

D. *Hypothesis Testing Result*

Path coefficient analysis and effect size evaluation (f^2) offer detailed insights into the influence of each predictor within the extended TAM2 model.

Table IV Hypothesis Testing Result

Hypho-thesis	t-value	p-value	f^2	Result
H1	0.548	0.583	0.009	Rejected
H2	6.042	< 0.001	0.337	Accepted
H3	0.582	0.560	0.003	Rejected
H4	2.549	0.011	0.060	Accepted
H5	0.849	0.396	0.008	Rejected
H6	19.223	< 0.001	1.325	Accepted
H7	0.406	0.685	0.001	Rejected
H8	7.733	< 0.001	0.173	Accepted
H9	2.836	0.005	0.064	Accepted
H10	6.317	< 0.001	0.487	Accepted
H11	15.968	< 0.001	1.017	Accepted

- Predictors of PEOU: System Reliability had a strong and significant effect on ease of use ($t = 6.042$; $p < 0.001$; $f^2 = 0.337$), showing that system stability and responsiveness are essential. In contrast, Training ($t = 0.548$; $p = 0.583$; $f^2 = 0.009$) and Compatibility ($t = 0.582$; $p = 0.560$;

$f^2 = 0.003$) were not significant, indicating current training and system fit need improvement.

- Predictors of PU: PEOU was the strongest predictor of usefulness ($t = 19.223$; $p < 0.001$; $f^2 = 1.325$). Job Relevance had a smaller yet significant effect ($t = 2.549$; $p = 0.011$; $f^2 = 0.060$). Process Efficiency showed no impact ($t = 0.849$; $p = 0.396$; $f^2 = 0.008$), suggesting users value system outcomes over internal process flow.
- Predictors of Behavioral Intention (BI): PEOU ($t = 6.317$; $p < 0.001$; $f^2 = 0.487$), PU ($t = 2.836$; $p = 0.005$; $f^2 = 0.064$), and Organizational Support ($t = 7.733$; $p < 0.001$; $f^2 = 0.173$) significantly influenced intention to use. Subjective Norm was not significant ($t = 0.406$; $p = 0.685$; $f^2 = 0.001$), reflecting that organizational policies, not peer pressure, drive adoption in PLN.
- From Intention to Actual Use: Behavioral Intention strongly predicted Actual System Use ($t = 15.968$; $p < 0.001$; $f^2 = 1.017$), with a very large effect size. This validates that cultivating user intention—through improved usability, relevance, and formal support—is key to increasing actual system engagement.

E. User Needs and Development Via QFD

Through the Voice of Customer (VoC) analysis, nine key issues were identified (see Section 3.D), highlighting that while SIMPUS delivers functional value, it falls short in usability and responsiveness. These needs were linked to technical solutions and prioritized using the House of Quality (HoQ) method (Figure 4). The result of Hypothesis also used as priority weight of improvement direction based on equation (1) [16], [17], [18].

$$Weight_{Voc} = min\left(5, round\left(\frac{w(H_i)}{n} \times \sqrt{n}\right)\right) \quad (1)$$

where:

w(Hi) = hypothesis weight; highly significant (5), significant (3), not significant (1)

n = number of hypotheses

The resulting HoQ revealed the top three development priorities:

- User Interface/User Experience (UI/UX) redesign
- New feature (bulk document upload functionality and implementation of digital signature features)
- Simplification of the approval workflow

These priorities align with the strongest relationships (rated as “strong” or “medium”) in the relationship matrix and received the highest technical importance scores in the QFD calculation. These finding echoes research in e-government adoption, where intuitive interfaces and time-saving features are often more decisive for long-term system use than system complexity itself [19], [20].

F. Strategic Implications

The finding that Perceived Ease of Use (PEOU) is the most influential factor in SIMPUS adoption is consistent with recent studies on technology acceptance in government digital services, such as Pramiyati et al. (2019) and Al Ayyubi et al. (2022), which highlight usability and intuitive design as critical adoption drivers. Similarly, the strong role of Organizational Support reflects the conclusions of Burhan & Nadjib (2023), who observed that managerial endorsement and policy integration significantly increase acceptance rates in public-sector systems [9], [19], [20].

The insignificance of Subjective Norm aligns with research in other hierarchical organizations, where compliance is policy-driven rather than peer-influenced (Venkatesh et al., 2003). This suggests that in contexts like PLN, adoption strategies should prioritize practical improvements, such as role-based dashboards, responsive design, and embedded support tools (see Figure 4).

Project: Roadmap Development SIMPUS Application
Date:

Functional Requirement

Relative Weight	Customer Importance	Customer Requirement	Direction of Improvement	◊	↗	↗	◊	◊	↗	◊	Priority Weights
				Simplification of verification and approval workflows	Real-time integration with SAP systems	System performance optimization (speed & stability)	Development of new features (bulk uploads, e-signatur	interface redesign (UI/UX)	Improved technical support services	Development of SIMPUS mobile access	
17%	5	Complex verification/approval procedures		▲5				○3			5
13%	4	Features don't meet operational needs		○3			▲5	○3		□1	4
13%	4	Poor synchronization with SAP			▲5						4
13%	4	Slow loading/low response time				▲5					5
10%	3	Unresponsive technical support							▲5		3
10%	3	Confusing interface						▲5			5
10%	3	Manual and troublesome document upload process					▲5				5
7%	2	Lack of digital signature functionality					▲5				4
7%	2	No mobile access								▲5	4
		Importance Rating Sum (Importance x Relations x priority)		173	80	100	195	198	45	56	
		Relative weight		20.4%	9.4%	11.8%	23.0%	23.4%	5.3%	6.6%	
		Rank		3	5	4	2	1	7	6	

Figure 4 SIMPUS House of Quality Matrix

The QFD-derived priorities — UI/UX improvements, digital signature integration, and streamlined approval workflows — are in line with global trends in digital asset management systems. Recent literature (e.g., Wang et al., 2025; Anjani et al., 2024) emphasizes that enhanced usability and integrated digital authorization features not only

improve user satisfaction but also strengthen compliance, security, and process efficiency [21], [22]. These parallels underscore that the improvement roadmap generated in this study aligns with both local organizational needs and international best practices in public-sector asset management.

V. CONCLUSION

This study shows that the Technology Acceptance Model (TAM2) effectively explains user behavior in adopting SIMPUS. The most influential factor is Perceived Ease of Use (PEOU), which directly and indirectly affects Behavioral Intention (BI) through Perceived Usefulness (PU). Organizational Support also plays a key role, confirming that formal policies and managerial backing drive system usage. System Reliability indirectly supports BI by improving PEOU, while Job Relevance and PEOU both strengthen PU. In contrast, Training, Compatibility, Process Efficiency, and Subjective Norm were not significant. Subjective Norm was removed from the model, indicating that social influence is not a key driver in SIMPUS adoption—task relevance and functionality matter more.

Complementing the behavioral findings, QFD analysis identified three key system improvement priorities as stated in Section III. These priorities highlight that improving usability and workflow design is essential to increase user satisfaction and adoption. Combining TAM2 and QFD provides a solid framework for evaluating and enhancing digital systems in public sector organizations like PLN.

Future research is recommended to evaluate SIMPUS adoption using broader and more contextual technology acceptance models such as the Unified Theory of Acceptance and Use of Technology (UTAUT), the Technology–Organization–Environment (TOE) framework, or Diffusion of Innovations (DOI). These models allow exploration of additional dimensions—such as organizational climate, external support, technological readiness, and innovation characteristics—that were not addressed in this study. Follow-up studies can adopt one of two timing approaches: Pre-implementation, to assess organizational readiness, user expectations, and potential resistance before recommended features are rolled out. Post-implementation, to evaluate the impact of system improvements on user acceptance and actual usage behavior. Such extensions would provide a more holistic understanding of technology adoption dynamics within public-sector digital transformation.

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