Studi Akuntansi, Keuangan, dan Manajemen (SAKMAN)
ISSN 2798-0251 , Vol 5, No 2, 2025, 189-204 https://doi.org/10.35912/sakman.v5i2.5524

Behaviour and Satisfaction Effects on User Loyalty within e-Procurement of National Oil Firms

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Article History:
Received on 05 July 2025
1st Revision 29 July 2025
2nd Revision 18 August 2025
3rd Revision 28 August 2025
Accepted on 19 September 2025

Abstract
Purpose: This study aims to analyze the effects of Application Ease of Use, Digital Service Quality, and Digital Information Quality on User Behavior, User Satisfaction, and User Loyalty in National Upstream Oil and Gas Companies. It also examines the mediating roles of User Behavior and User Satisfaction in influencing loyalty.
Research Methodology: A quantitative approach was used with the SmartPLS 4 analysis tool to analyze the data. Data were collected from 296 respondents across 15 upstream oil and gas companies in Indonesia, selected through purposive sampling based on Slovin's formula. The analysis employed the Structural Equation Modeling (SEM-PLS) technique to test the direct and indirect effects of the study variables.
Results: The findings revealed that Ease of Use and Digital Service Quality significantly influenced both user behavior and satisfaction. Digital Information Quality does not significantly affect User Behavior but has a strong impact on User Satisfaction. Furthermore, User Behavior and User Satisfaction significantly enhance User Loyalty, confirming their mediating roles.
Conclusions: Ease of Use and Service Quality are critical determinants of user engagement and loyalty, whereas Digital Information Quality primarily strengthens satisfaction.
Limitations: This study focused only on upstream oil and gas companies in Indonesia and used cross-sectional self-reported data, which may limit causal interpretation.
Contribution: This study enriches digital loyalty theory by highlighting how behavioral and satisfaction factors mediate the impact of digital quality dimensions on user loyalty in industrial digital systems.

Keywords: *Digital Service Quality, Digital Information Quality, Ease of Use, User Behaviour, User Satisfaction, User Loyalty*

How to Cite: Parlindungan, P., Sanny, L., Sholihah, S. A., Nofrisel, N., Zaroni, Z. (2025). Behaviour and Satisfaction Effects on User Loyalty within e-Procurement of National Oil Firms. *Studi Akuntansi, Keuangan, dan Manajemen*, 5(2), 189-204.

1. Introduction

The e-procurement process plays a crucial role in enhancing efficiency, transparency, and accountability within Indonesia's oil and gas industry. Major firms such as PT Pertamina (Persero), national upstream oil and gas companies, and various private upstream operators use electronic procurement systems to handle the acquisition of goods and services, from heavy machinery and technical supplies to operational support. Through competitive open auctions, companies can select the best suppliers based on price, quality, and delivery terms. This procurement occurs primarily in two forms: business-to-business (B2B) and business-to-government (B2G). B2B procurement refers to digitally managed transactions between companies rather than with end consumers covering the entire

lifecycle from needs evaluation, supplier selection, contracting, ordering, to payment with the main advantages being time and cost savings, process transparency, real-time spending insights, and administrative automation (Sharma & Vaisla, 2022). On the other hand, B2G procurement involves private entities providing goods or services directly to government bodies (Kumar & Ganguly, 2020).

In Indonesia's oil and gas sector, upstream operators like Pertamina Hulu regularly participate in public tenders administered by agencies such as LKPP under the authority of regulations like Presidential Regulation No. 16 of 2018, ensuring legitimacy and support for national e-procurement frameworks (Susantya et al., 2022). E-procurement also improves auditing, compliance monitoring, and overall productivity, while helping drive digital transformation efforts and reinforcing accountability in the energy sector (Sitompul, 2022). However, challenges persist: many providers still lack technological readiness, suffer from insufficient digital infrastructure and skills, or experience dissatisfaction with user experience—all of which can hinder adoption (Arman & Sari, 2022). Notably, user satisfaction is key to building loyalty and ensuring continued engagement. Based on data regarding the e-procurement trends at SKK Migas, a decline has occurred as shown in the following figure 1.

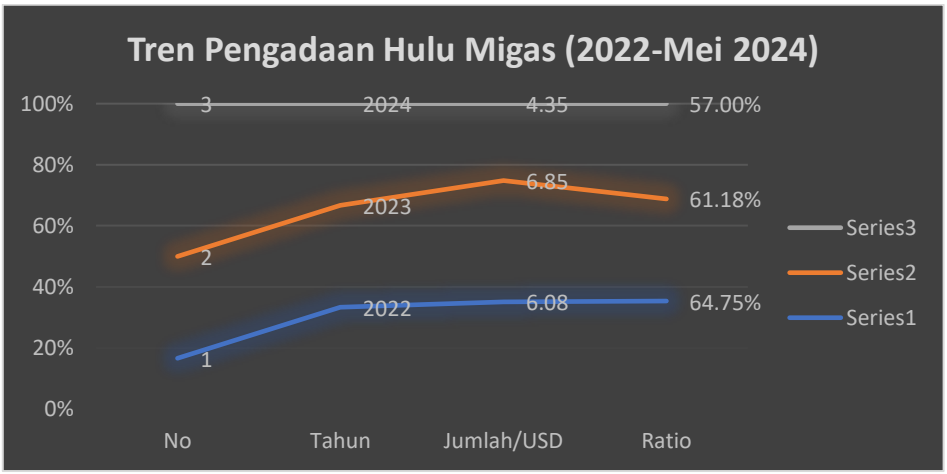

Figure 1 Upstream Oil & Gas Procurement Trend, 2022–May 2024
Source: https://money.kompas.com

SKK Migas data underscores the sector's dynamic nature: upstream procurement reached USD 6.08 billion in 2022 (domestic content ~64.75%) (Kompas Money), grew to USD 6.85 billion by October 2023 (domestic content ~61.18%) (suara.com), but then declined to USD 4.35 billion by June 2024 (domestic content ~57.52%) (Business Asia). Against this backdrop, this study examines factors influencing user satisfaction and loyalty in e-procurement within Indonesia's national oil and gas companies focusing on three key drivers: ease of use, digital service quality, and quality of digital information. These factors are shown to positively affect satisfaction, which in turn mediates their impact on loyalty. While trust and perceived value further strengthen this relationship, existing research yields mixed results, signaling a theoretical and empirical gap. Therefore, this study proposes an integrated model to explore how ease of use, service quality, and information quality jointly influence satisfaction, user behavior, and loyalty—for deeper insights into optimizing e-procurement strategies in Indonesia's oil and gas sector.

The research gap mentioned above lies in reconciling the findings with expectations and understanding why the seemingly intuitive relationship between quality factors and customer outcomes does not hold in e-procurement as it does in other digital contexts. Furthermore, this study aims to address this existing gap and offer novelty by integrating ease of use, digital service quality, and digital information quality into a single model and evaluating their impact on customer loyalty through the mediating roles of user behavior and user satisfaction. This can be analyzed and tested bibliometrically using the VOSviewer application as follows:

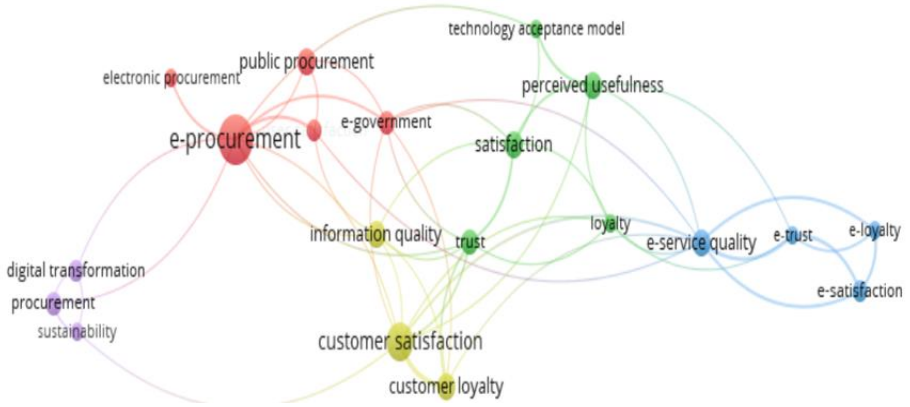

Figure 2 Bibliometric Analysis of E-Procurement User Loyalty
Source: output of Vosviewer (2025)

Figure 2, the yellow node representing 'user satisfaction' is much smaller and located farther away from the red node for 'e-procurement.' This suggests that customer loyalty in the context of e-procurement is still an underexplored topic, presenting considerable research opportunity. Moreover, research rarely includes variables such as user behavior, ease of use, digital service quality, and digital information quality together in models of e-procurement user loyalty. This study adopts a holistic approach to explore how ease of use, digital service quality, and information quality interact to influence customer loyalty. It highlights the mediating roles of user behavior and satisfaction, providing a detailed understanding of the mechanisms behind loyalty. Practically, these insights can guide app developers and digital service providers in designing better user experiences in today's digital era.

2. Literature Background and Hypotheses Development

2.1 The Impact of Ease of Use, Application Service Quality, and Application Information Quality On Customer Behavior

Understanding how ease of use, e-service quality, and information quality influence consumer behavior in e-procurement is critical. According to the Technology Acceptance Model (TAM), EOU strongly influences users' adoption and continued intention to use a system. In banking and e-service contexts, EOU consistently predicts customer satisfaction and attitudes toward technology adoption (Nguyen et al., 2022; Vatolkina et al., 2020).

H1: Ease of use directly improves and significant impact on consumer behavior.

E-service quality includes dimensions such as system functionality, reliability, security, personalization, fulfillment, and responsiveness (Ricardianto et al., 2024). Studies show that high e-service quality boosts satisfaction (Sopyan et al., 2023), trust, and behavioral intentions like repurchase, recommendations, and loyalty (Rita et al., 2019; Nguyen et al., 2022). In e-procurement, service quality positively affects perceived value, satisfaction, and e-loyalty (Brandon-Jones & Carey, 2011).

H2: Application service quality positively influences consumer behavior in e-procurement sector

In the specific context of e-procurement, service quality dimensions positively impact perceived value, overall satisfaction, and e-loyalty within B2G (business-to-government) settings, reinforcing their relevance in procurement systems (Brandon-Jones & Carey, 2011). Information quality pertains to accuracy, clarity, timeliness, and usefulness of data presented. In online retail and platform literature, information quality often intertwines with system quality as a key driver of overall e-service quality and, by extension, satisfaction and behavioral outcomes (Lien et al., 2017; Irenita et al., 2022).

For example, in e-learning environments, high information quality combined with system and service quality significantly elevates user satisfaction (Nuraini et al., 2025; Achmadi & Siregar, 2021). While consumer behavior in e-commerce has been extensively studied, e-procurement involves institutional users whose organizational stakes and procedural complexity differ. Yet, studies in B2G procurement show that e-service quality when well-rounded enhances perceived value, satisfaction, and loyalty

(Risal et al., 2024). Further, implementation studies indicate that system quality and information quality improve ease of use, which in turn promotes successful and sustained use of e-procurement systems (Setyadi et al., 2023). Based on the literature, the following hypotheses are proposed to explain how ease of use, application service quality, and information quality affect consumer behavior (in terms of satisfaction, loyalty, and continued use) in e-procurement.
H3: Application information quality enhances user behavior with the system of e-procurement

2.2 The Impact of Ease of Use, Application Sevice Quality, and Application Information quality on Consumer Satisfaction in e- procurement

Central to the Technology Acceptance Model (TAM), ease of use has been consistently shown to positively affect user acceptance, satisfaction, and continued intention to use technologies. In e-procurement, system quality enhances ease of use, which in turn drives successful system utilization. Studies at *Universitas Terbuka* and the *Open University* revealed that system and information quality indirectly improve e-procurement success through ease of use as a mediator (Setyadi et al., 2023; Prianto & Setyadi, 2023). These findings highlight ease of use as a critical mediating factor linking system and information quality to user satisfaction and success.
H4: Ease of use has a positive direct influence on consumer satisfaction with the e-procurement system.

E-service quality comprises multiple dimensions—reliability, responsiveness, security, fulfilment, and personalization—that shape user satisfaction (Ruminda et al., 2025). Research by Ighomereho et al. (2022) identified ease of use, reliability, and security as key determinants of overall e-service quality. In Malaysia's e-procurement context, Kadir & Shafirah (2016) demonstrated that service quality—measured via E-S-QUAL and E-RecS-QUAL dimensions such as efficiency, privacy, and responsiveness—strongly predicts perceived quality and behavioral intentions. These studies collectively emphasize that superior service delivery, beyond technical functionality, is essential for positive user experiences and satisfaction (Poncotoyo et al., 2022).
H5: Application service quality positively influences consumer satisfaction in e-procurement.

Information quality—referring to the accuracy, relevance, timeliness, completeness, and format of information—is another essential determinant of satisfaction. In e-learning systems, information, system, and service quality jointly enhance user satisfaction (Achmadi & Siregar, 2021). Within e-procurement, research in *Surakarta's local government* found that information quality significantly influences user satisfaction and system use, while system quality did not (Harjito et al., 2016). Similarly, Maagi & Mwakalobo (2023) found that system, information, and service quality collectively explained 52% of the variance in user satisfaction ($R^2 = 0.52$). These results affirm that high-quality, timely, and accurate information elevates user satisfaction and usage success in e-procurement settings.
H6: Application Information quality positively impact on customer satisfaction in e-procurement

2.3 The Direct Impact of Ease of Use, Application Service Quality, and Application Information Quality on Consumer Loyalty in E-Procurement

Ease of use central to TAM is known to drive user behavior and system acceptance. Evidence from digital banking and payments shows that ease of use not only increases satisfaction but also contributes directly to loyalty (Ayinaddis et al., 2023). Specifically, studies in Indonesia's mobile-banking context indicate that ease of use positively and significantly affects customer satisfaction and, consequently, loyalty (Abdul Kadir, 2024). While these findings derive from financial services, the relevance to e-procurement is strong: procurement platforms are similarly task-driven and professional, making usability crucial for repeated adoption and trust.
H7: Ease of use of an e-procurement system has a positive direct effect on consumer loyalty

E-service quality extends traditional service quality models to online contexts, encompassing efficiency, reliability, fulfillment, security, and responsiveness (Veloso et al., 2020). Empirical research consistently shows that higher e-service quality enhances customer satisfaction and loyalty across sectors such as retail, banking, and travel (Sasono et al., 2021). Indonesian studies further confirm significant direct effects of e-service quality on satisfaction and loyalty (Yunus et al., 2022). In e-

procurement, where reliability and responsiveness are vital, these dimensions play a crucial role in sustaining user trust and long-term platform engagement.
H8: Application service quality of the e-procurement platform exerts a positive direct impact on consumer loyalty.

Information quality accuracy, relevance, timeliness, and clarity is a crucial IS success dimension. Numerous studies in online commerce and digital services show that high information quality enhances both satisfaction and loyalty, either directly or indirectly (Khan et al., 2023). While research in procurement systems is less prominent, the same logic applies: effective procurement depends heavily on precise and current supplier, pricing, and logistics data, making information quality a key enabler of trust and repeated use. Although many studies examine these predictors separately, the joint impact of ease of use, service quality, and information quality on loyalty has been less frequently tested directly. Many studies recognize satisfaction as a mediating variable—but the direct influence on loyalty remains underexplored. For procurement platforms targeting business or institutional users, establishing a clear direct link is vital, particularly when usage is tied to organizational continuity and compliance.
H9: Application quality of information provided by the e-procurement application has a positive direct influence on consumer loyalty.

2.4 The Mediating Role of Customer Behavior and Customer Satisfaction on Customer Loyalty

Customer behavior in online environments encompasses engagement, purchase intention, and repeat interaction (Irrawati & Isa, 2025). Evidence from e-retail indicates that customer experience fosters engagement, which subsequently enhances both satisfaction and loyalty (Dananjoyo et al., 2024). This dynamic suggests that customer behavior functions as a mediating mechanism between experience and loyalty—similar to how satisfaction mediates service attributes and commitment (Rayan et al., 2024).
H10: Customer Behavior Mediates the Effects of Customer Loyalty in e-procurement

Extensive research identifies customer satisfaction as a key antecedent of customer loyalty across both traditional and digital service contexts. Marketing theory positions satisfaction as a primary predictor of loyalty and purchase intentions (Walean et al., 2025). A systematic review of over 200 Scopus-indexed studies confirmed that satisfaction consistently drives loyalty (Utami et al., 2023). In e-commerce and mobile settings, satisfaction frequently acts as a mediator between service quality and loyalty. For instance, in the Lazada mobile shopping context, service quality did not directly impact loyalty, but the effect became significant when mediated by satisfaction (Suharto & Widodo, 2023). Together, this body of knowledge suggests a two-stage mediation process in e-procurement: first, customer behavior (e.g., engagement, usage patterns) arises in response to e-procurement system qualities; second, behavior influences customer satisfaction, which in turn cultivates customer loyalty (Eka et al., 2025). Satisfaction and behavior thus act as critical conduits through which system-related inputs translate into loyalty.
H11: Customer Satisfaction Mediates the Effects on Customer Loyalty

2.5 Conceptual Framework

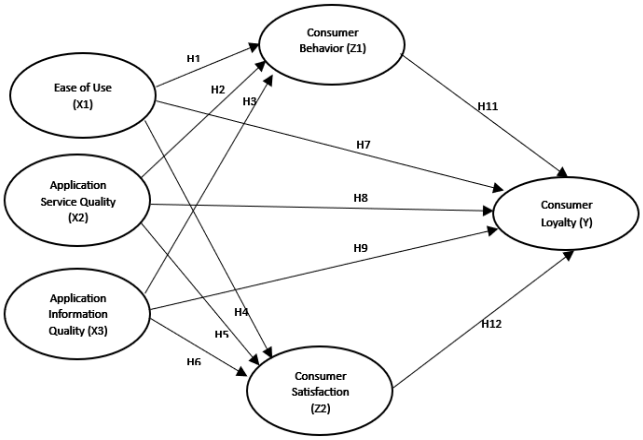

Figure 2: Conceptual Framework

3. Research Method

This study employs a quantitative explanatory design, using a survey to empirically investigate how customer behavior and satisfaction mediate the relationship between e-procurement system qualities and customer loyalty. The target population includes e-procurement system users such as procurement officers and suppliers who have engaged with the system for at least six months, ensuring sufficient familiarity. We aim to collect data from a purposive sample of at least above 200 respondents, a benchmark established by similar PLS-SEM studies in procurement contexts (Lamusu & Sari, 2023). Survey items will be adapted from validated scales to measure constructs such as customer behavior (e.g., frequency and depth of use), satisfaction, and loyalty, scored on a five-point Likert scale. Prior to full deployment, the questionnaire will undergo expert review and pilot testing for clarity and reliability.

For data analysis, we will use Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS an approach well-suited to modeling latent variables and testing mediation effects under non-normal data conditions. Initial evaluations will assess the measurement model, checking internal consistency (Cronbach's Alpha and Composite Reliability above 0.70), convergent validity (AVE above 0.50), and discriminant validity (using Fornell–Larcker criterion or HTMT ratios). Subsequently, the structural model will be assessed with bootstrapping (5,000 subsamples) to evaluate the significance of direct and indirect paths. The mediating influence of customer behavior and satisfaction on customer loyalty will be tested using established mediation testing procedures in SEM. Model assessment will also include checks for multicollinearity (inner VIF) and predictive relevance, following recent methodological benchmarks. This comprehensive methodology ensures that the relationships between customer behavior, satisfaction, and loyalty are rigorously tested providing fresh empirical insight into user dynamics in e-procurement systems.

4. Result and Discussion

4.1 Result

4.1.1 Respondent Demographic

Table 1. Respondent Demographic

Factor	Description	Frequency	Percentage
Gender	Male	157	53.0%
	Female	139	38.6%
	Total	296	100.0%
Age	31–40 years	21	8.0%
	41–50 years	255	86.0%
	≥ 50 years	20	6.0%
	Total	296	100.0%
Education	Bachelor's degree (S1)	278	94.0%
	Master's degree (S2)	18	6.0%
	Total	296	100.0%
Position	Operator/Admin	80	27.0%
	Leader/Supervisor	91	30.7%
	Assistant Manager/Manager	125	42.3%
	Total	296	100.0%
Years of Work	3 years	11	3.7%
	4 years	7	2.3%
	> 5 years	278	94.0%
	Total	296	100.0%

Source: data processed by researchers

The demographic profile of the 296 survey respondents presents a robust and experienced sample, with balanced gender representation (53% male and 47% female), indicating inclusivity across genders. A striking majority (86%) fall within the 41–50 age range, suggesting that mid-career professionals predominantly participated, while younger (31–40 years, 8%) and older (50+ years, 6%) cohorts are

underrepresented, potentially limiting perspectives from the early-career and late-career segments. Educationally, the sample is highly qualified, with 94% holding bachelor's degrees and only 6% possessing master's degrees, underscoring a strong academic foundation but minimal advanced education representation (Yeimo, Lewerissa, & Suripatty, 2025). In terms of organizational hierarchy, roles are distributed with approximately 27% in operator or administrative positions, 31% as leaders or supervisors, and a plurality of 42% serving as assistant managers or managers, highlighting substantial representation from mid- to senior-level professionals.

Notably, tenure is overwhelmingly high: 94% of respondents have over five years of experience, with minimal representation from those with only three years (3.7%) or four years (2.3%) on the job. This suggests a deeply experienced respondent pool capable of providing informed and stable insights. Overall, the sample comprises mainly seasoned, educated individuals in mid-to-upper professional roles, making their input particularly relevant and credible. However, the low representation of younger professionals and advanced-degree holders might narrow insights from those groups, which could be useful to consider in broader generalizations or future research designs.

4.1.2 Measurement Model

In PLS-SEM, the measurement model—also known as the outer model—describes how latent constructs (like ease of use, service quality, information quality, behavior, satisfaction, and loyalty) are represented by their observable indicators. For reflective models, where the construct manifests through its indicators, the assessment focuses on evaluating the quality of those indicators using criteria such as factor loadings (above 0.70), internal consistency reliability via Cronbach's Alpha or Composite Reliability (ideally above 0.70), convergent validity (Average Variance Extracted, AVE, should exceed 0.50), and discriminant validity using methods like the Fornell–Larcker criterion or the HTMT ratio (Hair, 2021). Once the measurement model is validated, attention shifts to the structural model, which tests hypothesized relationships among constructs.

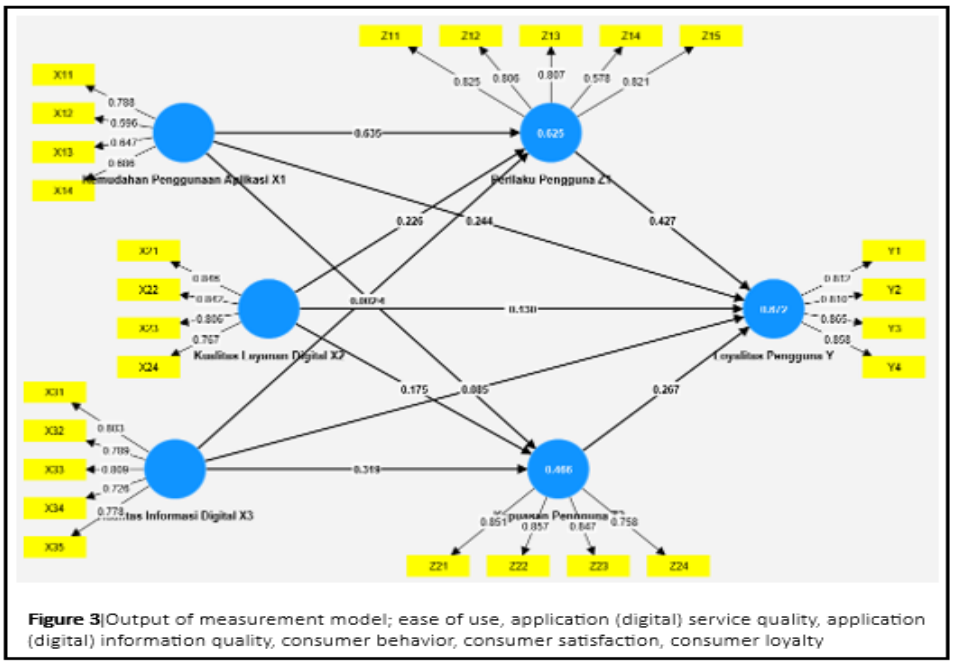

Figure 3|Output of measurement model; ease of use, application (digital) service quality, application (digital) information quality, consumer behavior, consumer satisfaction, consumer loyalty

Table 2. Reflective measurement model

Construct	Indicator	Outer Loading	Cronbach's α	Composite Reliability (CR)	AVE	VIF (inner collinearity)
Ease of Use	X1.1: Easy to learn.	0.788	0.724	0.776	0.567	1.288

	X1.2: Easy to remember.	0.596				1.197
	X1.3: Easy to access.	0.617				1.503
	X1.4: Easy to navigate.	0.686				1.565
Application (digital) service quality	X2.1: Fullfilment	0.846	0.832	0.888	0.665	1.924
	X2.2: Efficiency	0.842				2.223
	X2.3: Privacy	0.806				1.924
	X2.4: Communicative	0.767				1.528
Application (digital) information quality	X3.1: Accurate	0.803	0.842	0.887	0.611	1.812
	X3.2: Relevant	0.789				1.788
	X3.3: Useful	0.809				1.778
	X3.4: Reliable	0.726				1.680
	X3.5: Availabel	0.778				1.733
Consumer (Sobhani, Amran, & Zainuddin) behavior	Z1.1: Accountable	0.825	0.829	0.880	0.598	2.170
	Z1.2: Insightful	0.806				1.802
	Z1.3: Independent	0.807				1.824
	Z1.4: Competitive	0.578				1.272
	Z1.5: Transparent	0.821				2.065
Consumer (Sobhani et al.) satisfaction	Z2.1: Experience	0.851	0.848	0.898	0.687	2.013
	Z2.2: Relevance	0.857				2.450
	Z2.3: Recommendation	0.847				2.282
	Z2.4: Feedback	0.758				1.572
Consumer (Sobhani et al.) loyalty	Y1: Responsive	0.812	0.857	0.903	0.700	1.806
	Y2: Appropriate	0.810				1.794
	Y3: Compliance	0.865				2.487
	Y4: Sustainability	0.858				2.372

Output of SmartPLS 4.0

The measurement model shows strong psychometric adequacy, confirming that constructs such as ease of use, service quality, information quality, user behavior, satisfaction, and loyalty are being measured both reliably and validly. Specifically, indicator reliability is demonstrated by most outer loadings exceeding **0.70**, especially for service quality, information quality, satisfaction, and loyalty; though a few items in ease of use and user behavior load between **0.58–0.68**, these are still acceptable in exploratory settings and do not undermine overall construct validity. Internal consistency is well supported, as both Cronbach's alpha and Composite Reliability (CR) values are above the acceptable

threshold of **0.70**, indicating consistency across items measuring each latent construct. Convergent validity is also affirmed, with Average Variance Extracted (AVE) values surpassing the common benchmark of **0.50**, which means each construct explains more than half the variance of its indicators. Finally, multicollinearity among indicators is minimal—Variance Inflation Factor (VIF) values remain well below conservative thresholds (often < 3 or < 5), confirming that indicator overlap does not materially threaten the construct measurements. Prior research in PLS-SEM methodology supports each of these criteria: outer loadings ≥ 0.70 (or somewhat lower in early-stage or exploratory research) are standard for indicator reliability (Hair et al., 2021), CR and Cronbach's alpha ≥ 0.70 are typical thresholds for internal consistency (Hair et al., 2021), AVE ≥ 0.50 is used universally for convergent validity (Fornell & Larcker, 1981; Hamid et al., 2017), and VIF well below 5 indicates acceptable multicollinearity (common in many measurement model studies).

Table 3. Dicriminant Validity of Fornell-Larcker Criterion

Construct	EOU (X1)	CS (Z2)	AIQ (X3)	ASQ (X2)	CL (Y)	CB (Z1)
Ease of use X1	0.783					
Consumer satisfaction Z2	0.605	0.829				
Application (digital) information quality X3	0.619	0.598	0.782			
Application (digital) service quality X2	0.588	0.520	0.519	0.816		
Customer loyalty Y	0.709	0.693	0.547	0.452	0.837	
Consumer behavior Z1	0.769	0.691	0.513	0.601	0.764	0.773

Output of SmartPLS 4.0

The correlation matrix shows meaningful relationships among the constructs in your model. Ease of Use is strongly linked to Consumer Behavior (CB) (0.769), meaning that when users find the system easier to use, their behavior changes significantly likely toward higher engagement. It also has solid connections with Customer Loyalty (CL) (0.709) and Satisfaction (CS) (0.605), indicating EOU supports both satisfaction and loyalty. Information Quality (AIQ) correlates moderately with Satisfaction (0.598) and Ease of Use (0.619), suggesting that accurate and relevant information enhances both user satisfaction and usability. Service Quality (ASQ) shows weaker associations overall particularly with Loyalty (0.452) which may mean that, in this context, service aspects are less influential than usability and information.

Importantly, Customer Loyalty (CL) is highly linked with both Satisfaction (0.693) and Behavior (0.764), reinforcing that to foster loyalty, elevating satisfaction and positive user behavior is key. Meanwhile, Consumer Behavior (CB) itself shows strong ties across the board—anchoring its role as a critical driver connecting system qualities and loyalty. From a discriminant validity perspective, while some correlations (like EOU–CB and CB–CL) are high, they remain under the oft-cited threshold of 0.85 for concern in PLS-SEM. This suggests that the constructs are empirically distinct enough for valid interpretation.

Table 4. Discriminan Validity of HTMT

Construct	EOU (X1)	CS (Z2)	AIQ (X3)	ASQ (X2)	CL (Y)
Ease of use X1					
Customer (Sobhani et al.) satisfaction Z2	0.818				
Application (digital) information quality X3	0.850	0.697			
Application (digital) service quality X2	0.814	0.612	0.615		
Customer (Sobhani et al.) loyalty Y	0.826	0.811	0.616	0.531	
Consumer (Sobhani et al.) behavior Z1	0.810	0.821	0.580	0.718	0.826

Output of SmartPLS 4.0

The correlation table reveals strong positive relationships across several constructs. Ease of Use (Saleem, Mateou, & Malik) shows very high correlations with Customer Loyalty (CL) (0.826), Consumer Behavior (CB) (0.810), and Customer Satisfaction (CS) (0.818), indicating that perceived ease of use is strongly associated with user satisfaction, behavior, and loyalty. Consumer Behavior itself correlates highly with Customer Loyalty (0.826) and Consumer Satisfaction (0.821), highlighting its pivotal role as a bridge between satisfaction and loyalty. Application Information Quality (AIQ) is strongly connected with EOU (0.850) and has moderate ties with CS (0.697) and CL (0.616), suggesting reliable information quality enhances usability and adds to satisfaction and loyalty. Application Service Quality (ASQ) exhibits moderate correlations—highest with EOU (0.814) and CB (0.718) implying that service quality matters, but effects are less pronounced compared to ease of use and information quality. Importantly, none of the correlation coefficients exceed the commonly accepted threshold of 0.85 for concern in PLS-SEM discriminant validity (Henseler et al., 2015).

4.1.3 Structural Model

The structural model also known as the inner model in PLS-SEM depicts the hypothesized causal relationships among latent constructs: Ease of Use, Application (digital) Service Quality, Application (digital) Information Quality, Consumer Behavior, Consumer Satisfaction, and Consumer Loyalty. This model is evaluated after establishing the reliability and validity of the measurement model (Satyawati & Fitria, 2025). It allows testing which constructs directly influence others (e.g., whether Ease of Use leads to better Behavior and higher Satisfaction) and identifying any mediated pathways (such as Behavior and Satisfaction mediating the effect on Loyalty). Hypotheses are tested by assessing path coefficients for significance typically via bootstrapping and R^2 values to see how much variance is explained in key endogenous constructs like Satisfaction and Loyalty.

Table 5. Measurement Model of Direct Effect

Construct	**β**	**t-value**	**p-value**	**Significance**
Ease of Use → Customer Behavior	0.635	13.262	0.000	Significant
Ease of Use → Customer Satisfaction	0.304	5.205	0.000	Significant
Application (digital) Service Quality → Customer Behavior	0.226	4.707	0.000	Significant
Application (digital) Service Quality → Customer Satisfaction	0.173	3.112	0.002	Significant
Application (digital) Information Quality → Customer Behavior	0.002	0.045	0.964	Not-Significant
Application (digital) Information Quality → Customer Satisfaction	0.319	6.306	0.000	Significant
Ease of Use → Customer Loyalty	0.244	3.728	0.000	Significant
Application (digital) Service Quality → Customer Loyalty	0.013	2.580	0.010	Significant
Application (digital) Information Quality → Customer Loyalty	0.085	1.676	0.094	Not-Significant
Customer Behavior → Customer Loyalty	0.427	7.342	0.000	Significant
Customer Satisfaction → Customer Loyalty	0.267	4.538	0.000	Significant

Output of SmartPLS 4.0

The hypothesis testing the structural model yields a mix of strong and nuanced effects. Ease of Use significantly drives Consumer Behavior ($\beta = 0.635$, $t = 13.262$) and Consumer Satisfaction ($\beta = 0.304$, $t = 5.205$), both highly significant ($p < 0.001$), underscoring ease of use as a critical lever in shaping engagement and satisfaction. Similarly, Digital Service Quality significantly influences both Behavior ($\beta = 0.226$, $p < 0.001$) and Satisfaction ($\beta = 0.173$, $p = 0.002$), though with more moderate effects. Interestingly, Information Quality does not significantly impact Behavior ($\beta = 0.002$, $p = 0.964$), but it does have a strong positive effect on Satisfaction ($\beta = 0.319$, $p < 0.001$), suggesting that while accuracy and relevance of information enhance satisfaction, they do not directly alter behavior. Regarding

Customer Loyalty, several significant paths emerge: Ease of Use (β = 0.244, p < 0.001) and Service Quality (β = 0.013, p = 0.010) positively influence loyalty, though again with varying intensity. In contrast, Information Quality does not significantly predict loyalty directly (β = 0.085, p = 0.094). Notably, both Consumer Behavior (β = 0.427, p < 0.001) and Consumer Satisfaction (β = 0.267, p < 0.001) significantly and strongly impact loyalty, reaffirming their central role in building commitment to the platform.

Table 6. Measurement Model of Indirect Effect

Indirect Path	**β**	**t-value**	**p-value**	**Significance**
Ease of use → Customer behavior → customer loyalty	0.271	6.762	0.000	Significant
Application service quality → Customer behavior → Cust. Loyalty	0.097	3.541	0.000	Significant
Application information quality → Customer behavior → Cust. Loyalty	0.001	0.044	0.965	Not-Significant
Ease of use → Customer satisfaction → Cust. Loyalty	0.081	3.384	0.001	Significant
Application service quality → Customer satisfaction → Cust. Loyalty	0.047	2.510	0.012	Significant
Application information quality → Customer satisfaction → Cust. Loyalty	0.085	3.835	0.000	Significant

Output of SmartPLS 4.0

The mediation analysis reveals that Ease of Use significantly influences Customer Loyalty through its impact on Consumer Behavior (β = 0.271, t = 6.762, p < 0.001), indicating a robust indirect pathway. Similarly, Application (digital) Service Quality—while weaker—also shows a significant indirect effect via Consumer Behavior (β = 0.097, t = 3.541, p < 0.001). However, Information Quality fails to influence loyalty through behavior (β = 0.001, t = 0.044, p = 0.965), indicating no mediated effect in that path. In contrast, when considering satisfaction as the mediator, all three antecedents—Ease of Use (β = 0.081, t = 3.384, p = 0.001), Service Quality (β = 0.047, t = 2.510, p = 0.012), and Information Quality (β = 0.085, t = 3.835, p < 0.001)—exert significant indirect impacts on Customer Loyalty. This suggests that while information quality does not translate into loyalty through behavior, it does so through enhancing satisfaction

4.2 Discussion

This study provides a nuanced understanding of how ease of use, application (digital) service quality, and application (digital) information quality affect customer loyalty in e-procurement, both directly and through the mediating roles of user behavior and user satisfaction. The findings are interpreted through established theories—such as the Technology Acceptance Model (TAM), DeLone & McLean IS success model, and the Webreep model—and contextualized through empirical e-service quality literature. Our results show that ease of use exerts significant and robust direct effects on both consumer behavior (β = 0.635, p < 0.001) and consumer satisfaction (β = 0.304, p < 0.001), and also positively influences loyalty directly (β = 0.244, p < 0.001). Moreover, ease of use significantly impacts loyalty indirectly via both behavior (β = 0.271, p < 0.001) and satisfaction (β = 0.081, p = 0.001).

These findings are consistent with the Technology Acceptance Model (TAM), which posits perceived ease of use as a foundational belief influencing attitudes and behavioral intentions toward system use. In digital contexts, especially task-intensive ones like e-procurement, usability becomes not only a convenience factor but a strategic facilitator of adoption and repeat use. Empirically, ease of use's indirect role through behavior aligns with studies in e-procurement implementation. For instance, research at Universitas Terbuka found that system quality and information quality influence successful use through ease of use mediation (Kweyama et al., 2024). Similarly, studies in e-commerce platforms like Shopee underscore how ease of use enhances satisfaction, which then fosters loyalty (Lopes et al., 2024).

The combined direct and mediated effects affirm ease of use as a critical lever in fostering both positive user engagement and emotional commitment—a strong predictor of loyalty. The impact of application (digital) service quality on behavior ($\beta = 0.226$, $p < 0.001$), satisfaction ($\beta = 0.173$, $p = 0.002$), and loyalty ($\beta = 0.013$, $p = 0.010$) is significant but more modest in magnitude. Indirect effects through behavior ($\beta = 0.097$, $p < 0.001$) and satisfaction ($\beta = 0.047$, $p = 0.012$) are also significant, though relatively small. This suggests service quality plays a reinforcing role—enhancing user perceptions and institutionally supporting e-procurement adoption—but may not be the core driver in a relatively mature or internally focused professional context. This matches previous insights in e-service quality research, where dimensions like reliability, responsiveness, and fulfillment contribute to overall service perceptions but often exhibit diminishing marginal returns compared to usability in influencing loyalty (Ighomereho et al., 2022). In societal contexts, early evaluations of e-procurement in UK public sector also highlight the importance of internal service attributes—such as process quality and governance—but elevate system usability as the transformative variable (Croom & Brandon-Jones, 2007).

Unlike ease of use and service quality, application (digital) information quality does not significantly impact behavior ($\beta = 0.002$, $p = 0.964$) or loyalty directly ($\beta = 0.085$, $p = 0.094$). However, it does have a strong positive effect on satisfaction ($\beta = 0.319$, $p < 0.001$) and, through satisfaction, a significant indirect influence on loyalty ($\beta = 0.085$, $p < 0.001$).

Brandon-Jones and other procurement-specific scholars emphasize that user-perceived e-procurement quality includes dimensions like usability, accuracy, and professionalism—but often treat information quality as contributing more to compliance and satisfaction rather than driving habitual behavior (Brandon-Jones, 2017). The mediation results underscore the central role of consumer behavior and consumer satisfaction in translating system attributes into customer loyalty. Ease of use and service quality indirectly influence loyalty significantly via behavior—but information quality does not. A more intuitive system and reliable service lead to more active usage, repeat engagement, and ultimately loyalty. Information accuracy alone does not motivate behavior unless accompanied by usability. All three antecedents significantly affect loyalty through satisfaction. This highlights satisfaction's comprehensive mediating function—defining emotional investment, trust, and intent to remain.

Furthermore, studies in e-commerce, such as those examining Shopee's user satisfaction and loyalty models, demonstrate satisfaction's mediating role between system attributes and loyalty (Syaeful Anwar et al., 2024). This pattern is also reflected in e-commerce contexts like TikTok Shop, where perceived ease of use drives satisfaction, which leads to loyalty (Rahmawati & Ramli, 2024).

5. Conclusions and Suggesions

5.1 Conclusions

This study offers a detailed examination of the factors shaping customer loyalty in e-procurement systems, highlighting the roles of ease of use, digital service quality, and digital information quality, along with the mediating influences of consumer behavior and consumer satisfaction. Our findings reveal that Ease of Use stands out as the most influential driver, significantly enhancing user behavior, satisfaction, and directly contributing to loyalty underscoring the timeless impact of perceived effortlessness in technology adoption, as postulated by the Technology Acceptance Model (TAM). In contrast, Application Service Quality, while significant, exerts a more modest influence it supports user engagement and satisfaction but exerts limited direct impact on loyalty. Information Quality uniquely contributes by boosting satisfaction, which in turn drives loyalty, although it does not directly impact behavior or loyalty, reinforcing the theoretical underpinnings of IS Success models.

Crucially, both consumer behavior and satisfaction serve as essential mediators that translate system attributes into loyalty. Behavior, empowered by ease of use and service quality, acts as a conduit to loyalty, while satisfaction mediates all antecedents including information quality highlighting the emotional and cognitive pathways to sustained system commitment. This dual mediation echoes findings in broader e-service literature, where satisfaction consistently bridges the gap between service quality and loyalty. In practice, our results offer clear direction for e-procurement developers and

administrators: prioritize user-centric interface design to drive engagement and loyalty, ensure dependable service functionality, and maintain high standards of information accuracy to foster satisfaction. These investments will not only enhance adoption but also cultivate long-term loyalty.

Despite its insights, this study has limitations. Its sectoral or regional focus may affect generalizability. Future research could benefit from cross-sector replication, longitudinal analysis, and inclusion of additional mediators like trust, perceived usefulness, or organizational culture to further unpack the loyalty generation process. Qualitative exploration would also deepen understanding of user sentiments and the nuances underlying satisfaction and behavioral shifts. Overall, this research underscores that in e-procurement ecosystems, ease of use is pivotal, service quality supports, and information quality nurtures satisfaction with both user behavior and satisfaction acting as vital pathways that lead to enduring loyalty**.**

5.2 Suggesions

This study is limited to upstream oil and gas companies in Indonesia, which may restrict the generalizability of the findings to other industries or international contexts. The use of stratified random sampling also creates potential bias in respondent selection, while cross-sectional data prevent causal interpretations. Moreover, the study relies on self-reported measures, which may be subject to social desirability and response bias. The clear implication and direction from this research is that ease of use serves as the most powerful driver of customer behavior, satisfaction, and ultimately loyalty within e-procurement systems—highlighting the urgent need to refine user interfaces and workflows for optimal usability. While digital service quality and information quality both contribute positively service quality reinforcing engagement and satisfaction, and information quality enhancing satisfaction their influence is indirect and less potent than usability. The dual mediation paths via behavior and satisfaction underscore that system adoption and emotional engagement are both vital levers for cultivating loyalty. Practically, this means digital procurement solutions should prioritize intuitive interface design, ensure reliable service delivery, and maintain accurate, relevant information. From a broader strategic perspective, integrating advanced technologies such as AI for workflow automation and analytics could further boost usability and satisfaction echoing industry leaders' recognition of AI's strategic procurement potential.

Future research should explore how emerging innovations like AI-driven adaptivity, blockchain for transparency, and sustainability-focused features (e.g., integrating circular procurement practices) enhance the usability-satisfaction-loyalty nexus. Additionally, it's imperative to examine these dynamics across varied industrial and cultural settings, employ longitudinal designs to track user evolution over time, and potentially incorporate additional mediators like trust, perceived value, or organizational culture to enrich the explanatory model. Future research could expand the sample to include different sectors, apply longitudinal designs, and incorporate objective behavioural data to strengthen the robustness of the conclusions.

Acknowledgement

The authors would like to express sincere gratitude to all parties who contributed to the completion of this research. Special thanks are extended to the management and employees of the upstream oil and gas companies in Indonesia who generously provided their time and valuable insights as respondents. The support from academic mentors, colleagues, and peers has been invaluable in shaping the direction and rigor of this study. Finally, the author(s) acknowledge the encouragement of family and friends, whose continuous support made this research possible.

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