Unravelling the key factors of e-government systems effectiveness: a user behavior perspective

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Article Info:

Keywords:
Information System, System Quality, Information Quality, Service Quality, User Intensity, User Satisfaction, Individual Performance.

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DOI:
https://doi.org/10.64282/phi.v2i4.108

Received : 02-12-2025
Revised : 21-12-2025
Accepted : 23-12-2025
Published : 28-12-2025

Abstract

As digital governance becomes integral to modern public service delivery, evaluating the effectiveness of e-government systems through the lens of user behavior is increasingly essential. This study explores the critical success factors influencing the effectiveness of e-government services provided by the Indonesian Ministry of Foreign Affairs, using the DeLone and McLean Information System Success Model as the theoretical foundation. The model's core dimensions : system quality, information quality, service quality, use, user satisfaction, and individual performance, are examined to understand how these interrelated constructs shape user experience and performance outcomes. Employing a quantitative approach, data were collected from 384 valid respondents through structured questionnaires. Structural Equation Modeling (SEM) using AMOS was applied for data analysis. The results confirm that system quality, information quality, and service quality significantly influence both user satisfaction and usage intensity, which in turn have a positive impact on individual performance. The findings provide empirical validation of the DeLone and McLean model in the e-government context and offer practical insights for enhancing the design and delivery of digital public services based on user-centric performance indicators.

1. INTRODUCTION

E-government has become a defining mechanism of contemporary public administration, offering governments the capacity to enhance transparency, operational efficiency, and service accessibility through the strategic use of information and communication technologies (ICTs) (Ali et al., 2018; Abdulnabi, 2024). As digital platforms increasingly mediate interactions between governments and service users, evaluating their effectiveness is essential to ensure that digital transformation efforts yield measurable improvements in service delivery and public value.

Despite substantial scholarly attention, a critical gap persists in user-centered evaluations of e-government systems, particularly those integrating the perspectives of both citizens and government employees, the primary users of public-sector digital services. Existing studies tend to emphasize system features, website usability, or isolated internal workflows, while comprehensive assessments linking system quality, information

E-ISSN 3026-4111

quality, service quality, user satisfaction, behavioral intention, and performance outcomes remain limited (Stefanovic et al., 2016; Williams et al., 2015). This gap is especially salient in complex institutional environments such as the Indonesian Ministry of Foreign Affairs (MOFA), where e-government platforms underpin consular, administrative, and diplomatic services yet face operational challenges related to interoperability, cybersecurity, and uneven digital competencies. The DeLone and McLean (2003) Information System Success Model offers a theoretically grounded framework capable of addressing this gap by integrating technical, service, and behavioral dimensions of IS effectiveness.

However, no empirical study has systematically evaluated MOFA's e-government systems using a comprehensive, multi-stakeholder framework. To address this gap, the present study investigates: (1) how information, system, and service quality influence user satisfaction and intention to use; and (2) how these user perceptions and behaviors affect individual performance. The objectives are to identify key determinants of e-government success and to assess the mediating roles of satisfaction and usage intention. The study contributes to the literature by extending the application of the DeLone and McLean model to a diplomatic e-government context, offering a holistic evaluation that incorporates citizen and employee perspectives, and generating evidence-based insights to inform policy and strengthen digital public service strategies

2. THEORETICAL REVIEW AND HYPOTHESIS

DeLone & McLean Information System Success Model

In 2003, DeLone & McLean introduced the IS Success Model to conceptualize IS effectiveness through six interdependent constructs-system quality, information quality, use, user satisfaction, individual impact, and organizational impact (DeLone & McLean, 2003). The model asserts that system and information quality jointly influence both usage and satisfaction, which subsequently shape individual and organizational outcomes. While this causal chain has been widely supported (Petter et al., 2008; Urbach & Müller, 2012), later studies also suggest contextual variations. For example, Tam & Oliveira (2017) found satisfaction to be a stronger mediator in public-sector systems than in commercial ones, indicating that users in government contexts rely more heavily on perceived reliability and trust. These mixed findings demonstrate that, although the D&M model provides a robust theoretical foundation, the strength of its pathways can differ across institutional environments-underscoring the need to evaluate it within specific e-government settings such as the Ministry of Foreign Affairs.

System Quality

System quality refers to the technical functionality of an information system, encompassing attributes such as accessibility, convenience, flexibility, integration, response time, dependability, and usability. Prior research consistently links high system quality to increased efficiency and reduced user effort, which enhances satisfaction (DeLone & McLean, 2003; McGill & Klobas, 2003). However, studies differ in the magnitude of this effect: whereas Tam & Oliveira (2017) report system quality as the dominant predictor of satisfaction in government portals, other research suggests that in well-established systems,

its effect weakens as users take stability for granted. These contrasting patterns indicate that system quality remains foundational but may vary in influence depending on system maturity, user expectations, and institutional complexity-factors particularly relevant for MOFA's multi-platform e-government ecosystem.

Information Quality

Information quality includes accuracy, relevance, completeness, reliability, timeliness, and clarity-attributes essential for supporting user decision-making. As processed data that enhances user knowledge (Lem, 2024), information quality has consistently been identified as a key contributor to satisfaction (DeLone & McLean, 2003). Yet research shows divergent findings: some studies highlight information quality as the strongest determinant of satisfaction, especially when users depend on accurate procedural information, while others find its impact weaker when systems offer real-time service support that offsets informational shortcomings. This variation underscores the importance of examining information quality within the specific decision-making demands of e-government services, where incomplete or inaccurate data can directly affect administrative outcomes.

Service Quality

Service quality refers to the support provided to users, including responsiveness, accuracy, courtesy, and problem resolution and is recognized as a major determinant of satisfaction in IS environments (DeLone & McLean, 2003). Research demonstrates that high-quality support substantially improves satisfaction, particularly when users encounter complex or unfamiliar procedures. However, while some studies find that service quality can compensate for moderate system limitations, others note that its influence diminishes when systems are highly automated or self-service oriented. These differing findings suggest that service quality's role in e-government systems depends on the extent to which users require human or procedural assistance, making it a critical variable to assess in MOFA's hybrid manual-digital service environment.

Intensity of Use

ntensity of use, reflected in usage frequency and duration, illustrates how users engage with a system both behaviorally and cognitively. DeLone & McLean (2003) differentiate between actual and perceived usage to capture objective and subjective engagement patterns. While satisfaction generally predicts greater usage intensity, studies report inconsistent results in mandatory-use environments: some show strong positive relationships, whereas others indicate that satisfaction does not meaningfully affect usage when employees must use the system regardless of perception. This inconsistency highlights the need to examine intensity of use specifically within e-government institutions such as MOFA, where use may be compulsory but still varies in depth and quality depending on system experience.

Satisfaction

User satisfaction represents an affective and cognitive evaluation of system experience. Hadi (2015) note that satisfaction predicts loyalty, reduced perceived risk, and willingness

to continue using a service. In the IS domain, satisfaction mediates the relationship between quality constructs and user behavior. However, empirical findings vary: while many studies confirm satisfaction as a major driver of use, others in public-sector contexts show that users may continue using systems despite low satisfaction due to institutional mandates. These dynamics reveal satisfaction's dual role as both an outcome of system experience and a conditional predictor of behavior-underscoring the importance of evaluating its mediating effect within MOFA's mandatory and voluntary service interactions.

Employee Performance

Employee performance reflects the extent to which system use enhances task efficiency, accuracy, productivity, and decision-making. Public-sector performance frameworks, such as Indonesia's Government Regulation No. 30/2019, emphasize accountability and measurable behavioral competencies, while international guidelines (OECD, 2020) highlight the role of structured systems in motivating employees and aligning contributions with strategic goals. Research shows that when users interact with high-quality systems and experience greater satisfaction, their performance improves; however, findings also indicate that technological benefits may be diluted when systems are fragmented or lack interoperability, issues that remain prominent challenges in many government contexts, including MOFA. Thus, performance becomes the critical endpoint through which the broader success of the e-government system can be assessed.

Hypotheses Development

The research framework of this study is based on the DeLone and McLean (2003) model, which highlights the interplay between system quality, information quality, and their impacts on user behavior and organizational performance. System quality and information quality are reflected in the usefulness of the system's output, which influences system use and user satisfaction, factors shaped by user perceptions (McGill et al., 2003). Frequent use of information systems fosters greater user learning, enhancing individual performance, while at the organizational level, the adoption of information systems impacts decision-making hierarchies and reduces costs for information distribution (Malone in Radityo and Zulaikha, 2007). The model also captures the sequential processes and causal relationships among variables: high-quality systems and information drive intensive use, leading to user satisfaction, which enhances individual performance and ultimately boosts organizational performance (Jogiyanto, 2007). This interconnected process underscores the pivotal role of system quality and information quality in achieving organizational efficiency and effectiveness. Based on the theoretical review discussed above, the hypotheses for this research can be formulated as follows:

H_1 : Information quality has a positive effect user satisfaction.
H_2 : System quality has a positive effect on user satisfaction.
H_3 : Service quality has a positive effect on user satisfaction.
H_4 : The quality of information (information quality) has a positive effect on its use.
H_5 : The quality of the system (system quality) has a positive effect on its use (use)
H_6 : Quality of service (service quality) has a positive effect on its use (use)

H_7 : Use has a positive effect on individual performance (individual impact).
H_8 : User satisfaction has a positive effect on individual performance (individual impact)

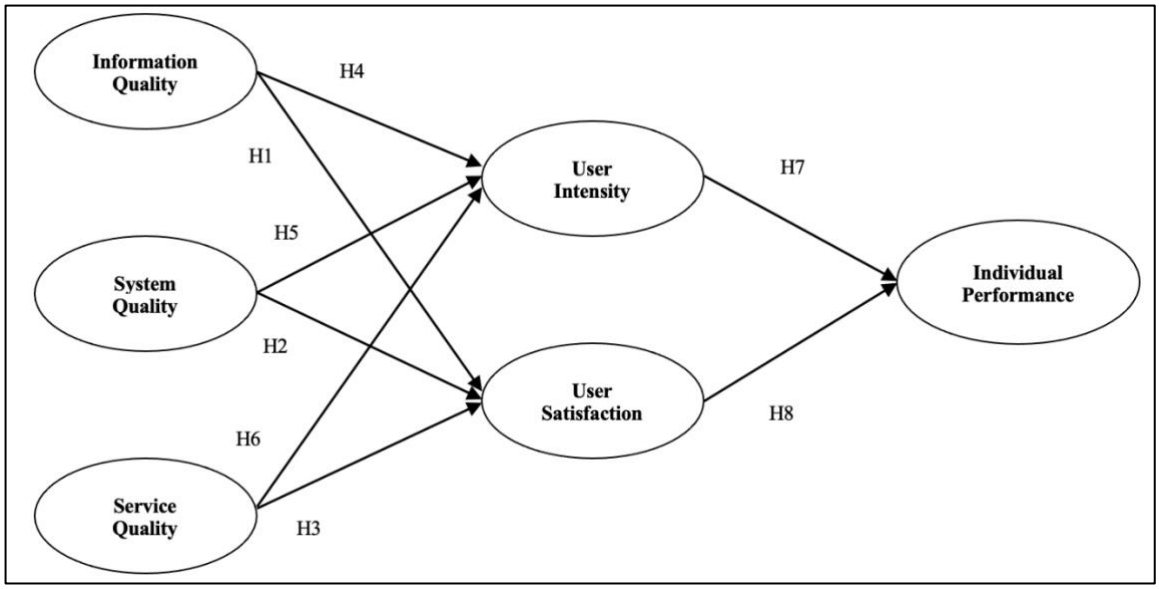

Figure 1. Research Framework

3. RESEARCH METHODOLOGY

This study employs a quantitative research methodology with a causal approach, as it is appropriate for evaluating and validating theoretical relationships in information systems research. The variables examined in this study include system quality, information quality, service quality, intensity of use, user satisfaction, and employee performance within an e-government context. The research was conducted at the Ministry of Foreign Affairs of the Republic of Indonesia from September 2023 to January 2024. The population consists of employees who access and utilize the Ministry's public service applications. A total of 400 questionnaires were distributed to employees of the Ministry of Foreign Affairs, other government offices, and system users with direct experience, of which 390 were returned. After data screening, six questionnaires were excluded due to incomplete responses, resulting in a final sample of 384 respondents. The sampling technique used was convenience sampling, selected due to administrative constraints, limited access to a comprehensive sampling frame, and the dispersion of users across multiple organizational units conditions commonly encountered in public-sector research. Data were collected using a structured questionnaire distributed online via the organization's official email system. The instrument employed a five-point Likert scale, ranging from Strongly Disagree (1) to Strongly Agree (5), and consisted of 33 measurement items. The data analysis technique utilized in this study was Structural Equation Modelling (SEM). Preliminary data processing was conducted using SPSS, while hypothesis testing and model evaluation were performed using AMOS, including assessment of the measurement model and structural model to examine the proposed relationships among variables.

4. RESULTS AND DISCUSSION

The respondent demographics for this study (n = 384) reveal a nearly equal gender distribution, with 51.8% male and 48.2% female participants. The majority of respondents are aged 31-40 years (43.8%), followed by 41-50 years (28.6%), 21-30 years (20.8%), and above 50 years (6.8%).

Table 1. Sample description (n=384)

Category	Description	Frequency	Percentage
Gender	Male	199	51.8%
	Female	185	48.2%
Age	Above 50 years	26	6.8%
	41 - 50 years	110	28.6%
	31 - 40 years	168	43.8%
	21 - 30 years	80	20.8%
Years of Employment	Above 20 years	39	10.2%
	16 - 20 years	42	10.9%
	11 - 15 years	198	51.6%
	6 - 10 years	37	9.6%
	Under 5 years	68	17.7%
Educational Level	Doctoral Degree	9	2.3%
	Master Degree	152	39.6%
	Bachelor Degree	185	48.2%
	Associate Degree	38	9.9%

Regarding years of employment, the largest group has 11-15 years of experience (51.6%), while 17.7% have under 5 years, 10.9% have 16-20 years, 10.2% have over 20 years, and 9.6% have 6-10 years.

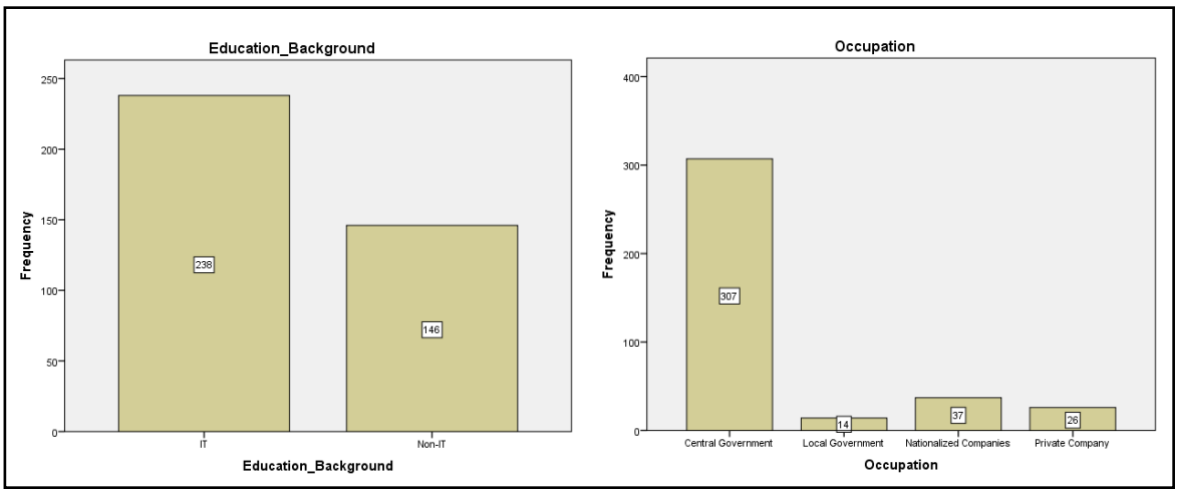

Figure 2. Respondent's Demographic Profile

In terms of educational level, most respondents hold a Bachelor's degree (48.2%) or a Master's degree (39.6%), while 9.9% have an Associate degree and 2.3% hold a Doctoral degree. This diverse demographic profile provides a broad perspective for the study.

Table 2. Validity and Reliability (EFA Results)

	Indicators	Factor Loadings	AVE	Cronbach's Alpha
Information Quality			0,571	0,799
KI1	The information provided by MOFA Web-Based Public Service meets my needs	0,824		
KI2	Through this MOFA Web-Based Public Services, I get the information in time	0,468		
KI3	Information provided by this MOFA Web-Based Public Services is accurate	0,805		
KI4	MOFA Web-Based Public Services provide output in an user convenience format	0,833		
KI5	The information provided by the MOFA Web-Based Public Services is understandable	0,784		
System Quality			0,600	0,865
KS1	MOFA Web-Based Public Services are supported by practical instructions to make it easily operated	0,829		
KS2	This MOFA Web-Based Public Services have an attractive interface and useful feature	0,711		
KS3	I get the benefit of this MOFA Web-Based Public Services when doing my work since it is supported by quick services in responding to complaints/problems	0,789		
KS4	MOFA Web-Based Public Services have specific functions which suit my need	0,809		
KS5	MOFA Web-Based Public Services are easy to access	0,809		
KS6	MOFA Web-Based Public Services use a language that is easy to understand	0,679		
Quality of Service			0,628	0,852
KL1	MOFA Web-Based Public Services have advanced features and real time	0,778		
KL2	When user has a problem, MOFA Public complaint service shows a seriousness in solving it	0,774		
KL3	Employees of MOFA public complaint service provide prompt responses to users	0,791		
KL4	MOFA public complaint service provides its appropriate responses	0,802		
KL5	MOFA Public complaint service has convenient operating hours for its users	0,818		
User Intensity			0,752	0,835
IP1	Information systems on this MOFA Web-Based Public Services are suitable to the user's job-related needs	0,874		
IP2	I find it easy to adjust to using this MOFA Web-Based Public Services	0,858		
IP3	I feel compelled to use this MOFA Web-Based Public Services again when I need it in other time	0,868		
User Satisfaction			0,722	0,807
KP1	Overall, I am satisfied with this MOFA Web-Based Public Services	0,856		
KP2	MOFA Web-Based Public Services has been effective in addressing the user needs	0,833		
KP3	MOFA Web-Based Public Services has been efficient in completing user task	0,859		
Individual Performance			0,509	0,805
PI1	MOFA Web-Based Public Services have consumed my time efficiently	0,742		
PI2	MOFA Web-Based Public Services have improved the quality of my decision making	0.489		
PI3	MOFA Web-Based Public Services have improved my productivity	0,737		
PI4	MOFA Web-Based Public Services have fastened the completion of my task	0,789		

PI5	MOFA Web-Based Public Services make it easy to complete my task	0,703
PI6	MOFA Web-Based Public Services are useful for doing my work	0,778

Note: If value of Cronbach's Alpha > 0.7 and AVE > 0.5, then all indicators and variables are declared valid and reliable.

Goodness of Fit

The feasibility of the research model is assessed by analyzing the output loading factor in accordance with the Goodness of Fit (GoF) criteria. The revised structural model satisfied the parameters and measurement standards for Goodness of Fit (GoF). The modified model is presented below.

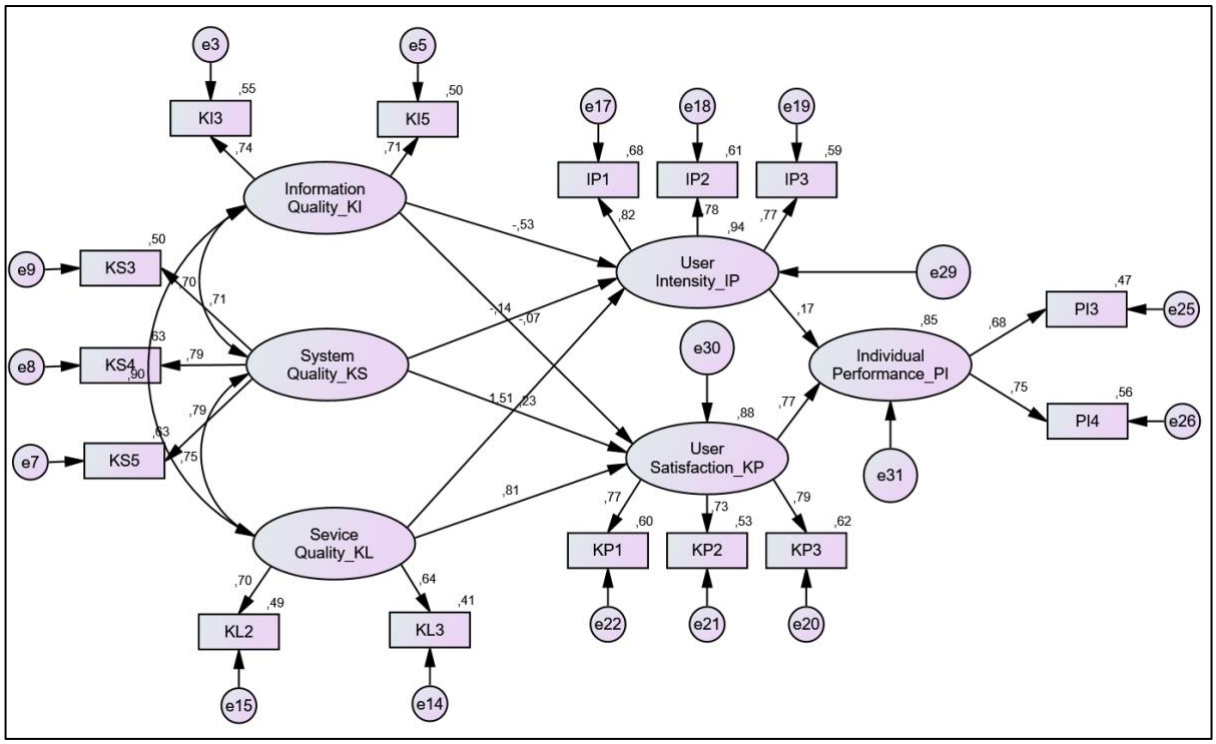

Figure 3. Model Modification Results

The table of fit summary shows that all criteria achieved a good fit. Here is the resume: CMIN/DF = 1.123; IFI = 0.997; TLI/NNFI = 0.995; CFI = 0.997; NFI = 0.969; RFI = 0.959; GFI = 0.971; AGFI = 0.956; and RMSEA = 0.018.

Table 3. Goodness of Fit (GoF) Summary

Goodness of fit	Match Level	Model Fit Summary Results	Note
Chi-Square (P-value)	P > 0.05	0,214	Good fit
RMSEA	≤ 0.080	0,018	Good fit
NFI	≥ 0.900	0,969	Good fit
NNFI/TLI	≥ 0.900	0,995	Good fit
CMIN/DF	≤ 2.000	1,123	Good fit
CFI	≥ 0.900	0,997	Good fit
IFI	≥ 0.900	0,997	Good fit
RFI	≥ 0.900	0,959	Good fit
SRMR	≤ 0.05	0,021	Good fit
GFI	≥ 0.900	0,971	Good fit
AGFI	≥ 0.900	0,956	Good fit

Construct Reliability and Variance Extracted

The research construct is declared valid and reliable in the SEM model if the construct reliability (CR) value is > 0.7 and the variance extracted (AVE) value is > 0.5. In this calculation, all indicators and variables of this research are declared valid and reliable.

Table 4. Construct Reliability and Variance Extracted

No.	Variabel	Indicator	Standard Loading Factor	Standar Loading^2	Measurement Error (1-Standard Loading^2)	Construct Reliability	Variance Extracted
1.	Information Quality (KI)	KI3	0,739	0,546	0,041	**0,960**	**0,923**
		KI5	0,707	0,500	0,046		
		∑	**1,446**	**1,046**	**0,087**		
		∑**2**	**2,091**				
2.	System Quality (KS)	KS5	0,792	0,627	0,041	**0,976**	**0,931**
		KS4	0,794	0,630	0,040		
		KS3	0,710	0,504	0,050		
		∑	**2,296**	**1,762**	**0,131**		
		∑**2**	**5,272**				
3.	Service Quality (KL)	KL3	0,643	0,413	0,042	**0,956**	**0,917**
		KL2	0,698	0,487	0,040		
		∑	**1,341**	**0,901**	**0,082**		
		∑**2**	**1,798**				
4.	User Intensity (IP)	IP1	0,823	0,677	0,028	**0,984**	**0,953**
		IP2	0,782	0,612	0,031		
		IP3	0,768	0,590	0,033		
		∑	**2,373**	**1,879**	**0,092**		
		∑**2**	**5,631**				
5.	User Satisfaction (KP)	KP3	0,789	0,623	0,028	**0,983**	**0,952**
		KP2	0,727	0,529	0,030		
		KP1	0,773	0,598	0,031		
		∑	**2,289**	**1,749**	**0,089**		
		∑**2**	**5,240**				
6.	Individual Performance (PI)	PI3	0,685	0,469	0,043	**0,959**	**0,922**
		PI4	0,749	0,561	0,044		
		∑	**1,434**	**1,030**	**0,087**		
		∑**2**	**2,056**				

Note: If the value of construct reliability (CR) > 0.7 and the variance extracted (AVE) > 0.5, then all indicators and variables are declared valid and reliable.

Hypothesis Test

Hypothesis testing on the structural model was carried out by conducting p-value significance test. The hypothesis is acceptable if the p-value < 0.05 and the t-value ≥ 1.96.

Table 5. Hypothesis Testing Results

				Estimate	S.E.	C.R.	P	Label
H1	Information Quality (KI)	→	User Satisfaction (KP)	-0,072	0,181	-0,397	0,691	Rejected

H2	System Quality (KS)	→	User Satisfaction (KP)	0,214	0,085	2,505	0,012	Accepted
H3	Service Quality (KL)	→	User Satisfaction (KP)	0,855	0,181	4,733	0,000	Accepted
H4	Information Quality (KI)	→	User Intensity (IP)	-0,597	0,423	-1,412	0,158	Rejected
H5	System Quality (KS)	→	User Intensity (IP)	-0,137	0,153	-0,895	0,371	Rejected
H6	Service Quality (KL)	→	User Intensity (IP)	1,689	0,463	3,646	0,000	Accepted
H7	User Intensity (IP)	→	Individual Performance (PI)	0,147	0,109	1,342	0,179	Rejected
H8	User Satisfaction (KP)	→	Individual Performance (PI)	0,701	0,122	5,762	0,000	Accepted

The effect of Information Quality on User Satisfaction (hypothesis 1)

The results show that information quality does not significantly influence user satisfaction ($\beta = -0.072$; $t = -0.397$; $p = 0.691$). This finding differs from studies that reported a significant positive association between information quality and satisfaction (Tam & Oliveira, 2017; Rahayu & Chadhiq, 2021). A plausible explanation is that MOFA's web-based public services operate within a mandatory and procedure-driven bureaucratic **environment**, where system use is often shaped by institutional requirements rather than user preference. In such settings, user satisfaction may be more strongly determined by operational support and system usability than by the informational attributes alone.

The effect of System Quality on User Satisfaction (hypothesis 2)

System quality significantly and positively affects user satisfaction ($\beta = 0.214$; $t = 2.505$; $p = 0.012$), supporting the DeLone and McLean (2003) model. This result aligns with prior studies indicating that system reliability and ease of use contribute to higher satisfaction in digital service platforms (Alzahrani et al., 2022; Kim & Park, 2020). The finding implies that technical performance, such as accessibility, responsiveness, and usability, remains important for shaping positive user perceptions in public-sector systems.

The effect of Service Quality on User Satisfaction (hypothesis 3)

Service quality has a strong and significant effect on user satisfaction ($\beta = 0.855$; $t = 4.733$; $p < 0.001$). This confirms that responsiveness, assurance, and assistance provided through complaint-handling and support services substantially influence user satisfaction. The result is consistent with previous research demonstrating that effective service support strengthens trust and satisfaction in e-government systems (Al-Hubaishi et al., 2022; Alzahrani et al., 2020). In practice, this finding indicates that service delivery plays a critical role in ensuring that users feel supported when encountering system-related issues.

The effect of Information Quality on User Intensity (hypothesis 4)

The analysis indicates that information quality does not significantly affect user intensity (β = −0.597; t = −1.412; p = 0.158). This finding contrasts with studies in voluntary-use settings where information quality encourages greater engagement (El-Masri & Tarhini, 2017; Shareef et al., 2021). In MOFA's context, usage intensity may be driven primarily by work assignments and administrative procedures. Therefore, even when information quality varies, it may not translate into differences in usage frequency or intensity.

The effect of System Quality on User Intensity (hypothesis 5)

System quality does not significantly influence user intensity (β = −0.137; t = −0.895; p = 0.371). Although previous studies have reported positive effects of system quality on usage behavior (Alzahrani et al., 2022; Kim & Park, 2020), the present finding suggests that in mandatory-use environments, users interact with systems due to compliance requirements rather than voluntary motivation. Consequently, system quality may shape satisfaction but does not necessarily lead to increased usage intensity.

The effect of Service Quality on User Intensity (hypothesis 6)

Service quality significantly influences user intensity (β = 1.689; t = 3.646; p < 0.001). This indicates that users are more likely to engage with the system when they receive responsive, reliable, and supportive services. The result supports previous research showing that service support increases both satisfaction and continued use of digital services (Al-Hubaishi et al., 2022; Shareef et al., 2021). In MOFA's operational setting, service quality may reduce barriers to system use by helping users overcome procedural or technical difficulties.

The effect of User Intensity on Individual Performance (hypothesis 7)

User intensity does not significantly affect individual performance (β = 0.147; t = 1.342; p = 0.179). This result suggests that higher usage frequency may reflect routine compliance rather than productive system utilization that improves outcomes. In bureaucratic systems, repeated system access does not automatically translate into efficiency gains unless it is accompanied by meaningful task support, adequate user competence, and effective integration into workflow processes. Therefore, usage intensity alone may not be a sufficient predictor of performance (Rahi et al., 2022)

The effect of User Satisfaction on Individual Performance (hypothesis 8)

User satisfaction significantly and positively affects individual performance (β = 0.701; t = 5.762; p < 0.001). This finding corroborates the DeLone and McLean Information Systems Success Model and indicates that satisfied users are more likely to experience improvements in productivity, efficiency, and task completion. This result is consistent with previous studies showing that satisfaction enhances individual performance through stronger engagement and confidence in system usefulness (Alsabawy et al., 2020).

5. CONCLUSIONS AND RECOMMENDATIONS

This study examined the effects of information quality, system quality, and service quality on user satisfaction and usage intensity, as well as their implications for individual performance within a government-mandated information system at the Ministry of Foreign Affairs of the Republic of Indonesia. The findings demonstrate that e-government effectiveness in the public sector is influenced not only by technical system attributes but also by organizational and bureaucratic contexts.

The results reveal that system quality and service quality are the primary drivers of user satisfaction, which in turn has a significant positive effect on individual performance. These findings support the DeLone and McLean Information Systems Success Model in public-sector settings. However, the non-significant effects of information quality and usage intensity highlight the characteristics of mandatory-use systems, where system interaction is shaped by procedural requirements and hierarchical workflows rather than voluntary engagement.

From the perspective of Indonesia's SPBE implementation, the findings reflect the coexistence of digital systems with established bureaucratic processes. ASN users often engage with systems to fulfill administrative obligations, while performance improvements depend more on system reliability, perceived usefulness, and effective service support. The strong role of service quality underscores the continued importance of human and procedural assistance in addressing regulatory complexity, system fragmentation, and uneven digital maturity across organizational units.

Overall, the study emphasizes that enhancing e-government effectiveness in Indonesia requires more than technical system development. Strengthening service quality, fostering user satisfaction, and aligning digital systems with ASN work culture and bureaucratic processes are essential for ensuring that SPBE implementation delivers meaningful performance outcomes and supports sustainable public-sector digital transformation. Future research is encouraged to expand comparative analyses across ministries, incorporate objective performance indicators, and explore organizational and behavioral factors that may further explain information system success in the public sector.

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