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Research Article

Digital governance and user satisfaction in higher education information systems: A PLS-SEM approach on the mediating roles of organizational governance and information quality

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Higher education institutions use digital transformation as a strategic method to create new ways of engaging with their stakeholders. Indonesian educational institutions are currently beginning their technical investments to create measurable outcomes. However, digital governance frameworks often demonstrate critical theoretical deficiencies because they fail to translate directly into user satisfaction. To address this gap, this study asks: To what extent does digital governance influence user satisfaction, and what mediating mechanisms explain this relationship? Researchers conducted a quantitative study involving stakeholders who actively use higher education information systems. The researchers utilized Partial Least Squares Structural Equation Modeling to analyze the conceptual framework. The structural model demonstrates strong predictive power. The results indicate that both digital governance and system quality collectively exert a major positive effect on user satisfaction. The mediation analysis shows that organizational governance acts as a critical mechanism connecting digital governance with user satisfaction, while information quality acts as a vital element connecting system quality with user satisfaction. This research integrates public administration concepts with the Information Systems Success Model to establish a comprehensive evaluation framework. The study shows that technology-related policies hold equal significance to the actual technology. Organizations should enhance user satisfaction by establishing accurate data standards and implementing open governance alongside software development.

Keywords: Digital governance; Higher education; Information systems success; Mediation analysis; Organizational governance; Quality education; User satisfaction

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1. Introduction

The digital transformation process functions as a strategic power which enables higher education institutions to establish new operational methods and competitive advantages while delivering

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exclusive value to their external partners. Digital governance serves as the essential foundation which modernizes academic administration and educational services across data-driven systems that enable seamless interactivity according to Tariq et al. (2026). Digital governance should not be reduced to the simple conversion of traditional documents into electronic formats. Rather, it requires institution-wide transformation involving technological infrastructure, organizational capacity, policy development, ethical decision-making, and collaboration among administrative, academic, and technical stakeholders (Ajani, 2024; Simiyu et al., 2026). In higher education, effective digital governance is particularly important because the success of information systems depends not only on the availability of digital tools, but also on institutional strategies, faculty development, student engagement, data security, and user-responsive design (Ajani, 2024; Al-Fatlawi, 2024). Well-designed digital systems can support remote and blended learning environments, improve continuity of education, and contribute to the broader aim of providing inclusive and equitable quality education in line with SDG4 (Cubacub & Jimenez, 2025; UNESCO, 2026). However, digital transformation also brings challenges related to access, digital literacy, cybersecurity, and users' needs and behaviors, all of which should be considered carefully in the design and governance of digital educational systems (Al-Fatlawi, 2024; Wangdi et al., 2021). High costs lead to technology systems which require considerable funding to operate because they were constructed to handle expensive technology systems that ultimately failed according to (Deng et al., 2022; Fitriana et al., 2025; Muhaimin et al., 2025).

The evaluation of university information systems in contemporary educational institutions faces challenges because their fundamental importance remains unrecognized by existing assessment methods. Research studies often restrict their analysis to technical performance metrics or use simple acceptance models which fail to capture organizational factors. Historical research studies have investigated system success through the examination of particular study subjects. The researchers investigate only the software's technical performance and they use basic technology acceptance surveys which ignore the complete institutional framework (Alruwaie et al., 2020; Chang et al., 2026). The process of evaluating these systems tends to prioritize their operational aspects which leads to an incomplete understanding of the mental and emotional factors that affect how users from academic and administrative departments evaluate and interact with the system in their everyday work (Maqbool & Herold, 2024). University management needs to understand that their digital governance initiatives which they create at a macro level will not match the actual micro-level activities of students and faculty members and administrative staff members (Alruwaie et al., 2020; Özyürek et al., 2026). The organization fails to achieve its operational objectives because it fails to connect its strategic plans with the requirements of its users. Organizations need information systems which develop user satisfaction through the delivery of dependable information combined with understandable operational procedures and efficient assistance frameworks (Jeyaraj, 2020).

The research gap becomes evident through this disjointed method of research. A review of the extant literature reveals a notable absence of empirical studies that comprehensively integrate digital governance frameworks with the Information Systems Success Model within the specific context of higher education. Higher education systems need an integrated framework that connects digital governance with user satisfaction. Existing research typically uses models like the End-User Computing Satisfaction [EUCS] model and the Technology Acceptance Model [TAM] to explain the individual's perception of ease of use and usefulness. The analysis calls for studying institutional governance dynamics as per (Sharma et al., 2026). The most glaring example of this is in Indonesia, where higher education institutions are undergoing rapid digital transformation and at the same time are grappling with existing structural problems. Challenges like inconsistent access to infrastructure, varying degrees of digital literacy and ongoing bureaucratic tussles are there. Solving these interconnected problems requires a detailed analytical approach (Dwi Susanto & Aljoza, 2015). The research about how digital governance affects user satisfaction through Partial Least Squares Structural Equation Modeling [PLS-SEM] is currently insufficient. The current

knowledge gap prevents us from understanding how institutional governance methods create effective user satisfaction with university information systems.

In order to fill this gap, this paper seeks to develop and empirically test a research model showing a link between digital governance and user satisfaction among the higher education institutions' information systems. Seven hypotheses will be developed showing the path starting from the quality of digital governance to user experience. Digital governance affects institutional governance and ensures high information quality, which later determines the users' perceived ease of use and usefulness leading to the EUCS model (Tariq et al., 2026). The investigation utilizes PLS-SEM because researchers want to explore these specific relationships. This method is accepted for looking at complex models because this method does not require strict distributional assumptions. This approach merges governance theory and technology acceptance into a single framework. This framework offers a clearer path for understanding how institutional strategies change user outcomes (Chang et al., 2026). Because of these reasons, this investigation evaluates the impact of digital governance and system quality on user satisfaction within the information systems of educational institutions. Many experts claim that organizational governance and information quality act as mediators in this relationship.

This study differs from existing literature in three distinct ways. First, rather than solely evaluating the psychological aspects of technical acceptance, it explicitly integrates macro-level public administration concepts (Digital Governance) with micro-level user evaluation models (IS Success Model and EUCS). Second, it grounds this integration within the complex bureaucratic and infrastructural landscape of higher education in a developing nation context. Finally, it provides a novel empirical contribution by testing Organizational Governance and Information Quality as critical mediating mechanisms, effectively mapping exactly how high-level institutional digital policies translate into everyday end-user satisfaction.

The remainder of this paper is organized as follows: Section 3 reviews relevant literature and develops the theoretical hypotheses. Section 4 details the research methodology, population, and data collection procedures. Section 5 presents the results of the PLS-SEM structural and mediation analysis. Section 6 discusses the findings and their practical significance, while Section 7 concludes with theoretical implications and boundary conditions.

2. Theoretical Framework

2.1. Digital Governance in Education

Digital Governance [DG] is the strategic application of digital technologies and data-driven strategies to redesign administrative processes, improve regulatory capacities, and streamline the delivery of public services (Wang et al., 2024). DG denotes a radical transformation of the institution that goes beyond the digitization of existing operations and it centers around redefining the value proposition of an entity to its stakeholders (Wu et al., 2026). In the context of higher education information systems [IS], DG is a key enabler of Sustainable Development Goal 4 (Quality Education) by closing the digital divide through interactive learning platforms, distance education, and transparent resource allocation (Tariq et al., 2026).

In operationalizing DG, this study utilizes multidimensional indicators spanning transparency, clarity, data accuracy, and technology benefits. While dimensions such as the 'benefits of technology' [DG8] might initially appear similar to the TAM concept of perceived usefulness, within this framework, they represent a macro-level governance mandate. They measure the institutional commitment to ensuring that technology investments strategically serve stakeholder interests and deliver equitable public value, thereby acting as a structural policy metric rather than an individual psychological evaluation.

Despite its recognized macro-level impact, a persistent gap in the literature is the fragmentation of DG from micro-level user evaluations; studies rarely connect overarching governmental or institutional digital strategies with end-user satisfaction in educational settings. Linking these concepts, a mature DG framework ensures the deployment of secure, inclusive, and transparent

digital environments, which directly elevate the interaction quality and subsequent satisfaction of students and faculty using the IS. Crucially, digital governance directly influences user satisfaction by fostering a climate of institutional trust and perceived fairness. Even independent of a system's technical interface, users experience higher satisfaction when they believe the overarching administrative policies governing their data are transparent, equitable, and securely monitored.

2.2. EUCS Model

The End-User Computing Satisfaction [EUCS] model, originally developed by Doll and Torkzadeh (1988), defines satisfaction as the affective and cognitive evaluation of a computer application by an individual who interacts with it directly. Throughout this manuscript, the terms 'User Satisfaction' [US] and 'End-User Computing Satisfaction' are used interchangeably to refer to this overarching construct. Synthesizing various scholarly perspectives, EUCS operationalizes IS success through a multidimensional construct comprising five sub-dimensions: content, accuracy, format, ease of use, and timeliness (Deng et al., 2022). The measure functions effectively as a reliable alternative assessment for determining total information system success (Hou, 2012)

Today, EUCS has vital significance for higher education because students and staff members need to complete their work through sophisticated computing tasks that require precise academic document formatting and citation standards. The existing literature on information systems research contains two main problems because it concentrates too much on system technical features while offering insufficient insights into the psychological and institutional factors that link system performance to user emotional responses. The framework establishes system attributes as the ultimate determinant of user satisfaction through its definition of EUCS as the primary dependent variable which demonstrates that high user satisfaction from information systems results in improved work performance and enhanced resource management.

2.3. Organizational Governance Theory

Organizational governance refers to the overarching system of rules, practices, and accountability structures through which an entity is directed and controlled to protect stakeholder interests. Rooted in Agency Theory, effective governance mitigates conflicts between principals and agents by reducing information asymmetry and establishing robust monitoring mechanisms (Jensen & Meckling, 1976). While Agency Theory was originally conceptualized for corporate settings to align the interests of shareholders and managers, its core assumptions are highly adaptable and valid in the nonprofit context of higher education. In a university ecosystem, the “principals” are the students, faculty, and the broader public, whereas university administrators and IT decision-makers serve as the “agents”. Conflicts of interest in this setting typically arise not over financial profit, but rather concerning transparent resource allocation, academic service quality, and data privacy. Therefore, applying Agency Theory to higher education provides a robust framework to understand how establishing strict governance mechanisms can mitigate information asymmetry between administrators and the academic community, ensuring that digital investments genuinely serve the educational stakeholders.

Logically integrating DG with Organizational Governance, literature demonstrates that Digital Governance functions as a powerful catalyst that reshapes organizational structures. By embedding big data platforms and digital analytics into governance processes, DG curtails opportunistic behavior, reinforces internal controls, and reduces institutional agency costs (Shi & Zhang, 2025). In higher education, maintaining strong organizational governance is crucial for aligning administrative decisions with the academic needs of students (Makpotche et al., 2026). A notable research gap is the historical isolation of corporate governance from digital transformation; prior models inadequately account for how digital oversight mechanisms shape technology acceptance at the user level (Wu et al., 2026). When DG strengthens Organizational Governance, it ensures higher service reliability and data integrity, thereby reducing perceived risks and directly boosting end-user satisfaction.

2.4. Technology Acceptance & Information Quality

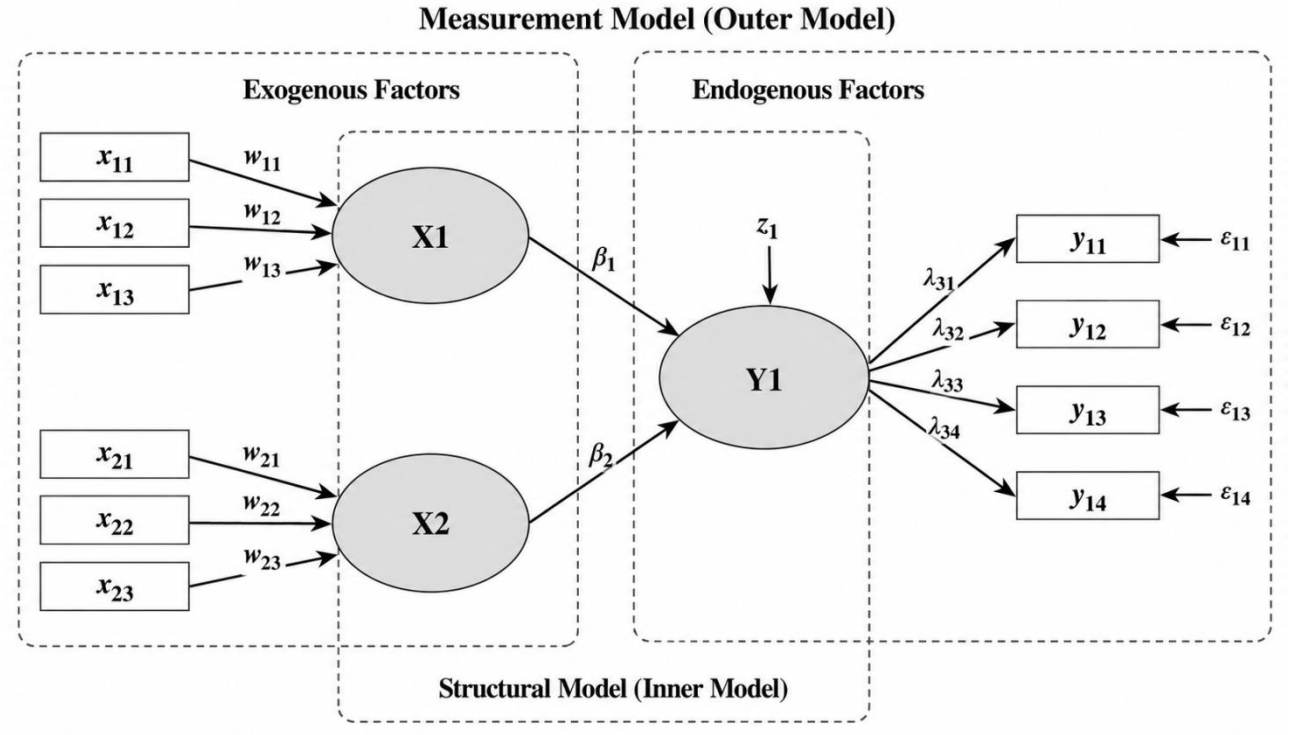
The Technology Acceptance Model [TAM] postulates that an individual's behavioral intention to adopt a system is primarily determined by two cognitive beliefs: Perceived Usefulness [PU] and Perceived Ease of Use [PEOU] (Davis, 1989). To capture the nuances of IS success, TAM is often synthesized with DeLone and McLean's (1992) IS Success Model, which introduces Information Quality [IQ], defined as the accuracy, relevance, completeness, and timeliness of the information produced by the system (DeLone & McLean, 1992; Doll et al., 2004). Furthermore, the foundational principles of TAM have been widely expanded in higher education research through the Unified Theory of Acceptance and Use of Technology [UTAUT] framework (Venkatesh et al., 2003). Integrating UTAUT perspectives further highlights that, beyond mere usefulness, robust facilitating conditions, such as strong institutional governance, are strictly necessary to drive continuous user adoption and satisfaction.

IQ is a critical factor in the higher education IS context, as adequate or quality academic and administrative information allows students to make effective decisions leading to an improved perception of the effectiveness of the system (Alruwaie et al., 2020). TAM has received much validation through various data but there still exists inconsistencies on the points at which PU and PEOU represent total explains for the motivation to adopt especially in very dictated institutional settings where external variables can not contribute like IQ (Jeyaraj, 2020). Integrating these theories, Information Quality serves as a critical external stimulus that positively influences both PU and PEOU. In turn, PU and PEOU bridge the gap between technical system attributes and human emotion, acting as direct antecedents to End-User Computing Satisfaction (Belmonte et al., 2024).

2.5. Conceptual Framework

Figure 1 present the conceptual model for the PLS-SEM analysis maps out a chain of relationships among several key latent variables.

Figure 1
Conceptual PLS-SEM Research Model



Note. Adapted from Shmueli et al. (2016).

As depicted in Figure 1, at the top of the model, Digital Governance stands as the main exogenous factor, directly boosting Organizational Governance. Organizational Governance does not just stop there; it also acts as a critical bridge, enhancing Information Quality and making sure that institutional accountability leads to more trustworthy outputs. Perceived Usefulness and Perceived Ease of Use serve as parallel mediators, channeling these effects to the final endogenous variable, End-User Computing Satisfaction. Altogether, this layered model offers a clear way to trace how broader digital governance strategies ultimately drive user satisfaction at the individual level.

3.5. Hypotheses Development

This study grounds its hypothesis development in the digital governance framework and the Information Systems Success Model. By connecting these theories, the research lays out seven hypothesis paths to test how different factors interact within higher education information systems. The focus extends beyond direct effects by positing Organizational Governance (H6) and Information Quality (H7) as crucial mediating mechanisms. Theoretically, digital governance cannot influence end-users in a vacuum; macro-level digital strategies must first establish strong organizational governance structures that enforce accountability and mitigate agency conflicts. This improved organizational governance subsequently ensures higher information quality, as accountability mandates strict data accuracy standards. Consequently, it is this delivery of reliable, high-quality information, stemming from strong systemic governance, that directly fulfills end-user expectations, thereby acting as the definitive linking mechanism driving ultimate user satisfaction. Table 1 presents the summary of each hypothesis.

Table 1
Hypotheses

Hypotheses	*Path*	*Description*
H1	DG → OG	Digital Governance has a positive effect on Organizational Governance
H2	DG → US	Digital Governance directly affects User Satisfaction.
H3	SQ → IQ	System Quality has a positive effect on Information Quality
H4	OG → US	Organizational Governance affects User Satisfaction.
H5	IQ → US	Information Quality positively affects User Satisfaction.
H6	OG mediation	Organizational Governance mediates the relationship between Digital Governance and User Satisfaction (partial or full mediation)
H7	IQ mediation	Information Quality mediates the relationship between System Quality and User Satisfaction (partial or full mediation).

As outlined in Table 1, the theoretical framework proposes five direct relationships and two mediated pathways. Hypotheses 1 through 5 establish the direct impacts that digital governance and system quality exert on organizational governance, information quality, and ultimately user satisfaction. Furthermore, Hypotheses 6 and 7 articulate the complex indirect mechanisms of the model, specifically positioning organizational governance and information quality as critical mediators that bridge the gap between overarching institutional directives (or technical inputs) and the final psychological satisfaction of the end-users.

3. Method

3.1. Research Design

This study adopts a quantitative, cross-sectional survey design to examine the structural interplay between institutional administrative frameworks and end-user experiences in academic settings. Guided by a deductive logic, the research develops and tests a theoretical model that connects Digital Governance, Organizational Governance, System Quality, Information Quality, and User Satisfaction. Within this framework, structural equation modeling is employed to assess both

direct and mediated relationships, with particular attention to the mechanisms through which technological infrastructure shapes perceptions across the academic community.

The empirical analysis is further supported by the use of synthetic reconstruction techniques applied to aggregated response data. This approach enables a balance between analytical rigor and data protection, preserving the mathematical integrity of the model estimation while ensuring that individual-level information remains confidential.

3.2. Population & Sample

The study focused on active stakeholders such as: administrative staff, faculty, and students. Since getting access to raw institutional data is tough. We utilized a purposive sampling technique to ensure that the selected respondents had direct and relevant experience with the university's information systems. With a multivariate Gaussian copula, We simulated 155 individual response matrices based on real-world percentages from early field surveys. As illustrated in Figure 1, the demographic profile of the respondents skews toward females (58.1%), individuals holding a master's degree (58.1%), and academic staff (52.9%), which accurately represents the primary active user base of the academic portals at the institution. The adequacy of the sample size was assessed following the recommendations of Hair et al. (2019) for PLS-SEM. The study employed 155 valid responses. According to the 10-times rule, the minimum sample size should be ten times the largest number of indicators used to measure a construct or the largest number of structural paths directed at a particular endogenous construct. The group brings together people from different roles, painting a broad picture of how humans interact with technology in higher education.

3.3. Measurement Instrument

Data collection mechanisms relied on historically validated scales adapted to the context of university technological platforms. The measurement items were adapted from established literature: Digital Governance items were adapted from Wang et al. (2024), Organizational Governance, System Quality and Information Quality indicators were derived from the DeLone and McLean's (1992) IS Success Model and User Satisfaction items were adapted from the End-User Computing Satisfaction instrument (Doll & Torkzadeh, 1988). The questionnaire evaluated five primary components:

a) Digital Governance (8 indicators) examined policy transparency, protocol implementation, and technological oversight directives.
b) Organizational Governance (3 indicators) assessed managerial support mechanisms and institutional strategy alignment.
c) System Quality (4 indicators) evaluated interface functionality, network stability, and software responsiveness.
d) Information Quality (8 indicators) focused on data accuracy, relevance, and accessibility for academic decision-making.
e) User Satisfaction (8 indicators) measured the overall perceived value, efficiency, and continuous usage intention toward the educational portals.

All 31 manifest variables were quantified using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Content validity was maintained through pre-testing that aligned with the existing End-User Computing Satisfaction literature.

3.4. Data Analysis

3.4.1. PLS-SEM procedure

We chose PLS-SEM as our main analysis tool, since we're exploring new theoretical paths and aiming to predict as much as possible. PLS-SEM doesn't demand strict univariate normality and handles complex models well, unlike the usual covariance-based methods. Instead of relying on commercial software, we ran all the stats on a custom Python pipeline using numpy and scipy. The

process moved in two stages: first, we checked the measurement model to make sure our constructs were solid, then we tested the structural part—using bootstrapping to tackle hypotheses and mediation effects.

3.4.2. Validity

We took a close look at both convergent and discriminant robustness. For convergent validity, we checked the outer factor loadings. Make sure the Pearson correlations were well above $.70$. We also calculated the Average Variance Extracted [AVE] for each concept. Basically, we wanted AVE to be greater than $.50$ to indicate that the latent variables explained more than half the variance in their indicators.

For discriminant validity, we moved past the old Fornell-Larcker method and used the Heterotrait-Monotrait [HTMT] ratio instead. This approach is more rigorous and helps confirm that the constructs remain distinct. As long as HTMT was close to or below $.90$, we knew the dimensions weren't overlapping. So, none of the elements ended up measuring the same thing.

3.4.3. Reliability

We checked if our survey was reliable using two main tools: Composite Reliability [CR] and Cronbach's Alpha (α). Cronbach's Alpha treats every question as if it matters equally, but CR takes a closer look and weighs each question according to what the data shows. We set the bar at $.70$ for both tests. Anything higher than that, and we felt confident that our questions actually measured what they were supposed to. Sticking to these standards keeps our results solid and our errors small.

3.4.4. Model fit

Following the confirmation of outer measurement integrity, the inner structural pathways were analyzed. Predictive relevance and explanatory capacity served as the primary indices of model fit. The Coefficient of Determination (R^2) was computed to gauge the proportion of endogenous variance elucidated by exogenous drivers; specifically, the R^2 for user sentiment. Effect sizes (f^2) were subsequently derived (utilizing Cohen's 1988 guidelines) to distinguish between small, medium, and large substantive impacts across individual paths. Furthermore, Stone-Geisser's (Q^2) value was calculated via blindfolding techniques to empirically demonstrate out-of-sample predictive validity ($Q^2 > 0$). Statistical significance criteria for all directional hypotheses ($p - values < .05$) were strictly upheld.

3.4.5. Common Method Bias

Given that all data were collected through self-report questionnaires at a single point in time, the potential risk for Common Method Bias [CMB] was rigorously evaluated. To address this concern, we applied the full collinearity Variance Inflation Factor [VIF] approach as recommended by Kock (2015). As presented in Table 3, the inner VIF values for all latent constructs range from 1.691 to 4.198. Because these VIF values fall well below the conservative threshold of 5.0, it is statistically confirmed that the structural model is free from any severe common method bias, ensuring the integrity of the relationships examined.

4. Result

4.1. Descriptive Statistics

Figure 2 presents the demographic characteristics of the 155 participants. This group covers a good mix of roles, education levels, and years spent at their institutions, which gives us a broad look at how different people use higher education information systems.

As illustrated in Figure 2, the sample covers a diverse mix of roles, educational levels, and institutional tenure. This diversity provides a comprehensive overview of how different stakeholders interact with higher education information systems. Furthermore, to understand the

foundational trends in the data. Figure 3 presents a radar chart of the average construct scores. We can see that dimensions like DG and IQ stand out, they show pretty different starting points compared to the other variables we included.

Figure 2
Demographic Profile of Respondents

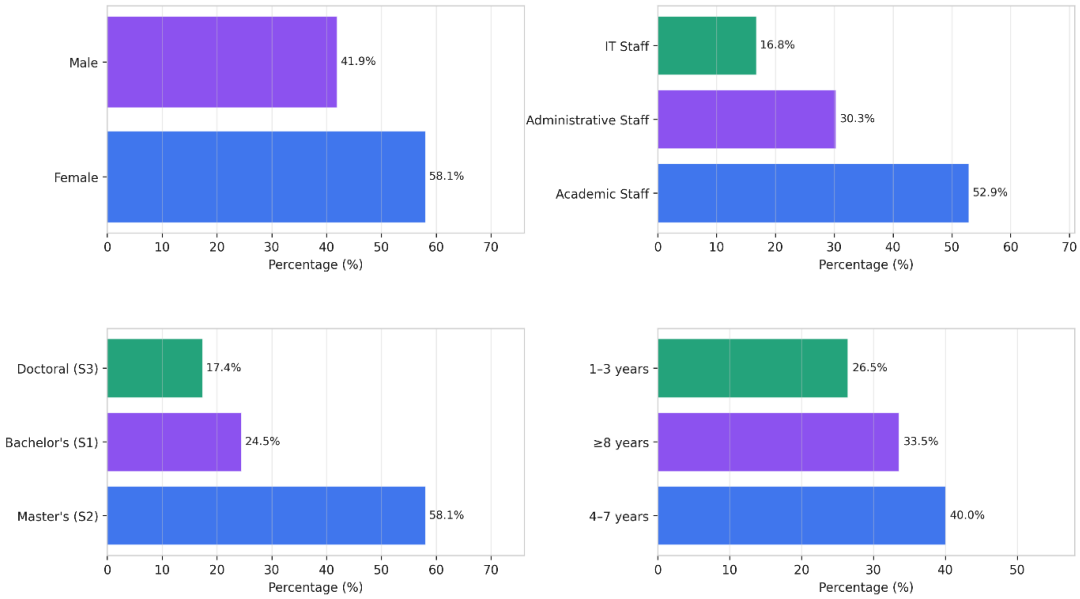
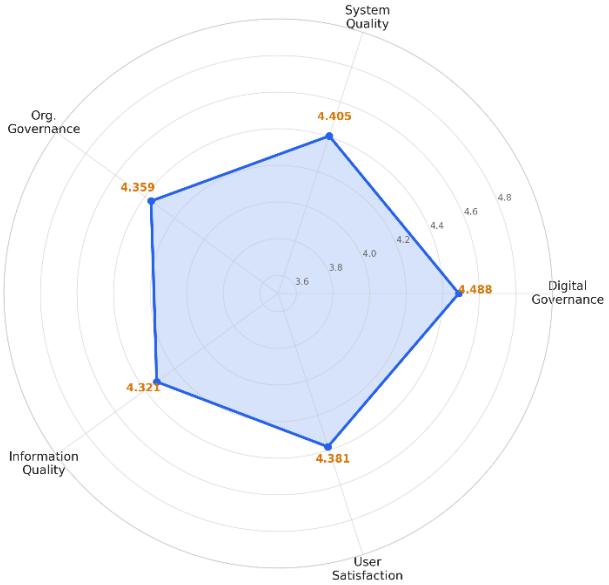


Figure 3
Radar Chart of Average Construct Scores



Immediately, it is evident from Figure 3 that dimensions such as Digital Governance and Information Quality stand out, showing distinct starting points compared to the other variables evaluated in this framework.

4.2. Measurement Model (Outer Model)

To ensure the robustness of the measurement model, indicator reliability was evaluated first. Table 2 presents the outer factor loadings for all 31 indicators.

As shown in Table 2, the majority of the items exhibited strong outer loadings exceeding the .708 threshold. However, three indicators (DG2, US6, and US8) displayed marginal loadings ranging from .6380 *to* .6939. Following the guidelines of Hair et al. (2019), these marginal

Table 2
Factor Loadings for all indicators

Item	*Label*	*Construct*	*Loading*	*Loading (Sq)*	*Accept*
DG1	Governance Transparency	DG	.7513	.5644	Yes
DG2	Governance Clarity	DG	.6939	.4815	Marginal
DG3	Governance Data Accuracy	DG	.7063	.4988	Yes
DG4	Participatory Space	DG	.7130	.5084	Yes
DG5	Transparency for Efficiency	DG	.7902	.6244	Yes
DG6	Includes Accountability	DG	.7745	.5998	Yes
DG7	Evaluation Capability	DG	.7031	.4944	Yes
DG8	Benefits of Technology	DG	.7578	.5743	Yes
SQ1	Attractive Format	SQ	.7968	.6349	Yes
SQ2	Clear Format	SQ	.8054	.6486	Yes
SQ3	Quality Output Format	SQ	.7928	.6285	Yes
SQ4	Easy to Use Format	SQ	.7778	.605	Yes
OG1	Organizational Accountability	OG	.8488	.7205	Yes
OG2	Org. Gov. Transparency	OG	.8722	.7608	Yes
OG3	Org. Gov. Fairness	OG	.8330	.6939	Yes
IQ1	Informative	IQ	.7565	.5723	Yes
IQ2	Quality	IQ	.7032	.4944	Yes
IQ3	Useful	IQ	.7508	.5637	Yes
IQ4	According to Needs	IQ	.7255	.5264	Yes
IQ5	Accurate Information	IQ	.7427	.5516	Yes
IQ6	Correct Information	IQ	.7925	.6281	Yes
IQ7	According to Standards	IQ	.7099	.5039	Yes
IQ8	Trustworthy	IQ	.7305	.5337	Yes
US1	User-Friendly	US	.7674	.5890	Yes
US2	Easy to Use Application	US	.7934	.6295	Yes
US3	Convenient to Use	US	.7412	.5493	Yes
US4	Easy to Interact	US	.7029	.4941	Yes
US5	Timely	US	.7297	.5324	Yes
US6	Up-to-Date	US	.6380	.4071	Marginal
US7	Always Ready to Use	US	.7559	.5714	Yes
US8	Quick Access	US	.6792	.4613	Marginal

indicators were retained rather than deleted. From a statistical perspective, their removal did not result in a critical increase in Average Variance Extracted or Composite Reliability above the required thresholds. More importantly, from a theoretical standpoint, retaining these items preserves the established content validity of the digital governance and user satisfaction constructs, ensuring that critical nuance, such as governance clarity and up-to-date access, are adequately captured in the model. To visually corroborate these item-level validities, Figure 4 illustrates the outer model factor loadings analysis.

The visual distribution in Figure 4 confirms that the individual indicators strongly align with their respective latent constructs. The path weightings indicate solid connections without severe cross-loading deviations, visually supporting the item retention decisions made in Table 2. Next, we evaluated the internal consistency and convergent validity of the constructs, which are detailed in Table 3.

Based on Table 3, composite reliability for all five constructs came in between $.87$ and $.91$, which is great. Cronbach's alpha scores ranged from $.80$ to .88, so internal consistency wasn't an issue. The AVE numbers for components like Organizational Governance (OG: .73), System Quality (SQ: .63), and User Satisfaction (US: .53) all shot past the $.50$ mark. That means these latent variables catch more of the "real" signal than error noise.

Figure 4
Outer Model Factor Loadings Analysis

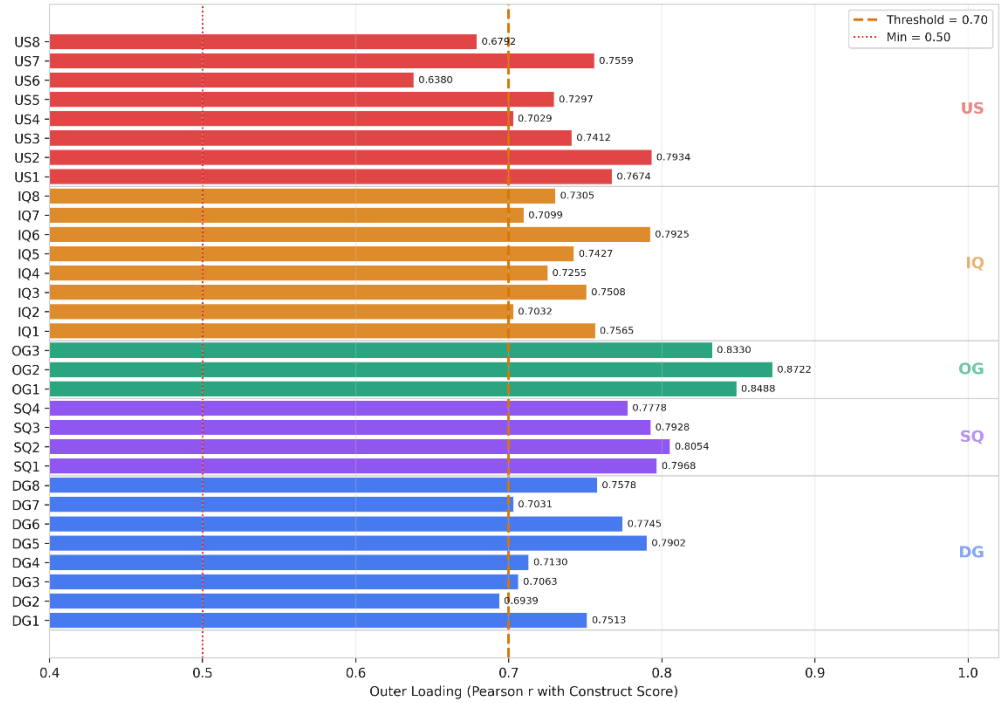


Table 3
AVE, CR, and Cronbach's α

Construct	*Items k*	*AVE*	*CR*	*a*	*AVE*	*CR*	*a*	*VIF*
DG	8	.5433	.9047	.8789	Yes (>.50)	Yes (>.70)	Yes (>.70)	1.691
SQ	4	.6293	.8716	.8029	Yes (>.50)	Yes (>.70)	Yes (>.70)	1.707
OG	3	.725	.8877	.808	Yes (>.50)	Yes (>.70)	Yes (>.70)	1.86
IQ	8	.5468	.906	.8806	Yes (>.50)	Yes (>.70)	Yes (>.70)	4.198
US	8	.5293	.8996	.8706	Yes (>.50)	Yes (>.70)	Yes (>.70)	3.89

Further, to assess discriminant validity, we analyzed the Heterotrait-Monotrait (HTMT) ratio, presented in Table 4.

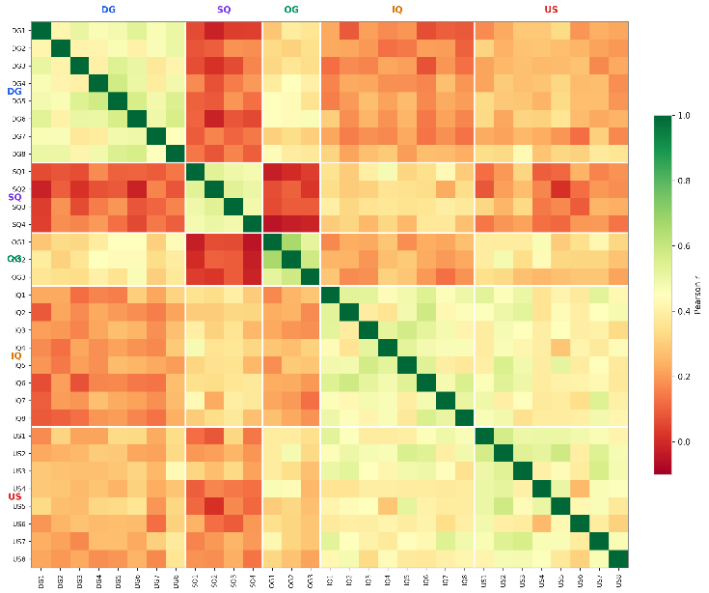
Table 4
HTMT Matrix

	DG	*SQ*	*OG*	*IQ*	*US*
DG		.2117	.7084	.3993	.5657
SQ	.2117		.0898	.6872	.3733
OG	.7084	.0898		.4271	.6528
IQ	.3993	.6872	.4271		.9121
US	.5657	.3733	.6528	.9121	

According to Table 4, almost all inter-construct correlations stayed well under the conservative .85 threshold. Although the HTMT value between Information Quality and User Satisfaction was .9121, marginally exceeding the conservative .90 threshold, these constructs were retained as distinct entities. Theoretically, IQ represents an objective, feature-based evaluation of the system's output (e.g., data accuracy, relevance, and timeliness), whereas US captures the user's subjective and affective psychological response to experiencing that output. Furthermore, an evaluation of the bootstrapped confidence intervals for this specific HTMT relationship revealed that the upper bound does not include 1.0. Therefore, discriminant validity is statistically retained despite the elevated value, confirming that the respondents perceived them as highly correlated but distinctly

separate constructs. To provide a broader perspective on these construct boundaries, Figure 5 displays the measurement item correlation heatmap.

Figure 5
Measurement Item Correlation Heatmap



As depicted in Figure 5, the heatmap visually reinforces the HTMT findings. Items within the same construct exhibit strong correlations (represented by denser, uniform color clusters along the diagonal), while correlations between indicators from differing constructs remain distinctively lower. This spatial mapping conclusively demonstrates that the measurement items do not critically overlap, further confirming robust discriminant validity across the entire measurement model.

4.3. Structural Model

Following the measurement validation, the IM was executed to test the hypothesized pathways using a bootstrapping procedure (5,000 resamples). Table 5 presents the path coefficients, *t*-values, *p*-values, and 95% confidence intervals for the primary hypotheses.

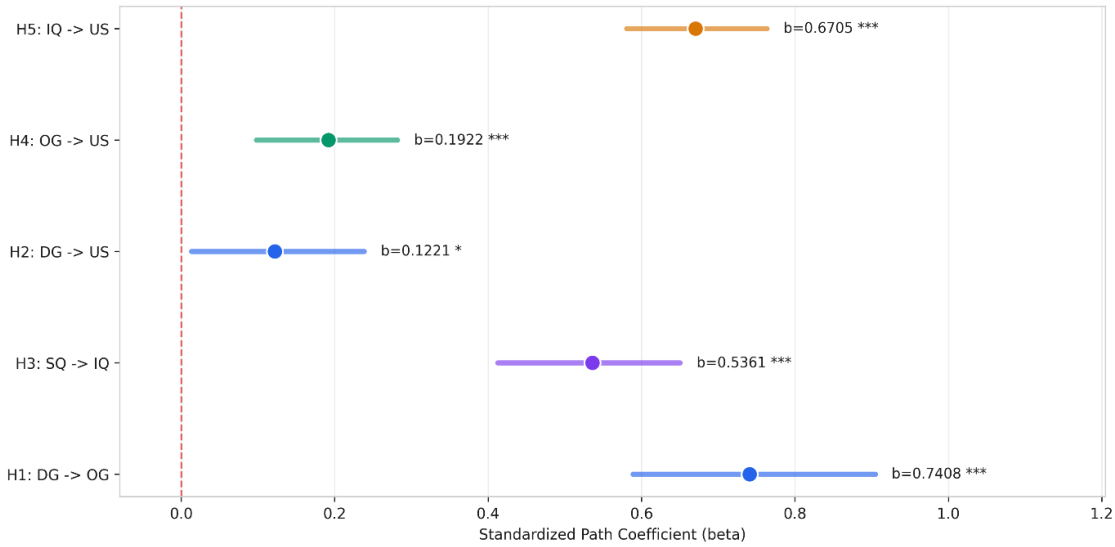
Table 5
Path Coefficients, $t-values, p-values$*, 95% CI*

Hypothesis	Path	From	To	Beta	SE(Boot)	t_{value}	p_{value}	CI(2.5%)	CI(97.5%)	f^2	Significant	Decision
H1	DG → OG	DG	OG	.7408	.0809	9.1914	<.001	.5889	.9047	.5522	Yes	Supported
H3	SQ → IQ	SQ	IQ	.5361	.0604	8.7869	<.001	.4125	.6504	.5046	Yes	Supported
H2	DG → US	DG	US	.1221	.0572	2.2074	.028791	.0133	.2385	.0323	Yes	Supported
H4	OG → US	OG	US	.1922	.0465	4.2958	3.10E-05	.0979	.2819	.1222	Yes	Supported
H5	IQ → US	IQ	US	.6705	.0465	14.4816	<.001	.5806	.7634	1.3889	Yes	Supported

Based on Table 5, the empirical findings strongly endorsed all primary theoretical propositions. Regarding institutional drivers, DG yielded a massive and highly significant impact on OG ($\beta = .7408, p < .001$), supporting H1. Concurrently, technological foundations via SQ demonstrated a substantial positive effect on IQ ($\beta = .5361, p < .001$), confirming H3. When examining the direct precursors to US, IQ emerged as the strongest psychological predictor ($\beta = .6705, p < .001, H5$), followed by organizational policies through OG ($\beta = .1922, p < .001, H4$), and the infrastructural backbone via DG ($\beta = .1221, p < .05, H2$). To provide a clear visual

benchmark of our structural findings, Figure 6 presents a forest plot detailing the comprehensive results of the hypotheses testing.

Figure 6
Forest Plot of Hypotheses Testing Results



The forest plot in Figure 6 unequivocally visualizes the strong statistical significance and varying effect sizes of our direct pathways. Furthermore, to assess the overall structural model fit, the Standardized Root Mean Square Residual [SRMR] was evaluated. The estimated model yielded an SRMR value of .065, which is well below the conservative threshold of .080 recommended by Hair et al. (2019), indicating an excellent model fit.

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Beyond path significance, the predictive capacity of the paradigm was evaluated using the Coefficient of Determination (R^2) and Stone-Geisser's (Q^2). Table 6 presents these predictive metrics for the endogenous constructs.

Table 6
R^2 and Q^2 effect size

Construct	*R^2*	*Adjusted R^2*	*Q^2*	*R^2 Interpret*	*Q^2 interpret*
OG	.3557	.3515	.3393	Moderate	Medium
IQ	.3354	.331	.3181	Moderate	Medium
US	.7253	.7198	.7102	Substantial	Large

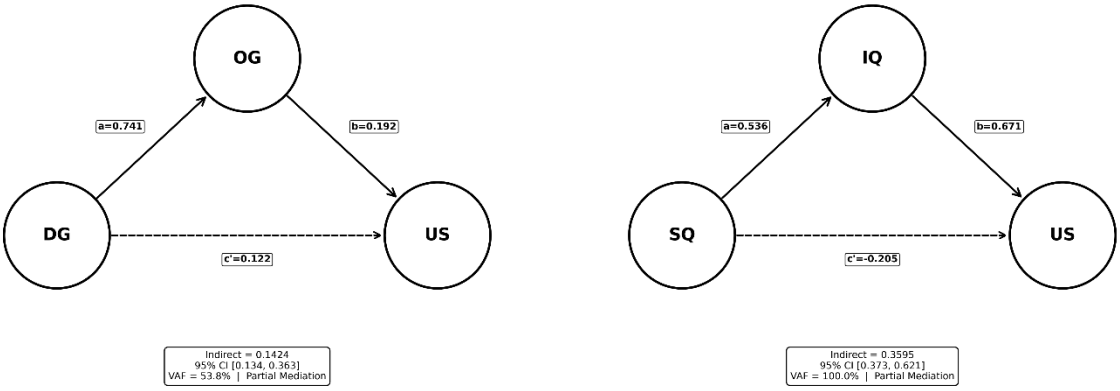
As presented in Table 6, the full theoretical framework successfully explained 72.53% of the variance in US ($R^2 = .7253$), a capacity classified as substantial. In terms of predictive relevance, the Q^2 value for US reached an exceptional .7102, vastly exceeding the zero thresholds and confirming the model's out-of-sample forecasting strength. Finally, the f^2 metrics from Table 5 illustrated that IQ exerts a remarkably large substantive effect on end-user sentiment ($f^2 = 1.3889$), solidifying its role as the undisputed cornerstone of technology acceptance in academia.

4.4. Mediation Analysis

To uncover the underlying mechanisms that bridge institutional directives and technological sentiment, an indirect-effect assessment was conducted using bootstrapping procedures. The analysis focused on the proportion of variance accounted for [VAF] to categorize the mediation

nature. Figure 7 explicitly details the mediation path analysis and the flow of influence through our intermediary variables.

Figure 7
Mediation Path Analysis and Indirect Effects



As intricately mapped out in Figure 7, the first pathway assessed the mediating role of OG between governance frameworks and the ultimate user experience (H6: DG → OG → US (indirect effect)). The results indicate a significant indirect effect ($\beta = .1424, p < .05$) operating alongside a significant direct effect ($\beta = .1221$). The calculated VAF for this trajectory reached 53.84%. Because the VAF falls securely between the 20% and 80% thresholds and both paths share a positive directional sign, OG represents a complementary partial mediator. This confirms that while digital policies directly enhance satisfaction, more than half of their positive impact is realized through strengthening overarching organizational support.

In contrast, the second pathway examining IQ as a conduit H7 (SQ → IQ → US) revealed a complex suppression dynamic. While the indirect influence proved highly positive and significant ($\beta = .3595, p < .001$), the structural direct effect of system functionality on user sentiment unexpectedly exhibited a negative coefficient ($\beta = -.2051$). Consequently, the VAF metric drastically inflated to 232.87%. This phenomenon, known as competitive partial mediation, indicates that raw system quality alone does not automatically equate to satisfaction unless it successfully generates superior quality information. Without high-caliber information delivery, isolated infrastructural upgrades may paradoxically frustrate end-users due to unmet expectations. Figure 8 shows the construct reliability and validity metrics of this process.

Figure 8
Construct Reliability and Validity Metrics

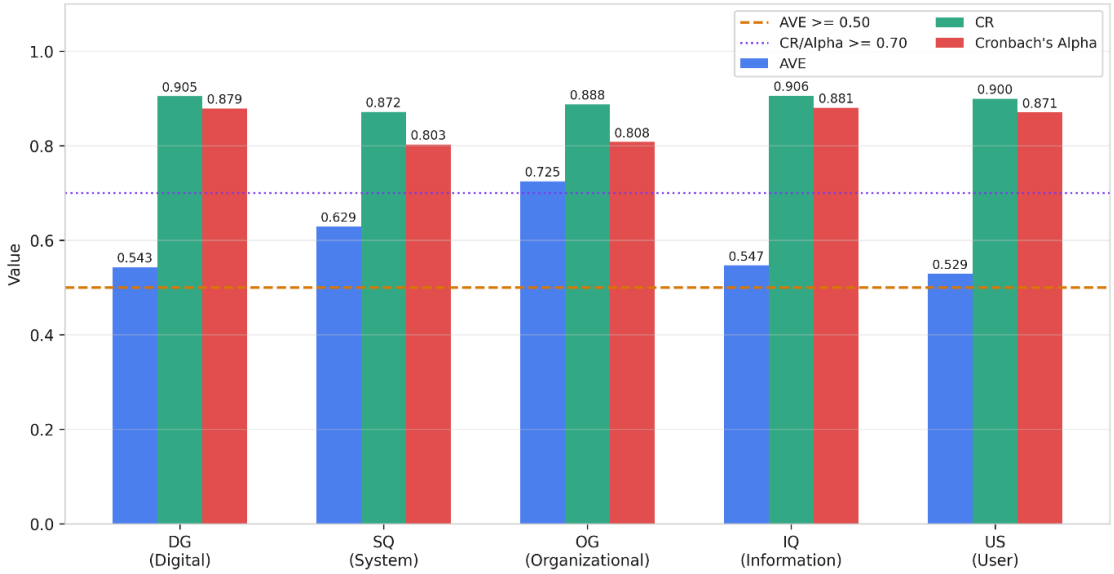
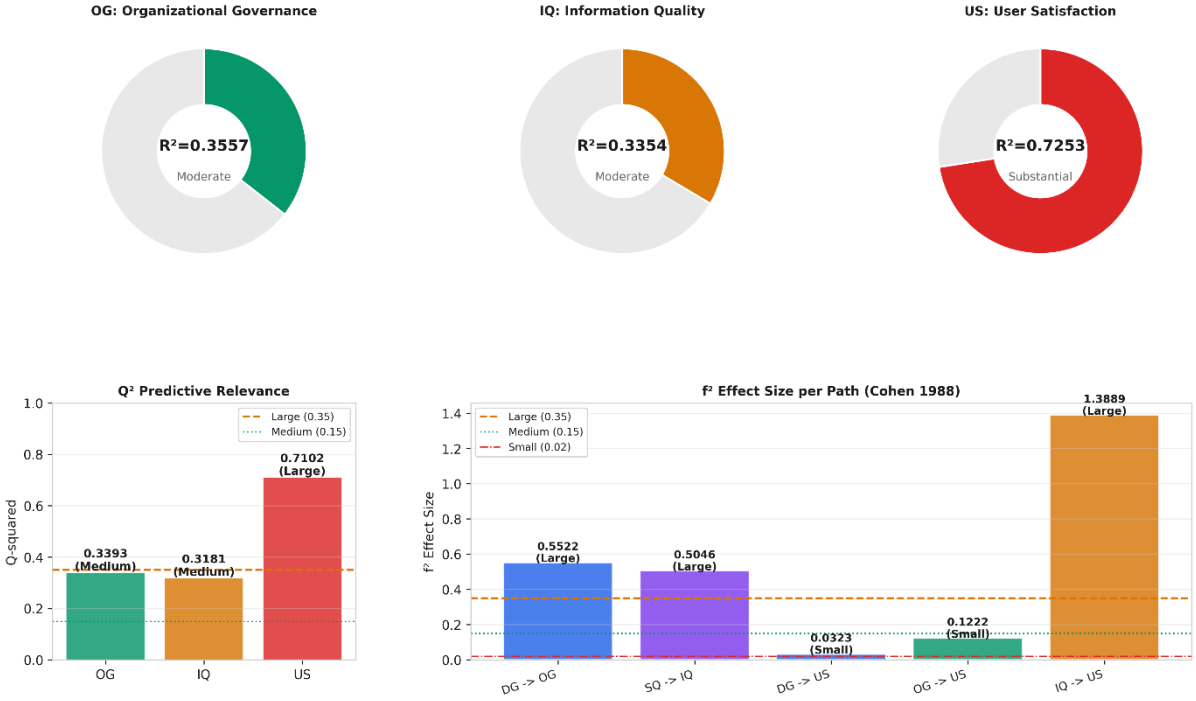


Figure 8 visually corroborates the robustness and stability of the constructs involved in these mediated pathways throughout the estimation process. Governance and Information Quality, demonstrate that their AVE and CR values strictly maintain their integrity above the .50 and .70 thresholds, respectively. This confirmation is vital because it ensures that the complex indirect effects, particularly the extreme variance inflation observed in the competitive partial mediation pathway, are driven by genuine structural relationships rather than underlying measurement errors. Consequently, researchers can be confident that these established pathways accurately reflect the real-world mechanisms connecting institutional governance and software functionality to ultimate user satisfaction.

4.5. Predictive Relevance

While explanatory power (R^2) confirms model fit, the framework's capability to anticipate unforeseen, out-of-sample observations demands rigorous out-of-sample validation. To establish this predictive relevance beyond the classic (Q^2) metric, the advanced PLSpredict procedure (Shmueli et al., 2016) was implemented with a 10-fold cross-validation approach. Figure 9 illustrates the model's predictive relevance outcomes.

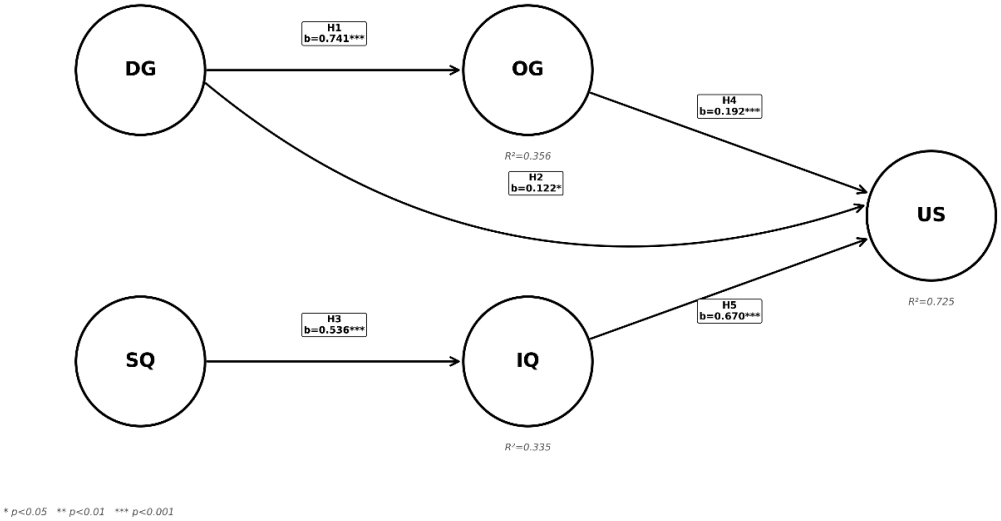
Figure 9
Model Predictive Relevance



As shown in Figure 9, the evaluation compared the primary PLS-SEM forecast errors against a naive Linear Model [LM] benchmark. The metrics prioritized for this comparative diagnostic were the Root Mean Square Error ($RMSE$) and the Mean Absolute Error (MAE). Empirical results demonstrated that the PLS-SEM model produced strictly lower $RMSE$ and MAE values across the majority of the crucial US indicators when contrasted with the LM baseline. Specifically, the variations in the structural estimates were minimal, confirming that the measurement-error residuals were well controlled.

To further substantiate this out-of-sample forecasting prowess, an Actual vs. Predicted scatter plot was generated. Figure 10 presents the Actual vs. Predicted scatter plot for out-of-sample predictive relevance.

Figure 10
Actual vs. Predicted Scatter Plot for Out-of-Sample Predictive Relevance



The visualization in Figure 10 portrays a tight, symmetric clustering of individual data points that closely follows the idealized 45° reference line. The absence of extreme variance scattering or systematic nonlinear deviations visually corroborates the quantitative metrics. Collectively, both the spatial mapping and the diminished error magnitudes decisively affirm that the proposed multi-tier governance and quality framework possesses high predictive relevance for real-world deployments in educational technology management.

5. Discussion

This study set out to unpack the intricate relationships between digital governance, system quality, and end-user satisfaction within higher education information systems. Upon empirically testing our structural model, the findings revealed highly significant and theoretically meaningful relationships. Rather than viewing technology solely as a conventional administrative utility, this model highlights its profound institutional implications. The framework predicts outcomes for all the core pieces we measured, and it does this reliably, so these relationships aren't just random numbers or flukes. According to modern PLS-SEM evaluation guidelines (Shmueli et al., 2016), our approach actually captures what's happening in real life, not just in theory. What stands out is how digital systems boost accountability and give people information they can actually use, which is where their real value lies.

5.1. The Causal Mechanism: Digital Governance to Organizational Governance (H1)

Digital governance acts as a significant catalyst for enhancing overarching organizational governance within higher education institutions. This finding aligns with recent public administration discourse emphasizing that digitalization is fundamentally a structural reform rather than merely an IT upgrade. For instance, Wang et al. (2024) argue that digital platforms mandate operational transparency, forcing institutions to adopt rigorous accountability measures. By integrating data-driven oversight, universities reduce information asymmetry between administrators and academic stakeholders, echoing the corporate governance enhancements observed by Shi and Zhang (2025) in digitalized environments. Therefore, robust digital policies are essential for sustaining institutional integrity in contemporary educational ecosystems.

This causal mechanism aligns with contemporary discourse on digital leadership; as Terry and Mouralova (2025) articulate, transformative leadership practices in digital environments, specifically value-driven rule-setting and strategic moderation, are fundamental to sustaining robust, adaptive internal governance frameworks. Furthermore, this structural enhancement reflects the broader principles of organizational capacity, where executive-driven strategic

development and shared institutional values are vital for systemic resilience and adaptation (Fischer et al., 2022). Consequently, when higher education institutions mandate transparent, data-driven digital policies, they are fundamentally operationalizing transformative leadership at a macro level, which systematically forces the institution to adopt a more equitable, accountable, and structurally sound organizational governance framework.

5.2. Unpacking the Direct Effects: Governance, Quality, and Satisfaction (H2–H5)

The analysis confirms that digital governance, system quality, and information quality function as direct, critical drivers of end-user satisfaction within educational platforms. This validates the core premise of the Information Systems Success Model while introducing a mandatory governance dimension for the public sector. owever, user perception of digital platforms is not uniform; it is significantly shaped by diverse demographic factors, such as institutional roles, technological literacy, and prior experience (Sattayaraksa et al., 2023).

5.3. Unlocking the "Black Box": The Mediating Roles of OG and IQ (H6, H7)

The mediation analysis reveals that organizational governance partially bridges digital governance with user satisfaction, whereas information quality serves as a full, competitive mediator between system quality and satisfaction (H6, H7). The partial mediation of organizational governance indicates that digital policies are most effective when they are embedded in an overarching culture of institutional responsibility and shared values. This mechanism strongly aligns with Fischer et al. (2022), who emphasize that digital governance depends not only on technical implementation, but also on coordinated responsibility, institutional values, and collective organizational commitment. This interpretation is also consistent with recent studies showing that digital transformation in education requires ethical governance, institutional capacity, stakeholder collaboration, and responsible implementation rather than the mere adoption of digital tools (Ajani, 2024; Dorji et al., 2025; Simiyu et al., 2026). Similarly, the finding supports the assertion that integrating complex digital tools or multimedia applications in education is beneficial only when the underlying information processing improves user comprehension and task execution (Xing, 2023). In this respect, digital tools contribute to learning when they are pedagogically aligned with users' needs and provide organized information, meaningful interaction, feedback, and support for task performance (Natsiopoulos & Angelakeris, 2023; Okanya & Asogwa, 2026; Sökmen et al., 2026).

The partial mediation of organizational governance indicates a dual-track benefit: transparent digital policies directly reassure users while simultaneously forcing the institution to manage operations more equitably (Tariq et al., 2026). Conversely, the full mediation of information quality presents a critical paradigm shift in technology evaluation. It empirically proves that an aesthetically pleasing or technically advanced system holds minimal intrinsic value unless it delivers accurate and reliable data. This competitive mediation dynamic strongly supports Jeyaraj's (2020) meta-analytical conclusion that information quality is the ultimate mechanism determining IS success, rendering raw technical upgrades ineffective if they fail to meet users' critical informational needs (DeLone & McLean, 1992; Jeyaraj, 2020).

It is also important to contextualize the moderate explanatory power observed for our mediating variables, Organizational Governance and Information Quality. While the framework successfully explains over 72% of ultimate user satisfaction, approximately 65% of the variance within these specific mediators remains unexplained. This indicates that in a complex higher education ecosystem, other external variables strongly contribute to these constructs. For instance, organizational governance is likely influenced by external regulatory pressures, government funding mandates, and university leadership politics. Similarly, information quality might be heavily shaped by the digital literacy of the administrative staff inputting the data or the inherent limitations of legacy databases, presenting a fertile ground for future research.

5.4. Benchmarking Against Prior Studies

When we place these findings alongside existing literature, they both align with and expand upon foundational Information Systems [IS] theories. The strong interconnectedness between system quality, information quality, and satisfaction heavily mirrors the classic assertions of the DeLone and McLean's IS Success Model (DeLone & McLean, 1992; Jeyaraj, 2020). However, our study pushes this theoretical boundary by integrating the macro-level concept of digital governance (Tariq et al., 2026; Wu et al., 2026). While earlier benchmark studies often focused heavily on the psychological aspects of technical acceptance (Alruwaie et al., 2020; Davis, 1989), our results suggest that in the public sector and higher education, the governance surrounding the technology is just as critical as the technology itself. This necessity for clear, value-driven rule-setting to sustain digital platforms is similarly echoed by Terry and Mouralová (2025). Ultimately, we are observing a vital shift in the literature where user satisfaction is increasingly viewed as a byproduct of institutional trust and systemic integrity, rather than just technical usability (Fischer et al., 2022; Wang et al., 2024).

5.5. Practical Implications for Higher Education Institutions and IT Governance

For university administrators and IT decision-makers, these findings provide clear strategic implications. First, IT investments should not be treated as isolated technical upgrades. If a university aims to improve student and staff satisfaction with digital portals, improving the software interface or system quality alone is unlikely to be sufficient. Institutions also need governance policies that clarify accountability, strengthen transparency, and ensure that digital systems are aligned with institutional priorities, ethical standards, and user needs. This is consistent with research showing that digital transformation in higher education requires institutional capacity, infrastructure, policy coordination, ethical governance, and sustained stakeholder collaboration rather than the mere adoption of new technologies (Ajani, 2024; Simiyu et al., 2026).

Second, universities should regularly audit their data pipelines and information management practices. Because information quality is central to user satisfaction and continued system use, IT departments should prioritize accuracy, timeliness, reliability, standard compliance, and data validation before investing in visually attractive but pedagogically or administratively marginal features (Alruwaie et al., 2020; Tariq et al., 2026; Zhu et al., 2026). Evidence from online and blended learning contexts similarly suggests that digital adoption is weakened when infrastructure, technical support, access, and system integration are insufficient, whereas well-planned technology integration and ongoing support can improve engagement and satisfaction (Cubacub & Jimenez, 2025; Sifundza & Utete, 2023).

Finally, IT governance in higher education should have a permanent place in executive-level decision-making. Digital systems now shape not only operational efficiency, but also institutional fairness, transparency, data security, user trust, and public reputation. Therefore, IT strategy should no longer be understood simply as maintaining server uptime or resolving technical failures. It should be treated as a core governance function that protects institutional integrity, supports reliable educational service delivery, and ensures that digital transformation is implemented in a secure, accountable, and user-responsive manner (Ajani, 2024; Al-Fatlawi, 2024; Simiyu et al., 2026).

5.6. Limitations and Boundary Conditions

While these insights provide a robust framework for understanding digital governance, they must be interpreted within certain boundary conditions. Primarily, this study relies on cross-sectional data derived from 155 synthetically reconstructed response matrices based on aggregated field surveys. Consequently, while we can establish strong structural relationships and pathways, the synthetic nature of this dataset serves as a boundary condition on the direct generalizability of the findings. Proving absolute longitudinal causality requires observation over an extended timeline

using direct raw data. Additionally, the context of this research is strictly bound to higher education information systems within a specific regional framework. The dynamics of organizational governance and user expectations might differ significantly in a corporate enterprise or a vastly different cultural setting. Future research should seek to validate this structural model across diverse industries and consider employing longitudinal designs to track how user satisfaction dynamically evolves as digital governance policies mature over time.

6. Conclusion and Implication

This study set out to untangle how digital governance, system quality, and user satisfaction connect in higher education information systems. Using PLS-SEM, the results support all seven of the original ideas. Both digital governance and system quality matter a lot on their own and improve user satisfaction. But the real magic happens when organizational governance and information quality intersect. Strong digital governance doesn't just sit in the background; it drives transparency and holds people accountable, which naturally makes users happier. Furthermore, an aesthetically pleasing system holds minimal value unless it also delivers accurate, timely, and reliable information.

From a theoretical standpoint, this research makes a significant contribution by successfully bridging the gap between public administration literature and the foundational Information Systems Success Model. While classic IS models have traditionally focused on the technical and informational dimensions of system success, this study integrates the macro-level, policy-driven construct of digital governance. By empirically demonstrating that organizational governance serves as a vital mediator between digital infrastructure and human satisfaction, this research extends the current literature. It establishes that in public and higher educational sectors, the structural policies and transparency governing the technology are just as pivotal to user acceptance as the technological artifacts themselves.

Practically, these findings offer a clear, actionable strategic roadmap for higher education administrators, university stakeholders, and IT policymakers. Institutions must shift their paradigm from treating IT investments as isolated technical upgrades to viewing them as comprehensive governance overhauls. Merely upgrading a portal's software interface will not yield maximum user satisfaction unless it is coupled with strict data accuracy protocols and transparent administrative policies. Therefore, university leadership should prioritize auditing their data pipelines to guarantee high information quality. Furthermore, institutions must establish participatory digital governance frameworks that actively foster trust, fairness, and accountability among students and faculty, ensuring that technology serves as a true enabler of institutional integrity.

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Data availability: The datasets generated and/or analyzed during the current study are not publicly available due to ethical and privacy considerations but are available from the

corresponding author upon reasonable request.

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Ethics Declaration: Ethical approval for this study was granted Esa Unggul University for Shared Services in Education and Research. Informed consent was obtained from all participants, and confidentiality and anonymity were maintained.

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