

Integrating E-Service quality, user satisfaction, and trust: A multi-model approach in higher education digital services

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Abstract

The rapid digitalization of higher education services has intensified the need to understand the factors that shape user trust and satisfaction. While prior studies have emphasized the role of system and service quality, they have given limited attention to integrating organizational and contextual dimensions to explain user perceptions. This study addresses this gap by proposing an integrated model that combines the Technology–Organization–Environment (TOE) framework and the Information Systems Success Model (ISSM). Using a quantitative approach, data were collected via a survey of higher education users and analyzed with Partial Least Squares Structural Equation Modeling (PLS-SEM) and Confirmatory Composite Analysis (CCA). The results indicate that the proposed model demonstrates strong explanatory power ($R^2 = 0.896$) and predictive relevance, confirming its robustness in explaining user trust and satisfaction. The findings reveal that information quality is the most influential determinant, followed by organizational factors, while system quality and service quality show negligible effects. These results suggest a shift from a system-centric to an information-driven, context-oriented evaluation of digital services. This study contributes to the literature by extending the TOE and ISSM frameworks into a unified model and challenging traditional assumptions regarding the dominance of technical system attributes. Practically, the findings highlight the importance of higher education institutions prioritizing information quality and organizational readiness when designing user-centered digital services.

Keywords

E-service, Trust and satisfaction, higher education, TOE-ISSM integration

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Introduction

The rapid advancement of Information and Communication Technology (ICT) has fundamentally reshaped service delivery across multiple sectors, including higher education. Universities are increasingly leveraging digital platforms to provide academic and administrative services, positioning e-services as a critical component of institutional competitiveness, operational efficiency, and long-term sustainability. In this evolving landscape, the adoption of a student-centered approach has emerged as a strategic imperative, recognizing students not only as users but as primary stakeholders whose perceptions significantly influence institutional performance. Consequently, student satisfaction and trust have become key indicators of digital service effectiveness, as they directly affect user loyalty, institutional reputation, and sustained engagement (Martínez-Argüelles & Batalla-Busquet, 2016; Stodnick & Rogers, 2008).

Service quality has long been established as a central determinant of user satisfaction, traditionally conceptualized as the gap between user expectations and perceived service performance (Grönroos, 1990). The seminal work of Parasuraman et al. (Parasuraman et al., 1988) introduced foundational dimensions of service quality, which have since been adapted to various contexts. With the digital transformation of services, these dimensions have evolved into the concept of e-service quality, encompassing system usability, information quality, responsiveness, and security within online environments. Recent studies emphasize that e-service quality plays a critical role in shaping user experience, perceived value, and behavioral outcomes in digital platforms (Suradi et al., 2021; Zeqiri et al., 2023).

The integration of digital technologies into higher education has further intensified the strategic importance of e-service platforms in shaping user experience (Dalbehera, 2020; Jameel et al., 2021; Nasution et al., 2019; Suradi et al., 2024). Universities increasingly rely on web-based systems to deliver information, facilitate communication, and support academic processes. As a result, the quality of digital services significantly influences how users perceive, evaluate, and engage with institutional systems (Efthymiou & Zarifis, 2021; Rachbini et al., 2021). Empirical studies consistently demonstrate that e-service quality positively affects user satisfaction and influences behavioral outcomes such as loyalty and Word-of-Mouth (WOM) (Blut, 2016; Demir et al., 2021). In addition, trust has emerged as a critical factor in determining user acceptance and continued use of digital services, particularly in environments characterized by uncertainty, data sensitivity, and reliance on system reliability (Dwivedi et al., 2021; Hooda et al., 2023).

Despite the growing body of literature, several critical gaps remain. First, prior studies predominantly examine isolated relationships—such as the direct effect of e-service quality on satisfaction—without simultaneously capturing its influence on trust and subsequent behavioral outcomes. Second, many existing models adopt a technology-centric perspective that may not fully reflect the complexity of user interactions within contemporary digital ecosystems. Third, empirical evidence in higher education, particularly within developing-country contexts, remains limited and fragmented. Moreover, the relationship between e-service quality and broader relational outcomes, such as trust and Word-of-Mouth behavior, has not been sufficiently examined within a unified analytical framework. This fragmentation restricts a comprehensive understanding of how digital service quality translates into sustained

user engagement and institutional value (AL Dulaimi & Al-Mashhadany, 2023; Cheung et al., 2008).

Given the societal role of higher education institutions, understanding how users perceive and evaluate digital services is of paramount importance. In digital environments, trust serves as a critical mechanism for managing uncertainty about system reliability, data security, and service transparency (Fahr et al., 2024). However, the interplay between e-service quality, satisfaction, and trust remains insufficiently explored within an integrated, multidimensional framework that captures both technological and organizational influences.

To address these limitations, this study proposes an integrated framework that combines the Technology–Organization–Environment (TOE) framework and the Information Systems Success Model (ISSM), with user satisfaction and trust (UST) as key outcome variables. This multi-model approach enables a more comprehensive understanding of how organizational readiness, system quality, and information quality interact to shape user perceptions and behavioral responses. This study conceptualizes satisfaction not only as an outcome variable but also as a mediating mechanism that strengthens trust in institutional digital services.

This study makes several important contributions. First, it advances the theoretical understanding of digital service evaluation by integrating TOE and ISSM into a unified, multi-level framework that captures the interplay between contextual, technological, and user-perception dimensions. Second, it provides empirical evidence on the role of information quality, organizational readiness, and system characteristics in shaping trust and satisfaction within higher education digital services, particularly in developing-country contexts. Third, it extends prior research by linking e-service quality to relational and behavioral outcomes, including trust and word of mouth, thereby offering a more holistic perspective on digital service success. Finally, this study provides practical insights for higher education institutions to design user-centered digital services that enhance trust, improve satisfaction, and support sustainable digital transformation.

Methodology

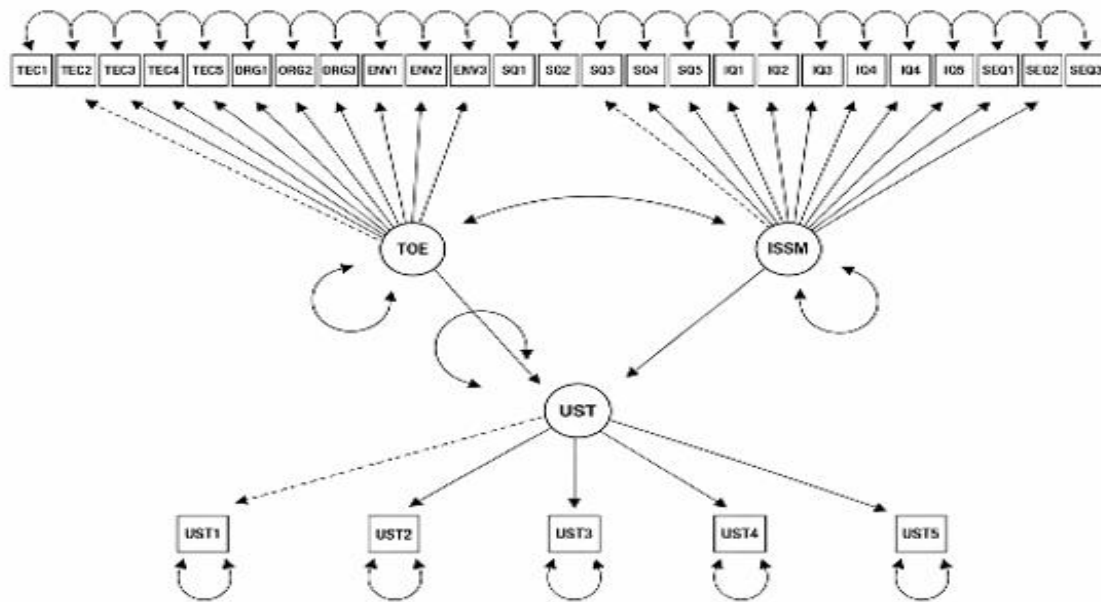
Research Design and Model Development (Theoretical Framework)

This study adopts a quantitative research design to empirically examine the relationships among e-service quality, user satisfaction, and trust within higher education digital services. A quantitative approach is appropriate for testing theoretically grounded relationships and validating a conceptual model using empirical data. The study aims to provide robust statistical evidence on how multiple dimensions interact to shape user perceptions and behavioral outcomes in digital service environments.

The proposed research model is developed by integrating two well-established theoretical frameworks: the Technology–Organization–Environment (TOE) framework and the Information Systems Success Model (ISSM). The TOE framework explains how technological readiness, organizational capability, and environmental conditions influence the adoption and implementation of technological innovations (Oliveira & Martins, 2010; Tornatzky et al., 1990). In contrast, the ISSM evaluates system success through core dimensions such as system quality, information quality, and service quality, which collectively influence user satisfaction and system effectiveness (Al-Hattami, 2021; DeLone & McLean, 2003; Suradi et al., 2026).

The integration of TOE and ISSM provides a comprehensive, multi-level perspective that captures the interaction between organizational context and system performance in shaping digital service outcomes. In the context of higher education, this approach is particularly relevant, as digital services are embedded within complex socio-technical systems that involve not only technological infrastructure but also institutional readiness and user engagement dynamics. The proposed model conceptualizes e-service quality as a mediating construct linking TOE factors to user satisfaction, while satisfaction serves as a key antecedent of trust in digital service environments.

Figure 1. *The proposed model*



Hypothesis development

Trust has become a central construct in digital service environments, particularly in contexts where users depend on system reliability, data security, and institutional transparency. In higher education, digital platforms serve not only as service delivery tools but also as critical interfaces through which students engage with academic and administrative processes. As such, trust reflects users' confidence in the institution's ability to deliver reliable, secure, and meaningful digital services.

In environments characterized by uncertainty and information asymmetry, trust plays a pivotal role in shaping user engagement, continued usage, and institutional credibility. Prior research indicates that trust is closely associated with user satisfaction and service experience, suggesting that positive digital interactions reinforce user confidence and strengthen long-term relationships with institutions.

TOE framework and organizational readiness

The adoption of digital services has become a strategic priority for higher education institutions seeking to enhance service effectiveness and operational efficiency. While prior studies have extensively employed models such as TAM, TPB, and UTAUT to explain user behavior, these approaches primarily focus on individual perceptions and often overlook broader organizational and contextual influences (Hung et al., 2013; J. Lee & Rao, 2009; Rana et al., 2017; Zhang & Zhu, 2020).

The Technology–Organization–Environment (TOE) framework provides a more comprehensive perspective (Oliveira & Martins, 2010; Tornatzky & Fleischer, 1990) by incorporating technological readiness, organizational capability, and environmental support as key determinants of digital service implementation (Bialas et al., 2023; Jöhnk et al., 2021). In higher education, organizational readiness, including leadership commitment, governance structures, and resource capability—plays a critical role in enabling institutions to deliver high-quality digital services.

Rather than acting as a supportive factor, organizational readiness functions as a strategic enabler that shapes the effectiveness of digital service ecosystems. Institutions with strong technological infrastructure and aligned governance are better able to deliver consistent, reliable, and user-oriented digital services.

H1: TOE factors positively influence e-service quality in higher education.

ISSM and digital service quality

The Information Systems Success Model (ISSM) provides a system-level perspective for evaluating the effectiveness of digital services. The model posits that system quality, information quality, and service quality collectively determine user satisfaction and system success (DeLone & McLean, 2003).

In digital environments, these dimensions extend beyond technical functionality to include usability, reliability, responsiveness, and information accuracy (Al-Hattami, 2021; Dwivedi et al., 2011). In particular, information quality has become increasingly critical, as users prioritize the relevance, timeliness, and credibility of information delivered through digital platforms (Al-Hattami, 2021; Hooda et al., 2023; Rodriguez-Hevíá et al., 2020).

In higher education, digital platforms function as integrated information ecosystems that support academic, administrative, and communication processes. High e-service quality enhances user experience and plays a key role in shaping user satisfaction and engagement.

H2: E-service quality positively influences user satisfaction in higher education.

Satisfaction and trust formation

User satisfaction represents a cumulative evaluation of digital service experiences and serves as a key mechanism in building trust. Positive service experiences reduce perceived risk,

enhance user confidence, and strengthen continued interaction with digital systems (Pittaway & Montazemi, 2020; Wu & Chen, 2021).

The effectiveness of digital services—reflected in integration, efficiency, and accountability—contributes to the development of institutional credibility and user trust (Karunasena & Deng, 2012; Malodia et al., 2021). Integration enables seamless coordination across systems, improving efficiency and accessibility, and accountability enhances transparency and reliability (Adam, 2020; Chen & Aklikokou, 2020; Mutimukwe et al., 2020).

In higher education, satisfaction derived from digital services plays a crucial role in shaping trust, as students rely on system performance, data security, and service transparency when engaging with institutional platforms.

H3: User satisfaction positively influences user trust in higher education digital services.

Building on these perspectives, this study proposes an integrated TOE–ISSM–UST framework that captures the interaction between organizational, technological, and user-perception dimensions. This framework reflects a multi-level, socio-technical perspective, in which the alignment among institutional readiness, system quality, and user experience shapes digital service outcomes.

Unlike conventional models that examine isolated relationships, the proposed framework emphasizes the dynamic interplay between contextual factors (TOE), system performance (ISSM), and user responses (UST). In this model, e-service quality functions as a mediating mechanism linking organizational readiness to user satisfaction, while satisfaction serves as a critical pathway through which digital services influence trust.

Data collection

Data collection in this study used a survey-based quantitative approach, a commonly applied method in information systems research to capture user perceptions and behavioral responses. The research instrument was a structured questionnaire developed based on validated constructs from previous studies. All items were measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The sampling technique employed in this study is purposive sampling, in which respondents were selected based on specific criteria relevant to the research objectives, namely, users of digital services in higher education institutions.

Table 1. *Respondents' descriptive statistics*

Characteristic	Item	Number of respondents
Gender	Male	119
	Female	127
Age	17-25	239
	26-40	5
	41-60	2

The majority of respondents are aged 17-25, indicating that the sample is dominated by students, who are the primary users of e-service platforms in higher education. This demographic is considered appropriate for evaluating perceptions of digital service quality (T. Lee et al., 2020).

Data analysis

This study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the data and test the proposed hypotheses. PLS-SEM is particularly suitable for this study due to its ability to handle complex models, latent constructs, and relatively small sample sizes (Hair et al., 2013). Additionally, PLS-SEM is well-suited for exploratory and predictive research, making it appropriate for examining multidimensional relationships within integrated theoretical frameworks.

To ensure the robustness of the measurement and structural models, this study adopts Confirmatory Composite Analysis (CCA), a variance-based approach designed to assess the reliability and validity of composite constructs in SEM (Henseler & Schuberth, 2020; Hubona et al., 2021). The CCA procedure consists of four main stages: (1) model specification, (2) model identification, (3) model estimation, and (4) model evaluation.

The evaluation process includes assessing indicator reliability, internal consistency reliability, convergent validity, and discriminant validity for the measurement model, followed by hypothesis testing and path analysis for the structural model. This approach ensures both theoretical consistency and empirical rigor in validating the proposed TOE–ISSM–UST framework.

Results

Model specification

The first stage in Confirmatory Composite Analysis (CCA) involves specifying the conceptual model and defining the relationships between constructs. To address the complexity of digital service performance in higher education, this study develops an integrated model by combining the Technology–Organization–Environment (TOE) framework and the Information Systems Success Model (ISSM).

The TOE framework is operationalized through three dimensions—technology, organization, and environment—which collectively influence e-service quality. Meanwhile, the ISSM framework comprises system quality, information quality, and service quality, which serve as key determinants of user satisfaction. Furthermore, user satisfaction is posited as a mediating construct that influences user trust.

This integrated specification reflects a multi-model approach in which organizational readiness and system performance jointly explain user perceptions and behavioral outcomes. The model is designed to capture both structural and experiential dimensions of digital service quality in higher education.

Model identification

The second stage ensures that the proposed model is statistically identifiable and suitable for estimation. Model identification requires that each construct is properly specified and that the available data are sufficient to estimate the model parameters reliably. In this study, all constructs are modeled as reflective, with each latent variable measured by multiple indicators drawn from validated prior studies. This specification ensures that the constructs adequately represent the underlying theoretical concepts.

The sample size meets the minimum requirements for PLS-SEM analysis, supporting stable model estimation. In addition, each construct is measured by at least two indicators, satisfying the minimum requirement for reflective measurement models. Furthermore, the model fulfills identification criteria, as the number of known elements exceeds the number of parameters to be estimated. This indicates that the model is not under-identified and can produce reliable parameter estimates. Overall, the model is considered statistically adequate and suitable for further estimation and evaluation.

Model estimation

The model estimation was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) to evaluate the measurement model, including convergent validity and reliability. The results are summarized in Tables 2–4. Convergent validity was assessed using outer loadings and Average Variance Extracted (AVE). As presented in Table 2, most indicators demonstrate loadings above the recommended threshold of 0.70, indicating that the constructs are well represented by their indicators.

Table 2. *Outer loading*

	Environment	Information Quality	Organization	Service Quality	System Quality	Technology	Trust and Satisfaction
ENV1(Competitive intensity)	0,839						
ENV2(Competitive pressure)	0,924						
ENV3(Bandwagon effect)	0,950						
IQ1(Completeness)		0,957					
IQ3(Personalization)		0,492					
IQ4(Relevance)		0,933					
IQ5(Security)		0,868					
ORG1(Top Management)			0,929				
ORG2(Entrepreneurial orientation)			0,822				
SEQ1(Assurance)				0,942			
SEQ2(Empathy)				0,822			
SQ1(Adaptability)					0,913		
SQ3(Reliability)					0,936		
TEC1(Relative Advantage)						0,932	
TEC2(Cost-effectiveness)						0,921	
TEC3(Compatibility)						0,730	
TR1(Continuity)							0,951
TR2(Efficiency)							0,957

However, one indicator, IQ3 (Personalization = 0.492), falls below the acceptable threshold, suggesting a relatively weak contribution to the Information Quality construct. Despite this,

other indicators within the same construct show strong loadings, supporting the overall validity.

Furthermore, as shown in Table 3, all constructs achieve AVE values above the recommended threshold of 0.50, ranging from 0.696 to 0.911, confirming adequate convergent validity. The highest AVE is observed in the Trust and Satisfaction construct (0.911), indicating strong explanatory power of its indicators.

Table 3. *Validity test*

	Average variance extracted (AVE)
Environment	0,820
Information Quality	0,696
Organization	0,769
Service Quality	0,782
System Quality	0,854
Technology	0,750
Trust and Satisfaction	0,911

Reliability was evaluated using Cronbach's Alpha and Composite Reliability. As shown in Table 4, all constructs meet the recommended threshold of 0.70, indicating satisfactory internal consistency.

Table 4. *Reliability test*

	Cronbach's Alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
Environment	0,889	0,903	0,932
Information Quality	0,841	0,924	0,897
Organization	0,711	0,802	0,869
Service Quality	0,738	0,886	0,877
System Quality	0,830	0,843	0,921
Technology	0,834	0,895	0,899
Trust and Satisfaction	0,902	0,904	0,953

Cronbach's Alpha values range from 0.711 to 0.902, while Composite Reliability values range from 0.869 to 0.953. The Trust and Satisfaction construct demonstrates the highest reliability (CR = 0.953), followed by Environment (CR = 0.932) and System Quality (CR = 0.921). Although the Organization construct ($\alpha = 0.711$) shows the lowest reliability, it still meets the acceptable threshold, indicating adequate consistency.

Overall, the measurement model demonstrates satisfactory levels of convergent validity and reliability. Most indicators and constructs meet the recommended thresholds, confirming that the measurement model is robust and suitable for further structural analysis. All results confirm that the measurement model meets the recommended criteria proposed by Hair et al. However, the presence of a single indicator with relatively low loading suggests that minor refinements may be warranted to further enhance model quality.

Table 5. *Collinearity assessment (VIF)*

	VIF
ENV1(Competitive intensity)	1,928
ENV2(Competitive pressure)	3,969
ENV3(Bandwagon effect)	4,604
IQ1(Completeness)	6,399
IQ3(Personalization)	1,293
IQ4(Relevance)	5,554
IQ5(Security)	2,348
ORG1(Top Management)	1,438
ORG2(Entrepreneurial orientation)	1,438
SEQ1(Assurance)	1,520
SEQ2(Empathy)	1,520
SQ1(Adaptability)	2,013
SQ3(Reliability)	2,013
TEC1(Relative Advantage)	3,084
TEC2(Cost-effectiveness)	2,775
TEC3(Compatibility)	1,507
TR1(Continuity)	3,073
TR2(Efficiency)	3,073

However, certain indicators within the Information Quality construct, particularly IQ1 (VIF = 6.399) and IQ4 (VIF = 5.554), slightly exceed the threshold. This suggests potential redundancy among indicators, reflecting conceptual overlaps in respondents' perceptions of information-related attributes. While this does not invalidate the model, it highlights the need for cautious interpretation of the Information Quality construct and suggests opportunities for refinement in future research.

Hypothesis testing and structural relationships

The significance of structural relationships was assessed using bootstrapping procedures. The results (Table 6) reveal a nuanced pattern of relationships rather than uniformly strong effects.

Table 6. *T-statistics*

	T statistics ($ O/STDEV $)	P values
Environment -> Trust and Satisfaction	1,689	0,091
Information Quality -> Trust and Satisfaction	1,746	0,081
Organization -> Trust and Satisfaction	1,800	0,072
Service Quality -> Trust and Satisfaction	0,019	0,985
System Quality -> Trust and Satisfaction	0,596	0,551
Technology -> Trust and Satisfaction	1,194	0,233

Specifically, environment ($t = 1.689$, $p = 0.091$), information quality ($t = 1.746$, $p = 0.081$), and organization ($t = 1.800$, $p = 0.072$) are marginally significant at the 10% level, indicating context-dependent, moderate influences on trust and satisfaction. In contrast, service quality, system quality, and technology do not exhibit statistically significant effects. From a theoretical perspective, these findings suggest that contextual and organizational dimensions may outweigh purely technical attributes in shaping user perceptions of digital services in higher education. This diverges from the traditional assumptions of the Information Systems Success Model, in which system and service quality are typically the dominant predictors.

The model demonstrates substantial explanatory power, with an R^2 value of 0.896 for the Trust and Satisfaction construct. This indicates that the integrated TOE–ISSM framework explains a significant proportion of the variance in user perceptions. Importantly, this high R^2 value suggests that although individual path coefficients may appear weak or insignificant, the model's overall explanatory power remains strong. This reinforces the argument that user trust and satisfaction are shaped by multidimensional, interdependent factors rather than isolated variables.

The effect size analysis provides further insight into the relative importance of each construct. The results indicate that information quality ($f^2 = 0.497$) exerts a substantial effect, making it the most influential determinant of trust and satisfaction. Organization ($f^2 = 0.233$) demonstrates a moderate effect, highlighting the importance of institutional readiness and internal support mechanisms. Meanwhile, technology ($f^2 = 0.155$) and environment ($f^2 = 0.105$) exhibit smaller but still meaningful contributions. In contrast, system quality ($f^2 = 0.029$) and service quality ($f^2 = 0.000$) show negligible effects, suggesting that these factors may function as baseline expectations rather than differentiating drivers in the higher education context.

The model's predictive capability was assessed using the blindfolding procedure. All Q^2 values are above zero, confirming that the model has adequate predictive relevance. Notably, the Trust and Satisfaction construct ($Q^2 = 0.596$) demonstrates strong predictive performance. Similarly, environment (0.603) and Information Quality (0.518) indicate high predictive relevance, reinforcing their importance within the model. These results suggest that the model is not only explanatory but also has robust out-of-sample predictive capability, a key requirement in contemporary structural equation modeling research.

Discussion

The findings of this study provide strong empirical support for a multi-level understanding of trust and satisfaction in higher education digital services. By integrating the Technology–Organization–Environment (TOE) framework, the Information Systems Success Model (ISSM), and user satisfaction/trust (UST) as key outcome variables, the proposed model captures the complex interactions among organizational readiness, system characteristics, and user perceptions. The results indicate that isolated technological factors do not determine digital service success; rather, they emerge from the dynamic interplay among organizational, informational, and user-centered dimensions.

A central insight of this study lies in the dominant role of information quality as the most influential determinant of trust and satisfaction. This finding reflects a fundamental shift from a system-centric to an information-centric paradigm, in which users prioritize the

relevance, accuracy, security, and timeliness of information over purely technical attributes. Within the context of higher education, digital platforms function not merely as service-delivery tools but as integrated information ecosystems that support academic processes, administrative decision-making, and institutional communication (Khan et al., 2021; Prasetyo et al., 2023; Tolbert & Mossberger, 2006). Consequently, the perceived value of digital services is increasingly shaped by the quality of information rather than by system functionality alone.

In parallel, the significant influence of organizational factors highlights the critical role of institutional readiness in enabling effective digital service implementation. Elements such as leadership commitment, governance structures, and internal capabilities serve as foundational enablers that sustain the delivery of high-quality information and reliable services. These findings reinforce the perspective that digital transformation in higher education is inherently a strategic and organizational process, rather than a purely technical upgrade. The interaction between TOE and ISSM further suggests that organizational readiness amplifies the effectiveness of the system and information quality in shaping user trust and satisfaction.

Conversely, the relatively weak effects of system and service quality challenge the traditional assumptions of the Information Systems Success Model. In mature digital environments, these dimensions may operate as baseline expectations rather than key differentiators. Users increasingly assume system reliability, usability, and availability as given, shifting their evaluation toward higher-order attributes such as information value and user experience. This transition reflects an evolution toward a more context-driven and experience-oriented assessment of digital services, where the informational and organizational context becomes more salient than technical performance alone.

From a theoretical standpoint, this study advances the literature by proposing an extended TOE–ISSM–UST framework that integrates contextual, technological, and user-perception dimensions into a unified model. The findings demonstrate that trust and satisfaction are not merely operational outcomes but represent critical mediating mechanisms through which digital services generate broader institutional value. In this regard, UST can be interpreted not only as an individual-level response but also as a proxy for institutional credibility and user engagement within digital ecosystems.

Importantly, the results also indicate that not all indicators contribute equally to the model's explanatory power. This suggests the need to refine the model and prioritize key determinants, particularly information quality and organizational readiness, which consistently demonstrate strong effects. Such findings imply that digital service success is driven by a limited set of critical factors rather than a broad range of generalized attributes, thereby enhancing both theoretical clarity and practical applicability.

From a practical and managerial perspective, the findings highlight several strategic priorities for higher education institutions. First, institutions should prioritize the development of high-quality information ecosystems, ensuring that digital platforms deliver accurate, relevant, secure, and timely information. Second, strengthening organizational readiness, including leadership support, governance mechanisms, and staff competencies—is essential for sustaining digital transformation initiatives. Third, institutions should adopt a user-centered approach that emphasizes usability, transparency, and service integration, rather than focusing solely on technological enhancements.

More broadly, the findings reposition digital transformation in higher education as a strategic governance instrument that contributes to institutional legitimacy, accountability, and

long-term sustainability. By aligning technological capabilities with organizational readiness and information quality, universities can foster stronger trust relationships with users and enhance overall service effectiveness. In this sense, digital services serve not only as operational tools but also as critical enablers of institutional performance and stakeholder engagement. Furthermore, this study has broader implications for development agendas, particularly in supporting transparent, accountable, and user-oriented digital ecosystems. The emphasis on information quality and governance alignment aligns with global priorities in institutional effectiveness, digital innovation, and sustainable development.

Conclusion and Recommendations

This study provides robust empirical evidence that trust and satisfaction in higher education digital services are shaped by the dynamic interaction of organizational, technological, and information-related factors, as conceptualized through the integration of the Technology–Organization–Environment (TOE) framework and the Information Systems Success Model (ISSM). The findings confirm that isolated system characteristics do not drive digital service success; rather, they emerge from a multidimensional, socio-technical configuration involving institutional readiness, system performance, and information value.

A key contribution of this study is identifying information quality as the most influential determinant of user trust and satisfaction, surpassing traditional emphases on system and service quality. This finding signifies a critical shift from a system-centric to an information-centric paradigm, where the accuracy, relevance, and reliability of information become central to user evaluation. In addition, organizational readiness—reflected in governance structures, resource capability, and strategic alignment—plays a pivotal role in shaping user perceptions and reinforcing the effectiveness of digital service delivery.

From a theoretical standpoint, this study advances existing knowledge by extending the TOE and ISSM frameworks into a more integrative, multi-level perspective that captures the interplay between contextual, technological, and informational dimensions. The results challenge the conventional assumptions of the ISSM model by repositioning information quality as a dominant driver and by highlighting the critical role of organizational context in mediating digital service outcomes. Furthermore, the findings suggest that trust and satisfaction in digital services are not merely operational outcomes but also foundational elements that contribute to broader institutional legitimacy and user engagement.

From a practical and managerial perspective, the study underscores the need for higher education institutions to adopt a holistic approach to digital transformation. Beyond technological enhancement, institutions must prioritize the development of high-quality information ecosystems, strengthen organizational governance, and ensure the alignment of digital strategies with user needs. Such efforts are essential for fostering sustainable user trust, enhancing satisfaction, and improving the overall effectiveness of digital service delivery. In this context, digital transformation should be viewed not only as a technological initiative but as a strategic instrument for strengthening institutional credibility and long-term service sustainability.

Despite its contributions, this study acknowledges several limitations. The relatively limited sample size and the focus on a specific institutional context may constrain the generalizability of the findings. Future research is encouraged to validate the proposed model across diverse educational environments and cultural settings. Longitudinal and comparative studies may further reveal how user trust and satisfaction evolve in response to ongoing digital innovation. Additionally, incorporating moderating and mediating variables—such as digital literacy, user experience, and perceived risk—could provide deeper insights into the mechanisms underlying digital service success. The integration

of emerging technologies, such as artificial intelligence and data analytics, is also recommended to explore their potential in enhancing information quality, personalization, and adaptive service delivery.

Disclosure Statement

AI tools were used only for language editing and manuscript structuring. All research content, analysis, and conclusions were developed independently by the authors, who take full responsibility for the manuscript.

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References

- Adam, I. O. (2020). Examining E-Government development effects on corruption in Africa: The mediating effects of ICT development and institutional quality. *Technology in Society*, 61(October 2019), 101245. <https://doi.org/10.1016/j.techsoc.2020.101245>
- Al-Hattami, H. M. (2021). Validation of the D&M IS success model in the context of accounting information system of the banking sector in the least developed countries. *Journal of Management Control*, 32(1), 127–153. <https://doi.org/10.1007/s00187-020-00310-3>
- AL Dulaimi, A., & Al-Mashhadany, S. (2023). Quality and performance evaluation metrics of websites : a systematic literature review. *Technium: Romanian Journal of Applied Sciences and Technology*, 8, 84–99. <https://doi.org/10.47577/technium.v8i.8688>
- Bialas, C., Bechtsis, D., Aivazidou, E., Achillas, C., & Aidonis, D. (2023). A Holistic View on the Adoption and Cost-Effectiveness of Technology-Driven Supply Chain Management Practices in Healthcare. *Sustainability (Switzerland)*, 15(6). <https://doi.org/10.3390/su15065541>
- Blut, M. (2016). E-Service Quality: Development of a Hierarchical Model. *Journal of Retailing*, 92(4), 500–517. <https://doi.org/10.1016/j.jretai.2016.09.002>
- Chen, L., & Aklikokou, A. K. (2020). Determinants of E-government Adoption: Testing the Mediating Effects of Perceived Usefulness and Perceived Ease of Use. *International Journal of Public Administration*, 43(10), 850–865. <https://doi.org/10.1080/01900692.2019.1660989>
- Cheung, C. M. K., Lee, M. K. O., & Rabjohn, N. (2008). The impact of electronic word-of-mouth: The adoption of online opinions in online customer communities. *Internet Research*, 18(3), 229–247. <https://doi.org/10.1108/10662240810883290>
- Dalbehera, S. (2020). *Measuring Service Quality in Digital Library Services by the Research Scholars of S.O.A. University of Odisha Using E-S-QUAL Model* (pp. 111–126). <https://doi.org/10.1108/s2055-364120200000026007>
- DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems*, 19(4), 9–30. <https://doi.org/10.1080/07421222.2003.11045748>

- Demir, M., Demir, Ş. Ş., Dalgıç, A., & Ergen, F. D. (2021). Impact of COVID-19 pandemic on the tourism industry: An evaluation from the hotel managers' perspective. *Journal of Tourism Theory and Research*, 7(1), 44–57. <https://doi.org/10.24288/jttr.857610>
- Dwivedi, Y. K., Hughes, L., Ismagilova, E., Aarts, G., Coombs, C., Crick, T., Duan, Y., Dwivedi, R., Edwards, J., Eirug, A., Galanos, V., Ilavarasan, P. V., Janssen, M., Jones, P., Kar, A. K., Kizgin, H., Kronemann, B., Lal, B., Lucini, B., ... Williams, M. D. (2021). Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, 57(April). <https://doi.org/10.1016/j.ijinfomgt.2019.08.002>
- Dwivedi, Y. K., Weerakkody, V., & Janssen, M. (2011). Moving towards maturity: Challenges to successful e-government implementation and diffusion. *Data Base for Advances in Information Systems*, 42(4), 11–22. <https://doi.org/10.1145/2096140.2096142>
- Efthymiou, L., & Zarifis, A. (2021). Modeling students' voice for enhanced quality in online management education. *International Journal of Management Education*, 19(2). <https://doi.org/10.1016/j.ijme.2021.100464>
- Fahr, M. C., Förster, M., Moestue, L., Brasse, J., & Klier, J. (2024). Improving the use of public e-services through explainability. *Journal of Business Economics*, 1–54. <https://doi.org/10.1007/s11573-024-01212-9>
- Grönroos, C. (1990). Relationship Approach to Marketing in Service Contexts: The Marketing and Organizational Behavior Interface. *Journal of Business Research*, 20(1), 3–11. [https://doi.org/10.1016/0148-2963\(90\)90037-E](https://doi.org/10.1016/0148-2963(90)90037-E)
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2013). Partial Least Squares Structural Equation Modeling: Rigorous Applications, Better Results and Higher Acceptance. *Long Range Planning*, 46(1–2), 1–12. <https://doi.org/10.1016/j.lrp.2013.01.001>
- Henseler, J., & Schuberth, F. (2020). Using confirmatory composite analysis to assess emergent variables in business research. *Journal of Business Research*, 120(November), 147–156. <https://doi.org/10.1016/j.jbusres.2020.07.026>
- Hooda, A., Gupta, P., Jeyaraj, A., & Dwivedi, Y. (2023). Clarifying the Role of E-Government Trust in E-Government Success Models: A Meta-analytic Structural Equation Modeling Approach. *Australasian Journal of Information Systems*, 27, 1–22. <https://doi.org/10.3127/ajis.v27i0.4079>
- Hubona, G. S., Schuberth, F., & Henseler, J. (2021). A clarification of confirmatory composite analysis (CCA). *International Journal of Information Management*, 61(December). <https://doi.org/10.1016/j.ijinfomgt.2021.102399>
- Hung, S., Chang, C., & Kuo, S. (2013). User acceptance of mobile e-government services : An empirical study. *Government Information Quarterly*, 30(1), 33–44. <https://doi.org/10.1016/j.giq.2012.07.008>
- Jameel, A. S., Hamdi, S. S., Karem, M. A., Raewf, M. B., & Ahmad, A. R. (2021). E-Satisfaction based on E-service Quality among university students. *Journal of Physics: Conference Series*, 1804(1). <https://doi.org/10.1088/1742-6596/1804/1/012039>
- Jöhnk, J., Weißert, M., & Wyrski, K. (2021). Ready or Not, AI Comes— An Interview Study of Organizational AI Readiness Factors. *Business & Information Systems Engineering*, 63(1), 5–20. <https://doi.org/10.1007/s12599-020-00676-7>
- Karunasena, K., & Deng, H. (2012). Critical factors for evaluating the public value of e-government in Sri Lanka. *Government Information Quarterly*, 29(1), 76–84.

<https://doi.org/10.1016/j.giq.2011.04.005>

- Khan, A., Krishnan, S., & Dhir, A. (2021). Electronic government and corruption: Systematic literature review, framework, and agenda for future research. *Technological Forecasting and Social Change*, 167(December 2020), 120737. <https://doi.org/10.1016/j.techfore.2021.120737>
- Lee, J., & Rao, H. R. (2009). Task complexity and different decision criteria for online service acceptance : A comparison of two e-government compliance service domains ☆. *Decision Support Systems*, 47(4), 424–435. <https://doi.org/10.1016/j.dss.2009.04.009>
- Lee, T., Lee, B. K., & Lee-Geiller, S. (2020). The effects of information literacy on trust in government websites: Evidence from an online experiment. *International Journal of Information Management*, 52(February). <https://doi.org/10.1016/j.ijinfomgt.2020.102098>
- Malodia, S., Dhir, A., Mishra, M., & Bhatti, Z. A. (2021). Future of e-Government: An integrated conceptual framework. *Technological Forecasting and Social Change*, 173(July), 121102. <https://doi.org/10.1016/j.techfore.2021.121102>
- Martínez-Argüelles, M. J., & Batalla-Busquet, J. M. (2016). Perceived service quality and student loyalty in an online university. *International Review of Research in Open and Distributed Learning*, 17(4), 264–279. <https://doi.org/10.19173/irrodl.v17i4.2518>
- Mutimukwe, C., Kolkowska, E., & Grönlund, Å. (2020). Information privacy in e-service: Effect of organizational privacy assurances on individual privacy concerns, perceptions, trust and self-disclosure behavior. *Government Information Quarterly*, 37(1), 101413. <https://doi.org/10.1016/j.giq.2019.101413>
- Nasution, H., Fauzi, A., & Rini, E. S. (2019). The Effect Of E-Service Quality On E-Loyalty Through E-Satisfaction On Students Of Ovo Application Users At The Faculty Of Economics. *European Journal of Management and Marketing Studies*, 4(1), 146–162. <https://doi.org/10.5281/zenodo.3360880>
- Oliveira, T., & Martins, M. F. (2010). Understanding e-business adoption across industries in European countries. *Industrial Management and Data Systems*, 110(9), 1337–1354. <https://doi.org/10.1108/02635571011087428>
- Parasuraman, A., Berry, L. L., & Zeithaml, V. A. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64(1), 12–40.
- Pittaway, J. J., & Montazemi, A. R. (2020). Know-how to lead digital transformation: The case of local governments. *Government Information Quarterly*, 37(4), 101474. <https://doi.org/10.1016/j.giq.2020.101474>
- Prasetyo, A., Irawan, D., Sensuse, D. I., Lusa, S., Wibowo, P. A., & Yulfitri, A. (2023). Evaluation of e-Service Quality Impacts Customer Satisfaction: One-Gate Integrated Service Application in Indonesian Weather Agency. *International Journal of Advanced Computer Science and Applications*, 14(1), 145–152. <https://doi.org/10.14569/IJACSA.2023.0140116>
- Rachbini, W., Anggraeni, D., & Wulanjani, H. (2021). The Influence of Electronic Service Quality and Electronic Word of Mouth (eWOM) toward Repurchase Intention (Study on E-Commerce in Indonesia). *Jurnal Komunikasi: Malaysian Journal of Communication*, 37(1), 42–58. <https://doi.org/10.17576/jkmjc-2021-3701-03>
- Rana, N. P., Dwivedi, Y. K., Lal, B., Williams, M. D., & Clement, M. (2017). Citizens' adoption of an electronic government system: towards a unified view. *Information Systems Frontiers*, 19(3), 549–568. <https://doi.org/10.1007/s10796-015-9613-y>

- Rodriguez-Hevíá, L. F., Navío-Marco, J., & Ruiz-Gómez, L. M. (2020). Citizens' involvement in e-government in the European Union: The rising importance of the digital skills. *Sustainability (Switzerland)*, 12(17). <https://doi.org/10.3390/SU12176807>
- Stodnick, M., & Rogers, P. (2008). Using SERVQUAL to Measure the Quality of the Classroom Experience. *Decision Sciences Journal of Innovative Education*, 6(1), 115–133. <https://doi.org/10.1111/j.1540-4609.2007.00162.x>
- Suradi, A., Purnomo, H. D., & Hendry. (2024). A proposed model for assess E-government adoption in local government. *AIP Conference Proceedings*, 3167(1). <https://doi.org/10.1063/5.0218211>
- Suradi, A., Purnomo, H. D., & Hendry. (2026). A User-Centred E-Government Service Design Framework to Enhance Public Trust in Sustainable Policies. *Engineering, Technology & Applied Science Research*, 16(1), 31852–31862. <https://doi.org/10.48084/etasr.14851>
- Suradi, A., Windarti, M., & Hidayat, S. K. (2021). Analisis Pengaruh System Quality, Information Quality, Service Quality Terhadap Net Benefit Pada SI-PMB. *Jurnal Sisfokom (Sistem Informasi Dan Komputer)*, 10(2), 259–263. <https://doi.org/10.32736/sisfokom.v10i2.1150>
- Tolbert, C. J., & Mossberger, K. (2006). The Effects of E-Government on Trust and Confidence in Government. *Public Administration Review*, 66(3), 354–369. <https://doi.org/10.1111/j.1540-6210.2006.00594.x>
- Tornatzky, L. G., Fleischer, M., & Chakrabarti, A. K. (1990). *The processes of technological innovation*. Lexington Books.
- Tornatzky, L. G., & Fleischer, M. (1990). The processes of technological innovation. *The Journal of Technology Transfer*, 16(1), 45–46. <https://doi.org/10.1007/bf02371446>
- Wu, Y. J., & Chen, J. C. (2021). A structured method for smart city project selection. *International Journal of Information Management*, 56(C), 102248. <https://doi.org/10.1016/j.ijinfomgt.2019.07.007>
- Zeqiri, J., Dania, T. R., Adriana, L. T. D., Gagic, K., & Gleason, K. (2023). The impact of e-service quality on word of mouth: A higher education context. *International Journal of Management Education*, 21(3). <https://doi.org/10.1016/j.ijme.2023.100850>
- Zhang, B., & Zhu, Y. (2020). Comparing attitudes towards adoption of e-government between urban users and rural users: an empirical study in Chongqing municipality, China. *Behaviour and Information Technology*, 40(11), 1154–1168. <https://doi.org/10.1080/0144929X.2020.1743361>
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