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IMPACT OF E-GOVERNANCE ON CITIZEN ENGAGEMENT: MEDIATING ROLE OF CITIZEN SATISFACTION IN PUBLIC SECTOR INSTITUTIONS

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Abstract

This study explores how e-governance service quality influences citizen engagement, focusing on the mediating Citizen Satisfaction. Drawing upon the Technology Acceptance Model, Expectation Confirmation Theory, and Public Value Theory, salaried employees of public sector universities in the Hazara region of Pakistan. A quantitative research design using simple random sampling was employed, and data were collected through structured questionnaires. Regression and mediation analyses revealed that e-governance service quality significantly enhances citizen engagement, Citizen Satisfaction with acting as partial mediator. The study emphasizes that improving digital service quality can foster stronger public trust, transparency, and participation. Policy implications suggest that prioritizing accessibility, responsiveness, and system reliability can strengthen Pakistan's digital governance framework.

INTRODUCTION

E-governance, or digital governance, refers to the use of information and communication technologies (ICTs) to enhance the efficiency, transparency, and accountability of government services. Worldwide, it has transformed public administration by streamlining service delivery, reducing bureaucratic delays, and fostering citizen participation. In developing countries such as Pakistan, e-governance holds considerable potential to address longstanding challenges, including inefficiency, corruption, and limited transparency. However, its successful implementation is often constrained by structural, institutional, and technological barriers. In Pakistan, the government has introduced several digital platforms, including online tax filing systems, NADRA identity and verification services, the Pakistan Citizen Portal, and digitalized land records. These initiatives aim to modernize public administration and improve service accessibility. Despite these advancements, citizen engagement with e-governance services remains inconsistent. Many individuals continue to rely on traditional in-person services due to concerns related to system usability, reliability, information quality, security, accessibility, and trust. As a result, service quality becomes a central factor influencing citizens' adoption and continued use of digital government services. Additionally, citizen satisfaction serve as important mediators, shaping the frequency and depth of citizen interaction with e-governance platforms.

The implementation of e-governance in Pakistan also faces broader challenges, including limited ICT

infrastructure, low levels of digital literacy, insufficient institutional capacity, a shortage of skilled personnel, cybersecurity vulnerabilities, and resistance to organizational change. Political instability and complex regulatory structures further exacerbate these difficulties, often leading citizens to perceive digital systems as unreliable or difficult to navigate. These issues highlight the need for a deeper investigation into how service quality and other psychological and behavioral factors influence citizen engagement with digital platforms. This study focuses on salaried employees of public sector universities in the Hazara region who routinely interact with digital tax systems and other e-governance services. It examines the influence of service quality on citizen engagement and explores the mediating roles of citizen satisfaction. The findings are expected to enrich the academic literature on digital governance while offering practical insights for policymakers seeking to enhance the accessibility, reliability, and citizen-centric nature of e-governance systems in Pakistan.

1.1 Research Problem

E-governance has emerged as a transformative tool for improving government service delivery, transparency, and citizen participation. In Pakistan, platforms such as online tax filing systems, NADRA digital services, and electronic land record systems have been introduced to modernize public administration. However, the effectiveness and adoption of these systems remain inconsistent, particularly in regions like Hazara, where citizens frequently encounter barriers related to system usability, reliability, information quality, security, and accessibility. These challenges negatively affect their engagement with digital platforms. Additionally, factors such as limited ICT infrastructure, low digital literacy, insufficient skilled personnel, and data privacy concerns impede the adoption and sustained use of e-governance services. Understanding how service quality influences citizen engagement, and the extent to which citizen satisfaction mediates this relationship, is therefore essential for developing effective digital governance strategies in Pakistan.

1.2 Research Questions

This study is guided by the central research question: How does e-governance service quality influence citizen engagement among salaried employees of public sector universities in the Hazara region of Pakistan? In addressing this question, the study explores how perceived service quality affects engagement with e-governance platforms, the mediating role of citizen satisfaction in the relationship between service quality and citizen engagement, and the structural or behavioral challenges that hinder effective adoption and use of e-governance systems among university employees in Hazara.

1.3 Research Objectives

The primary objective of this study is to examine the impact of e-governance service quality on citizen engagement and to evaluate the mediating role of citizen satisfaction among salaried employees in the Hazara region. Specifically, the research seeks to assess the current level of engagement with digital taxation and other e-governance services; identify key dimensions of service quality such as usability, reliability, information quality, security, and responsiveness; analyze the mediating effects of citizen satisfaction on engagement; and provide actionable recommendations for improving e-governance service delivery and citizen participation in Pakistan.

1.4 Research Significance

This study is significant because it provides empirical insights into how service quality shapes citizen engagement with e-governance platforms in the Hazara region of Pakistan. By examining the mediating role of citizen satisfaction, it offers a deeper understanding of citizen behavior within the digital governance landscape. The findings of this research can support policymakers, government departments, and public institutions in designing more effective, accessible, secure, and citizen-oriented e-governance systems that align with the country's digital transformation goals.

1.5 Research Scope

The scope of this research is limited to salaried employees of public sector universities in the Hazara region who regularly interact with e-governance services, particularly digital tax filing systems. The study focuses on analyzing key dimensions of service

quality that influence citizen engagement and assessing the mediating role of perceived service value in shaping user interactions. Furthermore, the scope includes developing recommendations to enhance service delivery, system usability, trust, and overall citizen participation in digital governance platforms across Pakistan.

2. Literature Review

This section provides an in-depth review of literature related to e-governance, service quality, citizen satisfaction, and citizen engagement, with particular emphasis on the mediating role of citizen satisfaction. The review draws upon classical service quality theories, Expectation–Confirmation Theory, and contemporary e-government research to establish theoretical grounding and empirical justification for the proposed relationships (Parasuraman et al., 1988; Bhattacherjee, 2001; UNDP, 2018).

2.1 E-Governance and Citizen Engagement

E-governance is defined as the strategic application of information and communication technologies (ICTs) to transform government operations, enhance service delivery, and strengthen democratic governance (UNDP, 2018; OECD, 2020). It extends beyond administrative automation to include online public services, digital identity systems, e-participation platforms, grievance redressal mechanisms, and electronic decision-making processes (Heeks, 2006; United Nations, 2020). Through e-governance initiatives, governments aim to improve transparency, accountability, responsiveness, and citizen trust. Citizen engagement in e-governance refers to the extent to which individuals actively interact with digital government platforms for service utilization, feedback provision, complaint submission, and participation in governance-related activities (Nam, 2012; OECD, 2019). Engagement is a multidimensional construct encompassing behavioral, emotional, and cognitive involvement with digital public services (Bovaird & Löffler, 2012). Prior research indicates that citizen engagement is significantly influenced by perceptions of system usability, trustworthiness, and overall service quality (Siddique, 2021; Alzahrani et al., 2017). Empirical evidence suggests that high-quality e-governance systems promote sustained engagement by reducing transaction costs, improving convenience, and enhancing perceived government responsiveness (Meijer et al., 2012; Mehmood, 2021). Conversely, poorly designed systems characterized by technical failures, slow response times, and limited interactivity reduce citizen participation and weaken trust in public institutions (Heeks, 2006; UNDP, 2018). Therefore, citizen engagement is not merely a technological outcome but also a reflection of service quality and user experience within digital governance environments.

2.2 Service Quality in E-Governance

Service quality is one of the most widely examined determinants of user behavior in digital service environments (Parasuraman et al., 1988; Zeithaml et al., 1996). In e-governance contexts, service quality is conceptualized as citizens' overall assessment of the performance, reliability, and effectiveness of digital government services (Papadomichelaki & Mentzas, 2012; Alathur et al., 2016). Drawing from SERVQUAL and Information Systems (IS) success models, e-governance service quality typically includes system quality, information quality, responsiveness, security, accessibility, and interactivity (DeLone & McLean, 2003; Papadomichelaki & Mentzas, 2012). System quality reflects the technical performance, reliability, and ease of use of e-governance platforms, while information quality concerns the accuracy, relevance, completeness, and timeliness of online content (DeLone & McLean, 2003). Service responsiveness captures the speed and effectiveness of support mechanisms, whereas interactivity reflects opportunities for two-way communication between citizens and government agencies (Alzahrani et al., 2017). Security and privacy are particularly critical in public sector digital services, as citizens must trust that their personal data are adequately protected (Carter & Bélanger, 2005). Multiple empirical studies confirm that high levels of e-governance service quality enhance perceived usefulness, trust, and citizen satisfaction, leading to higher adoption and engagement rates (Mehmood, 2021; Siddique, 2021). In contrast, system failures, security concerns, and poor service design negatively affect perceived value and discourage continued usage (Heeks, 2006; Alathur et al., 2016). These findings establish service quality as a foundational driver of positive behavioral

outcomes in e-governance. Accordingly, the following hypothesis is proposed:

H1: E-governance service quality positively influences citizen engagement.

2.3 Citizen Satisfaction as a Mediating Variable

Citizen satisfaction represents a user's overall affective and cognitive evaluation of their experience with e-governance services (Oliver, 1997). Rooted in Expectation–Confirmation Theory (ECT), satisfaction arises when perceived service performance meets or exceeds users' prior expectations (Bhattacherjee, 2001). In digital government contexts, satisfaction reflects citizens' judgments regarding system usability, service efficiency, reliability, transparency, and value creation (Wang & Liao, 2008).

2.3.1 Determinants of Citizen Satisfaction in E-Governance

Prior literature consistently identifies service quality as a primary antecedent of citizen satisfaction (Parasuraman et al., 1988; DeLone & McLean, 2003). High system reliability, accurate information, secure transactions, and timely responses positively shape satisfaction levels (Wang & Liao, 2008; Papadomichelaki & Mentzas, 2012). When citizens experience seamless interactions with digital platforms, their confidence in government capabilities increases, resulting in favorable evaluations of public services (Siddique, 2021). Moreover, satisfaction in e-governance is influenced by perceived fairness, transparency, and accountability (Bovaird & Löffler, 2012; OECD, 2019). Digital platforms that allow citizens to track applications, receive timely updates, and lodge complaints enhance perceptions of procedural justice, which further strengthens satisfaction. Studies conducted in developing countries reveal that satisfaction is particularly sensitive to system reliability and responsiveness due to infrastructural constraints (Mehmood, 2021; Siddique, 2021).

2.3.2 Citizen Satisfaction and Citizen Engagement

Citizen satisfaction plays a crucial role in shaping post-adoption behaviors, including continued use, trust, loyalty, and citizen engagement (Oliver, 1997; Bhattacherjee, 2001). Satisfied citizens are more likely to repeatedly use e-governance platforms, participate in feedback mechanisms, and recommend digital services to others (Wang & Liao, 2008). In contrast, dissatisfaction often leads to disengagement, resistance, and reliance on traditional service delivery channels (Heeks, 2006). Empirical research demonstrates that satisfaction directly influences citizen engagement by reinforcing positive attitudes toward digital governance (Alzahrani et al., 2017; Siddique, 2021). When citizens are satisfied with service delivery, they develop confidence in government systems, encouraging deeper and more sustained interaction. Thus, satisfaction serves as a psychological mechanism linking service experience to engagement behavior (Bhattacherjee, 2001). Based on this evidence, the following hypothesis is proposed:

H2: Citizen satisfaction positively influences citizen engagement.

2.4 Mediating Role of Citizen Satisfaction

The mediating role of satisfaction is widely supported in both private and public sector service research (Oliver, 1997; Zeithaml et al., 1996). In e-governance studies, citizen satisfaction acts as an intermediate mechanism through which service quality translates into behavioral outcomes such as trust, loyalty, and engagement (Wang & Liao, 2008; Papadomichelaki & Mentzas, 2012). High service quality improves user experiences, which enhances satisfaction and subsequently increases engagement with digital platforms. From a theoretical perspective, this mediation is explained by Expectation–Confirmation Theory and service quality frameworks, which posit that service performance influences behavioral intentions primarily through satisfaction (Bhattacherjee, 2001). Without satisfaction, improvements in service quality may not result in sustained engagement, particularly in public sector contexts where usage is often voluntary (Heeks, 2006). Empirical studies in e-government settings confirm that citizen satisfaction partially or fully mediates the relationship between service quality and engagement outcomes (Alzahrani et al., 2017; Siddique, 2021). This mediating mechanism is especially relevant in developing countries, where infrastructural challenges make user experience a critical determinant of continued usage (Mehmood,

2021). Accordingly, the following hypothesis is formulated:

H3: Citizen satisfaction mediates the relationship between e-governance service quality and citizen engagement.

2.5 Challenges Affecting Service Quality and Satisfaction

Despite its potential, e-governance implementation faces technological, institutional, socio-cultural, and security challenges that directly affect service quality and citizen satisfaction (Heeks, 2006; UNDP, 2017).

2.5.1 Technological Challenges

Limited internet access, unreliable electricity supply, and inadequate digital infrastructure restrict the usability of e-governance platforms, particularly in rural areas (ITU, 2018). Pakistan's low internet penetration and bandwidth disparities reduce citizens' ability to access digital services consistently (PTA, 2020). Additionally, shortages of skilled IT professionals hinder system maintenance and innovation (Vukanovic, 2013).

2.5.2 Institutional and Socio-Cultural Challenges

Weak political commitment, limited institutional capacity, and fragmented governance structures undermine service quality and responsiveness (Defitri, 2022; UNDP, 2017). Low digital literacy, language barriers, and limited awareness further reduce satisfaction and engagement, particularly among marginalized populations (ITU, 2018; Shahzad et al., 2018).

2.6 Security, Privacy, and Trust

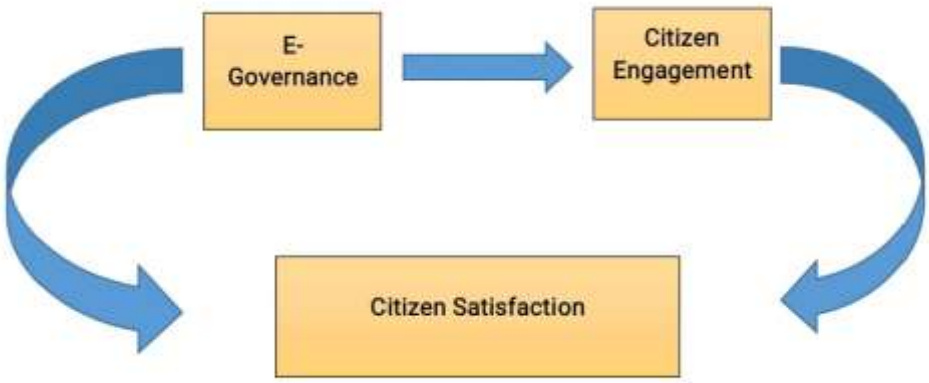
Security and privacy concerns significantly influence satisfaction and engagement in e-governance systems (Carter & Bélanger, 2005). Citizens are unlikely to engage with digital platforms if they perceive risks related to data misuse or cyber threats. Robust cybersecurity measures, transparent privacy policies, and secure authentication systems enhance user confidence, satisfaction, and long-term engagement (FIA, 2019; Siddique, 2021).

2.7 E-Governance in Pakistan

Pakistan has made notable progress through initiatives such as NADRA's biometric services, digital taxation systems, and the Pakistan Citizen Portal (UNDP, 2018). However, infrastructural limitations, institutional weaknesses, and trust deficits continue to constrain citizen satisfaction and engagement. Strengthening service quality and focusing on citizen-centric design are essential for improving digital governance outcomes in Pakistan (PTA, 2020; OECD, 2020).

2.8 Theoretical Framework

The theoretical model suggests that service quality alone may not fully determine engagement. Instead, citizen satisfaction mediate the relationship by shaping users' emotional and cognitive evaluations of the service. The following theoretical framework was developed based on review of relevant literature (see, Figure 1).



H1: E-governance service quality positively influences citizen engagement.

H2: citizen satisfaction positively influences citizen engagement.

H3: citizen satisfaction mediates the relationship between e-governance service quality and citizen engagement.

This study hypothesizes: (H1) Service quality positively influences citizen engagement; (H2) citizen satisfaction mediates the relationship between service quality and engagement.

3. Methods

This study uses a quantitative research design to explore how service quality influences citizen engagement with e-governance platforms, with particular attention to the mediating role of citizen satisfaction. A structured questionnaire was used to gather data because it allows for consistent measurement of key constructs and supports the statistical testing required to examine both direct and indirect relationships among variables. The study was conducted among salaried employees of public sector universities in the Hazara region, as they frequently interact with digital government services for filing taxes, applying for official documents, and accessing employment-related information. Data collection took place through physical distribution of the questionnaire, and a total of 250 individuals voluntarily participated after being informed about the purpose of the study, ethical considerations, and the confidentiality of their responses. To ensure that each member of the population had an equal chance of being included, the study employed simple random sampling, which helps reduce bias and improves the generalizability of the findings. The final sample size of 250 completed questionnaires was sufficient for conducting regression and mediation analyses, enabling the study to assess how service quality shapes citizens' engagement with e-governance platforms through the mediating effects of perceived service value and satisfaction.

3.1 Measures and Instruments

The study used a structured questionnaire based on established scales to measure the constructs. A 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) was used for all items. The constructs and measurement sources are as follows:

Service Quality: Adapted from previous studies measuring usability, reliability, security, accessibility, information quality, interactivity, and responsiveness.

Perceived Service Value: Measured by assessing citizens' overall evaluation of benefits versus costs of using e-governance services.

Citizen Engagement: Measured as the extent to which citizens interact with, use, and recommend e-governance platforms.

The questionnaire items were pre-tested to ensure clarity and reliability.

3.2 Data Analysis

Data were analyzed using SPSS (Statistical Package for the Social Sciences). The following analyses were conducted:

Reliability Analysis: Cronbach's alpha was calculated to ensure internal consistency of constructs.

Descriptive Statistics: Mean, standard deviation, median, and mode were computed to summarize the data.

Regression Analysis: Examined the direct relationships among independent, mediator, and dependent variables.

Mediation Analysis: Conducted using the bootstrap method to test indirect effects of perceived service value and citizen satisfaction between service quality and citizen engagement.

These methods enabled a robust examination of the relationships among variables and tested the hypotheses of the study.

4. Result and Analysis

4.1 Introduction

This study examined the impact of e-governance service quality (SQ) on citizen engagement (CE), with citizen satisfaction (CSF) as mediators. Data were collected from 250 respondents from public sector universities in the Hazara region. Analyses included descriptive statistics, reliability testing, correlation analysis, multiple regression, and mediation analysis to evaluate the proposed model.

4.2 Demographic Profile of Respondents

Table 1 presents the demographic characteristics of the respondents. The sample was predominantly male (72.4%) and mainly aged 40–50 years (47.2%). Most participants held a PhD (50.8%) and were employed

full-time (77.6%). Faculty members formed the majority of respondents (70%), and most reported occasional or rare use of e-governance services (79.6%). These results suggest that the sample is largely experienced academic staff with moderate interaction with digital government platforms.

Table 1: Demographic Characteristics of Respondents

Factors	Category	n	%
Gender	Male	181	72.4
	Female	69	27.6
Age	21–30	5	2.0
	30–40	87	34.8
	40–50	118	47.2
	50+	40	16.0
Education	BA/BSc	23	9.2
	MA/MSc	40	16.0
	M.Phil	60	24.0
	PhD	127	50.8
Employment Status	Full-time	194	77.6
	Contract	50	20.0
	Part-time	6	2.4
Job Description	Faculty	175	70.0
	Administrative Staff	75	30.0
Income (PKR)	<600,000	31	12.4
	600,000–1,200,000	86	34.4
	1,200,000–2,200,00	54	21.6
	2,200,000–3,200,00	79	31.6
E-Governance Usage	Rare	87	34.8
	Occasional	112	44.8
	Frequent	40	16.0
	Very Frequent	11	4.4

Reliability Analysis

The reliability of the measurement instruments was examined using Cronbach's alpha to ensure internal consistency among the items measuring each construct. The results indicate that all constructs demonstrate satisfactory reliability. Service Quality (SQ), measured through 26 items, reported a Cronbach's alpha value of .848, reflecting strong internal consistency. Citizen Engagement (CE) also showed high reliability, with an alpha coefficient of .866 based on three items. Likewise, Citizen Satisfaction (CSF) achieved an acceptable level of reliability, with a Cronbach's alpha value of .830. All reliability coefficients exceed the recommended threshold of .70, indicating that the measurement scales are reliable and appropriate for further empirical analysis.

Table 2: Reliability Analysis of Constructs

Variables	Sample Item	Items	A
Service Quality (SQ)	All services and features of the FBR webs function properly without any errors	26	0.848
Citizen Engagement (CE)	I plan to increase my use of FBR website the future as it helps maintain records income/expenditure	3	0.866

Variables	Sample Item	Items	A
Citizen Satisfaction (CSF)	I am satisfied with the service I receive fr the government FBR website	3	0.830

4.4 Descriptive Statistics

Descriptive statistics provide an overview of respondents' perceptions of e-governance service quality, engagement, perceived value, and satisfaction. Table 3 presents the means and standard deviations of the study variables. Respondents reported moderately high service quality (M = 3.664) and citizen engagement (M = 3.660). Perceived service value (M = 3.509) and citizen satisfaction (M = 3.445) were also moderate, with satisfaction showing greater variability. These findings indicate generally positive perceptions but suggest differences in experience with e-governance services.

Table 3: Descriptive Statistics

Variables	N	Min	Max	M	SD
SQ	250	2.22	5.00	3.664	0.683
CE	250	2.00	5.00	3.660	0.892
CSF	250	1.00	5.00	3.445	1.156

4.5 Correlation Analysis

Pearson's correlation analysis was employed to examine the associations among Service Quality (SQ), Citizen Satisfaction (CSF), and Citizen Engagement (CE). The findings reveal a positive and statistically significant relationship between Service Quality and Citizen Satisfaction ($r = .663$, $p < .01$). Service Quality also demonstrates a significant positive association with Citizen Engagement ($r = .561$, $p < .01$). Furthermore, Citizen Satisfaction is positively and significantly related to Citizen Engagement ($r = .623$, $p < .01$). All correlation coefficients are significant at the 0.01 level, indicating meaningful relationships among the study variables and supporting the proposed conceptual framework.

Table 4: Correlation Matrix

Variables	SQ	CSF	CE
SQ	1		
CSF	0.663**	1	
CE	0.561**	0.623**	1

Note: $p < 0.001$, N = 250.

4.6 Regression Analysis

Multiple regression was conducted to examine the direct effects of eight dimensions of service quality on citizen engagement. The model explained 56.2% of the variance in CE ($R^2 = 0.562$). Table 5 provides the model summary. All predictors were statistically significant, with interactivity, accessibility, and information quality showing the strongest influence, highlighting areas that can effectively enhance engagement with e-governance platforms.

Table 5: Regression Model Summary

Model	R	R^2	Adjusted	SE of Estim
1	0.7	0.5	0.547	0.600

Table 6 presents the regression coefficients for each predictor. Results confirm that improvements in service quality dimensions positively influence citizen engagement.

Table 6: Regression Coefficients

Predictor	B	SE	Beta	T	P
Constant	1.068	0.243	-	4.402	<0.001
SYSQ	0.244	0.068	0.244	3.613	<0.001
REL	0.250	0.092	0.170	2.709	<0.001
SET	0.239	0.087	0.171	2.740	<0.001
ACB	0.631	0.109	0.346	5.811	<0.001
SCA	0.338	0.069	0.299	4.927	<0.001
QOL	0.631	0.109	0.346	5.811	<0.001
IAY	0.718	0.129	0.334	5.572	<0.001
RSP	0.459	0.111	0.255	4.149	<0.001

4.7 Mediation Analysis

Mediation analysis was conducted to examine whether citizen satisfaction (CSF) mediates the relationship between service quality (SQ) and citizen engagement (CE). The results reveal that the total effect of service quality on citizen engagement was positive and statistically significant (B = 0.7332, $p < .001$, $\beta = 0.5612$), indicating that higher levels of e-governance service quality are associated with greater citizen engagement. When citizen satisfaction was included in the model, the direct effect of service quality on citizen engagement remained significant but substantially reduced in magnitude (B = 0.1932, $p = .012$, $\beta = 0.1479$). This reduction suggests that a considerable portion of the influence of service quality on engagement operates through citizen satisfaction. Furthermore, the indirect effect of service quality on citizen engagement via citizen satisfaction was statistically significant (B = 0.4133), as the bootstrapped 95% confidence interval did not include zero [0.3354, 0.4872]. The standardized indirect effect ($\beta = 0.4295$) indicates a strong mediating role of citizen satisfaction in this relationship.

Overall, these findings confirm partial mediation, demonstrating that while service quality directly influences citizen engagement, a substantial portion of this effect is transmitted through citizen satisfaction. This implies that citizen satisfaction is a critical mechanism through which improvements in e-governance service quality enhance citizen engagement, supporting Hypothesis H3.

Table 7: Mediation Analysis – SQ → CSF → CE

Effect Type	B	SE	T	P	95% CI Lower	95% CI Upper	B
Total Effect (SQ → CE)	0.7332	0.0687	10.677	0.000	0.5979	0.8685	0.5612
Direct Effect (SQ → CE)	0.1932	0.0760	2.454	0.0116	0.0436	0.3429	0.1479
Indirect Effect (SQ → CSF CE)	0.4133	0.0382	—	—	0.3354	0.4872	0.4295

5. Discussion

The findings of this study provide strong empirical support for the proposition that e-governance service quality is a critical antecedent of citizen engagement. The results show that improvements in usability, responsiveness, information quality, accessibility, and overall system reliability significantly increase citizens' willingness to interact with digital government platforms. These observations echo previous international and regional findings, reaffirming the argument that service quality plays a central role in shaping digital participation behaviors (Papadomichelaki & Mentzas, 2021; Pham, 2022). The present study further contributes to this body of knowledge by demonstrating that citizen satisfaction operates as an influential mediating mechanism that links service quality with engagement. Citizen satisfaction emerged as a powerful mediator, indicating that the quality of a citizen's experience with government technology does not translate directly into engagement; instead, citizens' emotional responses, value perceptions, and service evaluations significantly shape their behavioral intentions. This aligns with Expectation–Confirmation Theory (ECT), which posits that individuals continue to use a system when its performance meets or exceeds their expectations, thereby generating satisfaction that motivates ongoing interaction. Similarly, Technology Acceptance Theory (TAM) supports this pattern by highlighting the importance of perceived usefulness and ease of use two components strongly associated with service quality dimensions such as usability, reliability, and information clarity.

Moreover, the findings reinforce the central principles of Public Value Theory, which suggests that citizens engage with public institutions when they perceive that services create social, economic, or administrative value. When digital platforms reduce transaction costs, simplify administrative processes, ensure data security, and provide timely and accurate information, citizens perceive these services as valuable contributions to public governance. Increased satisfaction, therefore, becomes not merely an emotional response but an indicator that digital services are effectively fulfilling their public value mission. In this way, satisfaction acts as an essential bridge between service performance and participatory behavior. The relationship between service quality and engagement identified in this study reveals that citizens increasingly expect government services to mirror the efficiency, convenience, and responsiveness of private-sector digital platforms. When such expectations are met, engagement rises; when unmet, distrust grows and reliance on traditional bureaucratic processes persists. The results thus highlight the importance of citizen-centered digital governance models that prioritize user experience, transparency, reliability, and accessibility as core components of public sector modernization.

6. Theoretical and Practical Implications

The theoretical implications of this study contribute meaningfully to the literature on e-governance, public administration, and technology adoption. The findings strengthen Public Value Theory by demonstrating that service quality enhances citizen engagement through the generation of public value. Digital platforms, when designed effectively, do more than facilitate administrative functions; they promote trust, legitimacy, and meaningful interaction between citizens and the state. By confirming that satisfaction mediates the link between service quality and engagement, the study advances understanding of how public value is operationalized within digital environments. The results also extend Expectation–Confirmation Theory by showing that satisfaction arises when digital systems meet or surpass users' expectations, which, in turn, promotes continued engagement. This expands the application of ECT from private-sector digital services to the domain of digital public services. Similarly, the study enriches the Technology Acceptance Model by establishing service quality as a broader determinant of key TAM constructs such as perceived usefulness, ease of use, and trust. Demonstrating that user-friendly, reliable, and secure digital services increase engagement positions service quality as a foundational element of technology acceptance in public-sector settings. Furthermore, by highlighting satisfaction as a central mediating mechanism, the study contributes to emerging models that emphasize the importance of psychological and affective factors in digital governance. Finally, because the study was conducted in a developing country context, it offers empirical evidence that enhances the global applicability of digital governance theories, demonstrating how

constructs such as trust, system reliability, and accessibility function in environments with limited infrastructure and varied digital literacy levels.

The practical implications of the study provide actionable insights for policymakers and public institutions seeking to strengthen e-governance adoption in Pakistan. The results underscore the need for user-centered service design, emphasizing that digital platforms must be intuitive, easy to navigate, and responsive to citizen needs. When digital services are streamlined and simple, citizens are more willing to adopt and regularly use them. Improving system responsiveness and ensuring technical reliability are equally important, as fast loading speeds, minimal errors, and real-time updates greatly enhance citizen satisfaction. The study further highlights the value of service personalization; tailoring digital services to individual user needs, providing relevant notifications, and ensuring rapid issue resolution can significantly increase satisfaction levels. Strengthening trust through robust data security and privacy protections also remains essential, as citizens are more likely to engage when they believe their personal information is secure. The research emphasizes the need for national digital literacy initiatives, particularly in regions where ICT skills are limited, to empower citizens to confidently use digital platforms for tax services and public administration tasks. Incorporating feedback mechanisms and transparent communication about system improvements can further enhance engagement by giving citizens a sense of involvement and control. These practical implications align with Pakistan's broader digital transformation agenda and contribute to achieving the Sustainable Development Goals related to innovation, institutional effectiveness, and public participation. For universities and other public institutions, the findings suggest that investing in digital training and support systems for employees can facilitate more effective use of e-governance platforms, thereby improving overall institutional efficiency.

7. Limitations and Future Research

Despite its contributions, this study has several limitations that must be acknowledged when interpreting the results. First, the cross-sectional research design limits the ability to infer causality. Although the statistical analyses suggest directional relationships among service quality, satisfaction, and engagement, longitudinal research is necessary to determine whether these relationships remain consistent over time or evolve as government systems improve.

Second, the sample was confined to salaried employees of public universities in the Hazara region. This group is likely more educated, more digitally literate, and more familiar with government systems than the general population. As a result, the findings may not fully capture the experiences of rural residents, private-sector employees, self-employed individuals, or those with limited access to digital resources. Future studies should broaden sample diversity by including multiple regions, professional groups, and varying levels of digital proficiency to enhance generalizability. Third, the study relied on self-reported data, which may be subject to response biases such as social desirability, overestimation of usage behaviors, or subjective interpretations of service quality. Future research may incorporate system-generated data, behavioral analytics (e.g., frequency of logins, time spent on portal), or mixed-method approaches to provide a more comprehensive and objective assessment of citizen engagement.

Future research could also explore moderating variables such as digital trust, perceived risk, ICT literacy, organizational culture, and demographic factors to deepen understanding of engagement behavior. Additionally, comparative studies across regions or countries may provide insights into contextual influences on digital adoption. Experimental or longitudinal studies could test the effectiveness of specific policy interventions in enhancing satisfaction and engagement.

The results of this study are consistent with previous research emphasizing the importance of service quality as a foundation for public value creation (Papadomichelaki & Moore Mentzas, 2012; Pham et al., 2023). The findings also support the principles of Public Value Theory (, 1995) and Technology Acceptance Theory (Davis, 1989), which suggest that effective utilization of digital tools and consistent service performance lead to greater citizen satisfaction and engagement. Hence, e-governance service quality can be considered a strategic resource capable of fostering transparency, accountability, and citizen

participation essential components of democratic governance. Furthermore, the study confirms that perceived service value partially mediate the relationship between e-governance service quality and citizen engagement. This indicates that improved service quality not only has a direct effect on citizen participation but also operates indirectly by influencing the perceived benefits derived from using e-government systems. These results reaffirm that user-centered design, efficient online infrastructure, and responsive digital interfaces are critical for sustaining citizens' long-term engagement with government platforms.

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