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IMPACT OF USER SATISFACTION WITH E-GOVERNMENT SERVICES ON CONTINUANCE USE INTENTION AND CITIZEN TRUST USING TAM-ISSM FRAMEWORK

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ABSTRACT

Aim/Purpose	This study investigates the drivers of user satisfaction in e-government services and its influence on continued use intention and citizen trust in government. It employs the integration of the Technology Acceptance Model (TAM) and the Information System Success Model (ISSM).
Background	Electronic government, transforming citizen-state interactions, has gained momentum worldwide, including in India, where the aim is to leverage technology to improve citizen services, streamline administration, and engage the public. While prior research has explored factors influencing citizen satisfaction with e-government services globally, this area of study has been relatively unexplored in India, particularly in the post-COVID era. Challenges to widespread e-government adoption in India include a large and diverse population, limited digital infrastructure in rural areas, low digital literacy, and weak data protection regulations. Additionally, global declines in citizen trust,

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attributed to economic concerns, corruption, and information disclosures, further complicate the scenario. This study seeks to investigate the influence of various factors on user satisfaction and continuance usage of e-government services in India. It also aims to understand how these services contribute to building citizens' trust in government.

Methodology	The data were collected by utilizing survey items on drivers of e-government services, user satisfaction, citizen trust, and continuance use intention derived from existing literature on information systems and e-government. Responses from 501 Indian participants, collected using an online questionnaire, were analyzed using PLS-SEM.
Contribution	This study makes a dual contribution to the e-government domain. First, it introduces a comprehensive research model that examines factors influencing users' satisfaction and continuance intention with e-government services. The proposed model integrates the TAM and ISSM. Combining these models allows for a comprehensive examination of e-government satisfaction and continued intention. By analyzing the impact of user satisfaction on continuance intention and citizen trust through an integrated model, researchers and practitioners gain insights into the complex dynamics involved. Second, the study uncovers the effects of residential status on user satisfaction, trust, and continuance intention regarding e-government services. Findings reveal disparities in the influence of system and service quality on user satisfaction across different user segments. Researchers and policymakers should consider these insights when designing e-government services to ensure user satisfaction, continuance intention, and the building of citizen trust.
Findings	The findings indicate that the quality of information, service, system, and perceived usefulness play important roles in user satisfaction with e-government services. All hypothesized paths were significant, except for perceived ease of use. Furthermore, the study highlights that user satisfaction significantly impacts citizen trust and continuance use intention.
Recommendations for Practitioners	The findings suggest that government authorities should focus on delivering accurate, comprehensive, and timely information in a secure, glitch-free, and user-friendly digital environment. Implementing an interactive and accessible interface, ensuring compatibility across devices, and implementing swift query resolution mechanisms collectively contribute to improving users' satisfaction. Conducting awareness and training initiatives, providing 24×7 access to online tutorials, helpdesks, technical support, clear FAQs, and integrating AI-driven customer service support can further ensure a seamless user experience. Government institutions should leverage social influence, community engagement, and social media campaigns to enhance user trust. Promotional campaigns, incentive programs, endorsements, and user testimonials should be used to improve users' satisfaction and continuance intention.
Recommendations for Researchers	An integrated model combining TAM and ISSM offers a robust approach for thoroughly analyzing the diverse factors influencing user satisfaction and continuance intention in the evolving digitalization landscape of e-government services. This expansion, aligning with ISSM's perspective, enhances the literature by demonstrating how user satisfaction impacts continuance usage intention and citizen trust in e-government services in India and other emerging economies.

Impact on Society	Examining the factors influencing user satisfaction and continuance intention in e-government services and their subsequent impact on citizen trust carries significant societal implications. The findings can contribute to the establishment of transparent and accountable governance practices, fostering a stronger connection between governments and their citizens.
Future Research	There are several promising avenues to explore to enhance future research. Expanding the scope by incorporating a larger sample size could enable a more thorough analysis. Alternatively, delving into the performance of specific e-government services would offer greater precision, considering that this study treats e-government services generically. Additionally, incorporating in-depth interviews and longitudinal studies would yield a more comprehensive understanding of the dynamic evolution of digitalization.
Keywords	e-government, user satisfaction, continuance intention, citizen trust, India

INTRODUCTION

Rapid advancement in information and communication technologies has revolutionized how governments and citizens interact (Hujran, Alarabiat, et al., 2023). The digitalization of government services has been catalyzed by a combination of factors, such as the modernization of government institutions, the presence of tech-savvy administrative staff, and the rise of a digitally adept generation. The establishment of a robust digital ecosystem within the government and the strategic utilization of accessible digital technologies have further contributed to the seamless delivery of benefits and services to citizens (Alcaide-Muñoz et al., 2017; Rahim et al., 2023). The emergence of electronic government (e-government) has paved the way for convenient, efficient, and transparent service delivery, fostering citizen engagement and empowerment (Hooda et al., 2023). It has gained significant momentum worldwide, including in India, as governments seek to leverage technology to enhance citizen-centric service delivery, streamline administrative processes, and develop new channels to engage citizens (Venkatesh et al., 2016). E-government services encompass a wide range of digital platforms and applications that enable citizens to access government information, perform administrative tasks, avail themselves of various public services, and participate in democratic processes (Venkatesh et al., 2016).

Researchers are intrigued by the global growth of e-government and are studying how people adopt e-government services and the factors that influence this adoption (Hooda et al., 2023; Mensah, 2020). Undoubtedly, the success of such services heavily relies on fostering greater public engagement and trust (Hujran, Alarabiat, et al., 2023). The success of new technology should extend beyond its initial adoption and be supported by continuous use (Kala & Chaubey, 2023). To improve and sustain e-government services, it is crucial to comprehend the factors that influence citizens' satisfaction and their ongoing usage (Rahim et al., 2023). Prior research has looked into the factors influencing citizen satisfaction with e-government services. However, this area of study has been relatively unexplored in India, particularly in the post-COVID era. The post-COVID era is particularly relevant for exploring the landscape of e-government services in India for several reasons: (a) the pandemic has accelerated the pace of digital transformation globally, including in India; (b) significant shifts in user behavior towards digital platforms; (c) increased dependency on online services during and even after the pandemic; (d) governmental policies and investments in digital infrastructure; and (e) the potential for policymakers to refine e-government services based on pandemic experiences. This period provides insights into evolving dynamics, user behaviors, and policy implications amid unprecedented challenges.

In India, e-government adoption faces challenges due to its large and diverse population. In emerging economies, the widespread adoption of e-government services faces obstacles, including limited digital infrastructure and internet access in rural areas, low digital literacy among citizens, and weaker data protection regulations than in developed nations. Thus, the background of this study is thought to be useful and conducive to achieving its objectives. This paper aims to achieve the following objectives: (a) examine the impact of various drivers of e-government services on users' satisfaction; (b) impact of user's satisfaction on continuance usage intention; and (c) examine whether users' satisfaction with e-government services enhances their trust on government. This study particularly explores the relationships between key factors to provide valuable insights into how these variables influence user behavior within the e-government context. It introduces a novel aspect by identifying post-adoption factors and assessing how e-government services impact citizen trust. Furthermore, e-government services play a pivotal role in fostering economic development through streamlined processes, reduced corruption, and increased transparency. Prioritizing citizen satisfaction and encouraging continuous usage of these services will optimize their positive impact on overall economic growth.

E-GOVERNMENT SERVICES IN INDIA

Of late, the Indian government has achieved significant progress in digital advancement by digitizing various facets of people's lives. Under the 'Digital India' program to improve governance and promote digital literacy, the Press Information Bureau, Government of India (2022) introduced several schemes. These schemes empower both urban and rural communities, leading to a remarkable milestone of certifying approximately 47.6 million citizens as digitally literate. Ministry of Electronics and Information Technology and the National e-Governance Division introduced a Unified Mobile Application for New-age Governance (UMANG) platform offering e-governance services across India. As of October 2022, the UMANG platform offered 1658 government services. UMANG has more than 50 million downloads in the Google Play store as of 27 July 2023. Instead of making significant efforts to introduce e-government services, India's performance is not satisfactory at an international level. In 2022, the United Nations Department of Economic and Social Affairs placed India at 105 out of 193 countries in the E-Government Development Index. Likewise, in 2022, India's ranking was 61 in the E-Participation Index, indicating a significant drop from 29th in 2020 (United Nations, 2022). Hence, the context of this study is justified.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

TAM-ISSM INTEGRATION

Various Information System (IS) models have been developed to understand the adoption, success, and impact of information systems within organizations. In the pursuit of examining the initial adoption and continuance usage intention, the identification of the Technology Acceptance Model (TAM) and the Information System Success Model (ISSM) emerged as pivotal frameworks within the domain of information systems. TAM, proposed by Davis (1989), stands as one of the extensively researched and widely employed theories to understand individuals' adoption of new technologies. Likewise, ISSM propounded by DeLone and McLean (1992) has been frequently utilized to predict an individual's satisfaction and intention to continue a technology across various contexts (Al-Adwan et al., 2021, 2022; Kala & Chaubey, 2023; Liu et al., 2023). While TAM is particularly relevant for understanding users' acceptance during the adoption phase, ISSM provides a more comprehensive framework for evaluating the success of information systems over time, considering both user-centric and system-centric elements. Law et al.'s (2019) study suggested that to enhance predictive accuracy through theory integration, researchers combined the theories of TAM and ISSM to examine the satisfaction level of users and their continuance intention with e-government services. The integration

of TAM and ISSM offers a complementary perspective. We held the belief that leveraging the adaptability of TAM and ISSM could effectively and comprehensively address an individual’s initial acceptance, satisfaction, and continuance intention toward using e-government services.

The integration of TAM and ISSM is particularly suitable for studying e-government services in India, where, besides user acceptance, satisfaction, continuance, and effective system performance are critical for the success and continuity of digital governance initiatives. Given the complementary nature of these models, they adeptly address the distinctive challenges posed by diverse demographics, varied digital literacy levels, and vast governance structures. This approach provides a robust framework that can inform both academic research and policy considerations in the realm of e-government. While TAM and ISSM have proven valuable, acknowledging their limitations is essential. TAM lacks provisions to measure the impact of dynamic environments, technological advancements, and changes in user experience on user acceptance. Additionally, it doesn’t explicitly account for external variables like social influence and cultural factors, limiting its applicability in diverse socio-cultural contexts.

On the other hand, ISSM assumes that each dimension equally contributes to information system success. However, the impact of each dimension may vary across different contexts, industries, and systems, challenging the model’s generalizability. To sum up, TAM’s renowned user-centric focus on individual perceptions and attitudes toward technology adoption is enriched by ISSM. This combination ensures a more comprehensive understanding, moving beyond mere acceptance to encompass broader success factors influencing e-government service adoption. Furthermore, ISSM’s multi-dimensional evaluation, particularly considering information, system, and service quality, aligns well with the complexity of e-government services. This approach allows for a nuanced analysis of diverse facets contributing to the overall success of e-government initiatives. Overall, Both TAM and ISSM are adaptable frameworks suitable for different contexts. In the unique socio-political and cultural contexts of e-government services, the integrated model accommodates this diversity, offering a contextually relevant lens to assess factors influencing user acceptance and overall success in the specific domain of e-government.

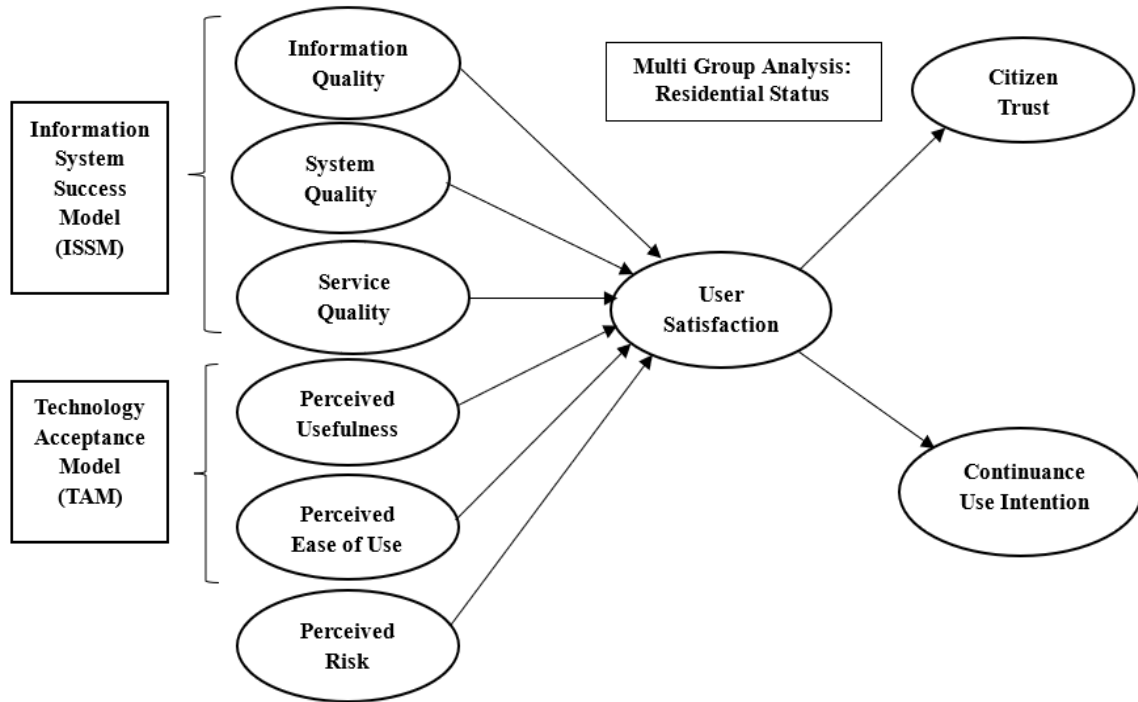


Figure 1. Conceptual framework

Further, digital tools are prone to potential cyber fraud, instability, and other technical issues, which may impact user satisfaction with e-government services. Consequently, the ‘perceived risk’ construct was deemed appropriate for inclusion in the study. Thus, this research thoroughly examines user satisfaction and continuance intention by expanding upon the integrated TAM-ISSM framework. The factors determining consumers’ satisfaction and continuance intention are comprehensively analyzed in the subsequent literature review, and hypotheses are formulated based on established theory and previous research (see Figure 1).

INFORMATION QUALITY (IQ)

IQ is critical for the success of e-governance as it enables citizens to make informed decisions and effectively interact with government services in line with their needs (Y. Li & Shang, 2020; Nulhusna et al., 2017; Venkatesh et al., 2016). It shows the capacity to deliver information that is appropriate, timely, precise, thorough, clear, and succinct (DeLone & McLean, 2003; Gupta & Maurya, 2020; A. Lee & Levy, 2014). Providing clear, accurate, and timely information, along with transparent explanations of transaction procedures, is highly important because most people lack familiarity with administrative processes (Grimsley & Meehan, 2007). In contrast, poor IQ could hinder the success of e-government and might decrease users’ inclination to use and trust the system (A. Lee & Levy, 2014). Extant literature (Hujran, Al-Debei, et al., 2023; Y. Li & Shang, 2020; Venkatesh et al., 2016) on e-government services have demonstrated the influence of IQ on a user’s contentment with services. Similarly, DeLone and McLean (2003) have confirmed the link between IQ, user satisfaction, and continued usage. Thus, we hypothesized:

H1: IQ has a positive effect on user satisfaction.

SYSTEM QUALITY (SYQ)

SyQ is defined as a user-friendly arrangement of the visible elements of government websites, including elements like website design, usability, ease of use, responsiveness, dependability, and accessibility (Al-Rahmi et al., 2022; DeLone & McLean, 2003; Y. Li & Shang, 2020; Nulhusna et al., 2017; Veeramootoo et al., 2018). It is interesting to note that citizens’ assessments of the quality of e-government services always start with a visual review of the SyQ of the government website (Blut, 2016). When users perceive the system to be of high quality, they are more likely to be satisfied with it and, therefore, more likely to use it. This can lead to increased engagement with the government services (Wang et al., 2019). Extant literature suggests that both in China (Wang et al., 2019) and India (Gupta, 2021), SyQ exerts a notable and favorable impact on user satisfaction with e-governance. Thus, we hypothesized:

H2: SyQ has a positive effect on user satisfaction.

SERVICE QUALITY (SQ)

SQ refers to how well users’ needs are met by e-government platforms (W. Li & Xue, 2021; Y. Li & Shang, 2020; Nofal et al., 2021), as well as how well e-government platforms enable effective and relevant information searches, online transactions, and citizen-government interaction (Blut, 2016). Previous studies (DeLone & McLean, 2003; J. Lee & Kim, 2018; Ramdhony et al., 2023; Veeramootoo et al., 2018) have verified the association between SQ and user satisfaction in the context of information systems. Users who consider e-government services as efficient, reliable, and effortless to use are very likely to be satisfied with their experience and consequently use them repeatedly (Gupta & Maurya, 2020; Y. Li & Shang, 2020; Ramdhony et al., 2023). Thus, it suggests that SQ significantly influences user satisfaction, thereby shaping the intention to continue using these services. Thus, we proposed:

H3. SQ positively influences user satisfaction.

PERCEIVED USEFULNESS (PU)

According to Venkatesh and Davis (2000), PU is the degree to which people think employing a particular technology would enhance their ability to accomplish their job. Research by Hujran, Al-Debei, et al. (2023) and Mensah (2020) highlights that e-government services offer citizens the convenience of accessing, viewing, and searching for information at any time and from anywhere. Extant literature has acknowledged the positive influence of PU on users' adoption intention of e-government services (Dwivedi et al., 2017; Hooda et al., 2023; Verkijika & De Wet, 2018). Based on the above findings, upon recognizing the performance advantages offered by e-government services, citizens will display a higher inclination to utilize such services. Thus, we posited:

H4: PU significantly impacts user satisfaction.

PERCEIVED EASE OF USE (PEOU)

PEOU measures the degree to which a person considers the use of a particular system to be effortless (Davis, 1989). Given that it's the endeavor of e-government services to offer simple yet effective and easy-to-use services to citizens, we argue that PEOU significantly influences the adoption of e-government. Supporting this notion, Puthur et al. (2020) discovered a substantial positive impact of PEOU on the intentions of Indians to utilize e-government services. Moreover, previous research has consistently indicated that PEOU strongly affects users' attitudes, behavioral intentions, and actual usage of e-government portals (Hooda et al., 2023; Mensah, 2020). These studies have established that the utilization of e-government services by citizens is particularly shaped by the ease, simplicity, and user-friendliness of accessing and engaging with these services. When citizens perceive e-government tools as requiring minimal effort, they are more prone to develop a favorable disposition toward these tools. Thus, we proposed:

H5: PEOU significantly impacts user satisfaction.

PERCEIVED RISK (PR)

PR refers to the uncertainty that individuals feel about potential negative consequences linked to using a product. In this study, PR specifically revolves around concerns regarding financial loss, information privacy, and security breaches when using e-governance services. For instance, when individuals provide personal information on e-government websites, they may worry about information leaks, leading to an increase in PR (Xie et al., 2017). In emerging markets, there is a prevailing skepticism toward online services primarily due to financial scams (Kala & Chaubey, 2023). Previous studies have highlighted that PR can potentially restrict the extent of public engagement with government e-services (Dwivedi et al., 2017; Xie et al., 2017). Citizens of different countries have supported the notion that PR is negatively linked to citizens' usage intention and satisfaction with e-government (Mirkovski et al., 2023; Muhammad & Kaya, 2023). Thus, we hypothesized:

H6: PR negatively influences user satisfaction.

USER SATISFACTION (US)

Satisfaction is regarded as an 'experience-specific affect' that results from comparing expectations with actual experiences (Bhattacharjee, 2001). In the context of this study, satisfaction refers to the emotions and sentiments experienced by citizens due to their cognitive assessment of their e-government service interactions (Hujran, Al-Debei, et al., 2023). The US is recognized as a crucial factor that fosters lasting interactions between citizens and e-government portals, influencing their continued usage behavior (Hujran, Al-Debei, et al., 2023). As e-government services provide accurate, relevant, and prompt services to citizens, it logically follows that satisfaction with these services plays a significant role in influencing citizen trust, continued usage, and even the adoption of new services (Alkrajji & Ameen, 2021). Studies have revealed that quality of service, system, and information has

positive influences on the US (Y. Li & Shang, 2020; Mirkovski et al., 2023; Veeramootoo et al., 2018). Additionally, IQ and operational effectiveness have been identified as significant determinants of US with e-government services (Venkatesh et al., 2016).

CITIZEN TRUST

Trust in government reflects citizens' confidence in their government's ability to act honestly and fairly (Easton, 1965). The relationship between trust in government and increased e-government adoption has been extensively examined. However, it is equally crucial to investigate how the adoption of e-government services can cultivate a stronger sense of trust in government (Bannister & Connolly, 2011; Malodia et al., 2021). Some studies suggest that e-government plays a vital role in building trust-based relationships between the government and citizens (Hooda et al., 2023). Alkrajji and Ameen (2021) discovered that e-government can enhance trust in government processes by improving interactions with citizens and their perceptions of the government's responsiveness. This involvement leads to a sense of trust and connection with the governance system, reducing feelings of isolation (Malodia et al., 2021). However, considering the low trust citizens place in government institutions, it is important to address whether e-government initiatives can potentially increase citizens' levels of trust in the government. Thus, we hypothesized:

H7: User satisfaction has a significant impact on citizen trust.

CONTINUANCE USE INTENTION

Satisfaction and continuance intention to use technology depend on their belief in its ability to help them perform tasks effectively (Bhattacharjee, 2001). In the context of e-government services, citizens' satisfaction with the quality, efficiency, effectiveness, and convenience of the services influences their willingness to continue using them in the future (Y. Li & Shang, 2020). According to e-government research, user satisfaction and continuance intention using e-government services are strongly correlated (Mirkovski et al., 2023; Yap et al., 2021). Considering India's digitalization efforts and its current position in the e-government index, it becomes crucial to examine Indians' continuance intention to use e-government systems. Therefore, it was hypothesized:

H8: User satisfaction has a significant impact on continuance use intention.

METHODOLOGY

SAMPLE AND PROCEDURE

The study's target population was Indian consumers of the urban, semi-urban, and rural areas. We intentionally included urban, semi-urban, and rural areas in our target population to ensure diverse perspectives and experiences. This decision is driven by the belief that these varied settings offer unique insights into the factors influencing our study parameters. Each geographical area's distinct socio-economic, cultural, and infrastructural characteristics are expected to significantly impact users' perceptions and behaviors related to e-government services. We used the questionnaire to examine users' satisfaction with and intention to continue using e-government services. The questionnaire was divided into three sections (Section A – e-government service usage; Section B – items of study constructs; and Section C – demographic information). We adopted established scales to construct the questionnaire (see Appendix). The researchers made modifications to certain statements to ensure content validity and focus on the research objectives. The modifications to the statements were primarily centered around contextualizing TAM and ISSM statements for the specific domain of e-government services. This involved adapting language and content to ensure relevance and clarity within the context of government services delivered electronically. Considering our diverse set of respondents from urban, semi-urban, and rural areas, we took great care in selecting language that would be

universally understandable. This approach was essential to maintain uniformity and prevent any potential bias. The modifications were further substantiated by the outcomes of panel validity and pretest exercises.

A five-point Likert scale (1 - strongly disagree, 5 - strongly agree) was used to record the responses from the respondents. The language of the questionnaire was English. Two academicians from the marketing and information systems fields and two users of e-government services made up a panel of four experts who evaluated and validated the questionnaire's content. A convenience sample of 20 respondents was used for a one-week pretest. The findings of the pretest revealed no issues with readability. We employed sample size determination methods (Cochran's Formula and Qualtrics). These two methods suggested a sample size of 385. However, recognizing the vastness of the population and the potential for variability, we deliberately added a 25% margin to the initially calculated sample size. This additional margin served as a precautionary measure to enhance the robustness of our results and account for potential uncertainties in the data. Efforts were made to ensure that the sample was representative of the population.

Data were collected between April and June 2023, spanning a period of eight weeks. Purposive and snowball sampling techniques were used to collect the data. These methods were deemed appropriate as the study focused on individuals using e-government services, and the respondents were selected based on their knowledge or experience. We adopted four methods to invite prospective respondents to participate in the study: (a) posted questionnaire link to a major social media platform – Facebook; (b) emailed questionnaire to known ones who are using e-government services; (c) shared the questionnaire link through WhatsApp; and (d) requested initial respondents to circulate questionnaire links to their acquaintances and known ones who are using e-government services. Since we employed purposive and snowball sampling to collect data, the precise response rate remained uncertain. However, we received 511 responses, after which ten incomplete responses were excluded from the analysis (see Table 1). Consequently, the calculated response rate was an impressive 98%. This holistic approach allowed us to capture a diverse range of perspectives and insights from the respondents, contributing to the robustness of our research findings. Cronbach's alpha for the questionnaire was 0.826, indicating acceptable reliability. Importantly, the study's primary goal is not broad generalizability but an in-depth exploration of specific aspects. It focuses on understanding the impact of various drivers on users' satisfaction with e-government services, assessing the influence of user satisfaction on continuance usage intention, and examining whether users' satisfaction enhances trust in the government. The sample size of 501 respondents was chosen for its exploratory nature, aiming to provide meaningful insights into factors affecting users' perceptions and behaviors within the context of e-government services, acknowledging the vast population and digital literacy in India.

Similar to previous research (Al Daboub et al., 2024; Bhat et al., 2024; Horani et al., 2023; Kala et al., 2023), data was analyzed using SmartPLS. SmartPLS stands out as a prominent software in the field of structural equation modeling (SEM). It leverages the Partial Least Squares algorithm, making it particularly suitable for quantitative research and studies characterized by limited sample sizes. The decision to utilize this statistical software was driven by its compatibility with research objectives, ability to perform multi-group analysis, robust bootstrapping for inference, adept handling of both formative and reflective constructs, and user-friendly interface. SEM allows for the simultaneous examination of complex relationships among multiple variables (Elmobayed et al., 2023; Hmoud et al., 2023). In the context of e-government services, factors influencing adoption, satisfaction, trust, and continuance intention are likely to be interconnected. SEM enables the modeling of these intricate relationships. Multi-Group Analysis allows for comparing models across diverse user segments, offering insights into potential variations in user behavior. The 5% significance level was employed to determine the results.

Table 1. Demographic profile

Criteria		Frequency	Percentage
Age (in years)	< 20	60	12.0%
	21-30	120	24.0%
	31-40	173	34.5%
	41-50	116	23.2%
	51 & above	32	6.4%
Gender	Male	279	55.7%
	Female	222	44.3%
Education	< 10+2	216	43.2%
	Graduate	115	23.0%
	Postgraduate	170	33.9%
Monthly income (in INR)	< 25000	117	23.35%
	25001-50000	156	31.14%
	50001-75000	58	11.58%
	75001-100000	107	21.36%
	>100000	63	12.57%
Occupation	Students	92	18.4%
	Self-Business	130	25.9%
	Salaried	164	32.7%
	Agriculture	83	16.6%
	Other	32	6.4%
Residential status	Urban	187	37.3%
	Semi-Urban	222	44.3%
	Rural	92	18.4%

COMMON METHOD BIAS (CMB)

The survey questionnaire has a significant problem with CMB. As information from respondents was being gathered, the order of the items was carefully mixed to lessen the possibility of CMB. To rule out any potential bias, we ran two separate experiments. First, we used Harman's single-factor test, which showed that there was no CMB because the amount of variance explained by the single component (approximately 38.77) was below the 50% cutoff (Harman, 1976). Second, we used Kock's (2015) method, which claims that VIF values below 3.3 are indicative of the presence of CMB. All the VIFs were within the 3.3 threshold (Table 2). These results suggest that CMB is not likely to be a major problem.

E-GOVERNMENT SERVICES USAGE BEHAVIOUR

On inquiring about the platform for e-government services, it was revealed that government websites (n=389) and common service centers (n=380) were prominently used to access such services. The usage of mobile applications (n=307) and social media platforms (n=134) was moderate. Respondents also revealed that accessing or applying for government services (n=422) and making online payments (n=383) were the most popular purposes of e-government services. Social welfare applications (n=286) and submitting grievances (n=199) also received significant engagement.

DATA ANALYSIS

MEASUREMENT MODEL

A measurement model was assessed prior to testing the given hypotheses. To assess the model fitness, Cronbach's alpha, composite reliability (CR), and convergent validity were examined. All constructs had Cronbach's alpha values that were significantly higher than the suggested level of 0.6. Since CR was thought to be a more precise indicator of reliability, all construct values (ranging from 0.800 to 0.908) were higher than the cutoff point of 0.70. The average variance extracted (AVE) values ranged from 0.502 to 0.714, suggesting an acceptable correlation among the items in each construct, indicating convergent validity. Additionally, all items had factor loadings greater than 0.5 (Table 2). These values indicate the fitness of the measurement model (Hair et al., 2017).

Table 2. Measurements

Items and constructs	Mean	SD	VID
Information Quality ($\alpha=0.847$, CR=0.898, AVE=0.688)	3.70	0.867	
IQ1	3.77	0.946	2.803
IQ2	3.72	0.974	2.242
IQ3	3.64	1.040	1.834
IQ4	3.70	1.021	1.877
System Quality ($\alpha=0.716$, CR=0.824, AVE=0.540)	3.76	0.781	
SyQ1	3.82	1.024	1.367
SyQ2	3.73	1.167	1.320
SyQ3	3.84	0.949	1.542
SyQ4	3.66	0.946	1.446
Service Quality ($\alpha=0.862$, CR=0.906, AVE=0.709)	3.73	0.788	
SQ1	3.83	1.064	2.593
SQ2	3.58	1.052	1.608
SQ3	3.77	1.060	2.703
SQ4	3.73	1.125	2.219
Perceived Usefulness ($\alpha=0.702$, CR=0.824, AVE=0.614)	3.75	0.803	
PU1	3.74	0.865	1.418
PU2	3.63	0.856	1.487
PU3	3.89	0.806	1.275
Perceived Ease of Use ($\alpha=0.738$, CR=0.828, AVE=0.621)	4.07	0.804	
PEOU1	4.13	0.588	1.880
PEOU2	3.93	0.729	1.238
PEOU3	4.16	0.580	1.814
Perceived Risk ($\alpha=0.754$, CR=0.859, AVE=0.671)	3.56	0.505	
PR1	3.62	0.696	1.763
PR2	3.55	0.682	1.373
PR3	3.50	0.710	1.605
Citizen Trust ($\alpha=0.825$, CR=0.857, AVE=0.552)	3.74	0.545	
CT1	3.76	0.947	2.900

Items and constructs	Mean	SD	VID
CT2	3.72	0.976	2.210
CT3	3.64	1.040	1.876
CT4	3.88	1.002	1.246
User Satisfaction ($\alpha=0.788$, $CR=0.855$, $AVE=0.544$)	3.64	0.761	
US1	3.77	0.529	1.876
US2	3.11	0.565	1.463
US3	3.75	0.516	1.760
US4	3.73	0.510	1.414
US5	3.82	0.891	1.564
Continuance Use Intention ($\alpha=0.765$, $CR=0.840$, $AVE=0.573$)	3.96	0.551	
CUI1	4.23	0.781	1.432
CUI2	3.79	0.877	1.853
CUI3	3.88	0.813	1.651

The heterotrait-monotrait ratio (HTMT) matrix was used to evaluate the discriminant validity of the suggested model. The HTMT should be less than 0.90 for discriminant validity to be established (Henseler et al., 2015). HTMT values were well within the cutoff value, confirming its discriminant validity (Table 3). Fornell-Larcker criterion also supported the model's discriminant validity, with all square roots of AVEs higher than the correlations among constructs and corresponding indicators (Table 3). These findings suggest that all constructs in the model achieved the desired level of discriminant validity. Overall, all indicators and constructs in the proposed model were well supported.

Table 3. Discriminant validity evaluation

	CT	CUI	IQ	PEOU	PR	PU	SQ	SyQ	US
CT	0.715	0.133	0.130	0.057	0.108	0.071	0.131	0.142	0.164
CUI	0.134	0.754	0.689	0.155	0.258	0.099	0.281	0.655	0.766
IQ	0.129	0.615	0.829	0.095	0.248	0.108	0.238	0.521	0.858
PEOU	-0.051	-0.111	-0.084	0.788	0.099	0.188	0.185	0.199	0.165
PR	0.061	0.198	0.199	0.04	0.819	0.227	0.060	0.171	0.383
PU	0.000	0.051	0.071	0.046	0.173	0.784	0.087	0.114	0.309
SQ	0.105	0.251	0.201	-0.15	-0.004	-0.068	0.841	0.223	0.593
SyQ	0.083	0.528	0.417	-0.143	0.127	0.027	0.177	0.736	0.718
US	0.167	0.675	0.702	-0.077	0.297	0.239	0.492	0.549	0.739

* Fornell-Larcker criterion (below the main diagonal) and Heterotrait-Monotrait Ratio (HTMT) (above the main diagonal)

* Main diagonal: in bold, square root of the AVE

STRUCTURAL MODEL AND HYPOTHESES TESTING

Path coefficients and t-values were used to calculate the significance of structural relationships. Standardized path coefficients, VIF, and R^2 , were used to check model fitness. All VIFs were within the range of 1.0-5.0 (with the highest being 2.803), indicating that multicollinearity was not a problem (Hair et al., 2017) (see Table 4). The R^2 values for user satisfaction, CT, and CUI were 0.749, 0.021, and 0.482, representing a satisfactory level of variation in the model. Furthermore, standardized path

coefficients were statistically significant at the level of 0.01. Taken together, these criteria establish the appropriate fitness of the structural model.

Table 4. Path coefficient

Hypothesized relationship	Path coefficient	T-statistics	P-values
IQ->US	0.482	18.088	0.000
SyQ->US	0.261	7.649	0.000
SQ->US	0.372	14.836	0.000
PU->US	0.200	8.014	0.000
PEOU->US	0.042	1.719	0.086
PR->US	0.131	5.110	0.000
US->CT	0.145	2.987	0.003
US->CUI	0.694	30.475	0.000

Path coefficients and their significance for each hypothesis are presented in Table 4. The results indicate that IQ ($\beta=0.482$, $t=18.088$, $p=0.000$), SyQ ($\beta=0.261$, $t=7.649$, $p=0.000$), and SQ ($\beta=0.372$, $t=14.836$, $p=0.000$) have a significant and positive effect on user satisfaction. Thus H1, H2, and H3 were accepted. PU ($\beta=0.200$, $t=8.014$, $p=0.000$) was also found significant. Thus, H4 was accepted. PEOU ($\beta=0.042$, $t=1.719$, $p=0.086$) shows an insignificant influence on user satisfaction. Thus, H5 was rejected. PR ($\beta=0.134$, $t=5.110$, $p=0.000$) shows a significant influence on user satisfaction. Thus, H6 was accepted. User satisfaction explains a significant and positive impact on CT ($\beta=0.145$, $t=2.987$, $p=0.003$) and CUI ($\beta=0.694$, $t=30.45$, $p=0.000$). Thus, H7 and H8 were accepted.

MULTI GROUP ANALYSIS (MGA)

Finally, we utilized PLS-MGA to investigate the impact of residential status on path differences among urban, semi-urban, and rural users. Urban areas often present different challenges and exhibit varied expectations compared to semi-urban and rural areas. To capture a diverse range of perspectives and experiences with e-government services, we collected responses from individuals residing in urban, semi-urban, and rural areas. The inclusion criteria were determined based on population density, the extent of infrastructure development, and access and literacy levels in technology. The study sample was categorized into three residential groups: urban ($n=187$), semi-urban ($n=222$), and rural ($n=92$). Subsequently, we assessed the relationships between different paths within these groups. It is crucial to carry out an invariance test using MICOM as described by Henseler et al. (2016) prior to completing MGA to compare the path coefficients between the three groups. The purpose of this test is to ascertain whether there is any consistency in the interpretation of construct measurements among the three groups. The three main steps of the MICOM test are to assess the compositional invariance and the configural invariance, and to guarantee that the mean values and variances of composites are distributed equally. Researchers must first prove configural invariance in the preliminary stage. By using the same items in each measurement model across all groups and treating item data consistently throughout, configural invariance was established in this investigation (Henseler et al., 2016). To evaluate compositional invariance, a permutation test was conducted using MICOM within the Smart-PLS software. Compositional invariance examines whether the initial correlation is equal to or exceeds the 5% quantile while maintaining a non-significant p-value (Henseler et al., 2016). The results indicated that the permutation c-value differences ($=1$) for the constructs within the three groups (urban, semi-urban, and rural) were statistically insignificant, thereby affirming compositional invariance. Furthermore, the permutation means and the variances of the permutation mean differences predominantly fell within the upper and lower bounds of 95% confidence interval, except for PEOU and CUI. As a result, partial measurement invariance (partial MGA) was applied, permitting the comparison of standardized coefficients of the structured model across the groups.

The outcomes of the MGA displayed variations in the impact of SyQ on user satisfaction across different user segments. Specifically, the effect was more pronounced for semi-urban and urban users compared to rural users. Conversely, the impact of SQ on user satisfaction was notably stronger for urban users in comparison to both rural and semi-urban users (Table 5). Additionally, the impact of user satisfaction on CT was more robust among both urban and semi-urban users than among rural users. As for the connection between user satisfaction and the intention to continue using the service, the consequence was more potent for rural users than urban and semi-urban users. Collectively, these results provided partial support for differences among the user groups, highlighting the significant moderating role of residential status in shaping the influencers of user satisfaction with e-government services, their trust levels, and their continuance usage intention.

Table 5. Multi-group analysis: Residential status

Hypothesized Relationship	Path Coefficients			Path Difference			p-value		
	Rural	Semi Urban	Urban	Rural – Semi Urban	Rural – Urban	Semi Urban – Urban	Rural	Semi Urban	Urban
IQ->US	0.450	0.454	0.496	-0.004	-0.046	-0.042	0.000	0.000	0.000
SyQ->US	0.290	0.317	0.182	-0.027	0.108	0.135	0.000	0.000	0.000
SQ->US	0.362	0.304	0.446	0.058	-0.084	-0.142	0.000	0.000	0.000
PU->US	0.236	0.187	0.166	0.049	0.07	0.021	0.000	0.006	0.001
PEOU->US	0.028	-0.063	0.023	0.091	0.005	-0.086	0.238	0.158	0.340
PR->US	0.130	0.129	0.089	0.001	0.041	0.04	0.000	0.011	0.034
US->CT	0.128	0.160	0.283	-0.032	-0.155	-0.123	0.047	0.237	0.103
US->CUI	0.647	0.764	0.673	-0.117	-0.026	0.091	0.000	0.000	0.000

DISCUSSION

The main goal of this study was to determine how various variables affect users' satisfaction with e-government services, which in turn influences both citizens' trust and their intention to continue using these services in the Indian setting. This model employing TAM and ISSM yields a suitable contribution to the field of research on e-government, information system success, and technology adoption. The hypothesized relationships between constructs were assessed through PLS-SEM. Except for one, all seven were confirmed as valid. The established relationships among these constructs not only identify factors influencing user satisfaction but also provide insights into potential strategies for enhancing citizens' participation in digital, smart, and transparent government.

The results indicate that IQ plays a pivotal role in determining user satisfaction with e-government services. Accurate, up-to-date, relevant, and easily understandable information ensures that citizens can access the right information to complete tasks, make informed decisions, and understand government policies and procedures. Providing accurate and well-organized information contributes to transparency, credibility, and efficiency, thereby encouraging citizens to adopt and utilize e-government portals. The findings align with previous studies (A. Lee & Levy, 2014; Y. Li & Shang, 2020; Venkatesh et al., 2016). In an era marked by the rapid dissemination of misinformation and fake news through social media and modern communication tools, the credibility of governments often comes under scrutiny. To combat the influence of misleading information and promote a sense of trust among citizens, high-quality information distribution through e-government platforms is essential. SQ and SyQ have considerable influence on user satisfaction, indicating that citizens value technologies and responsiveness that facilitate swift and efficient task completion. These results support the outcomes of prior research (Gupta, 2021; J. Lee & Kim, 2018; Y. Li & Shang, 2020; Nulhusna et al., 2017; Ramdhony et al., 2023; Veeramootoo et al., 2018; Wang et al., 2019). A well-designed and

reliable system ensures that citizens can complete tasks smoothly and without technical glitches. If the system is slow, prone to errors, or lacks security measures, citizens may hesitate to use it for fear of data breaches or frustrating experiences. Robust SyQ builds trust in the government's ability to handle citizens' data securely and provide a seamless online experience, thereby encouraging adoption and continuance usage. Delivering excellent SQ fosters positive perceptions of government competence and responsiveness, fostering higher adoption rates.

The positive influence of PU on e-government adoption is consistent with the results of previous studies (Dwivedi et al., 2017; Hooda et al., 2023; Mensah, 2020; Verkijika & De Wet, 2018). Citizens who are well-versed in technology find value in these services as they offer the benefits of time savings, reduced effort, and convenient task execution compared to traditional offline methods. Furthermore, the comprehensive shift of major government services to online platforms through e-government portals enhances the efficiency and convenience of task completion for both citizens and government personnel, facilitated by ample information availability. Contrary to the findings of earlier research (Hooda et al., 2023; Mensah, 2020; Puthur et al., 2020), this study reveals that PEOU does not significantly impact user satisfaction. While a significant number of Indians are proficient in utilizing digital platforms, the distinct socio-economic and technological landscape gives rise to obstacles in both the adoption and satisfaction associated with e-government systems. Digital divide, language and literacy barriers, preference for face-to-face interactions, inadequate internet connectivity, and slow network speeds are some of the common problems in emerging economies (Meet et al., 2022). Addressing these challenges requires a comprehensive approach that considers infrastructure development, digital literacy initiatives, cultural sensitivities, and user-centered design to confirm that government portals are accessible and easy to use for everyone, irrespective of their socio-economic background or technological familiarity.

The results indicate a significant but negative relationship between PR and user satisfaction. Factors such as encountering errors or glitches during e-services, inaccuracies in governmental procedures, lack of clear problem resolution mechanisms, concerns regarding personal information safety and confidentiality, susceptibility to cyberattacks or hacking, the reliability of e-government platforms, and the absence of direct human interaction contribute to PR and subsequent dissatisfaction. These findings align with prior research by Dwivedi et al. (2017), Xie et al. (2017), Mensah (2020), Muhammad and Kaya (2023), Mirkovski et al. (2023). Addressing these challenges requires a comprehensive approach focusing on enhancing data security, implementing robust cybersecurity measures, ensuring transparent and clear communication about data usage, providing user education on online risks, and establishing effective legal frameworks protecting user rights. By addressing PR, governments can enhance user satisfaction and encourage wider usage of e-government services.

The findings indicate a substantial impact of user satisfaction on citizen trust. The outcome aligns with prior research (Alkrajji & Ameen, 2021; Hooda et al., 2023) that found that e-government services positively enhance citizen engagement and interactions with the government and consequently improve their trust in the government. Our results also demonstrated that user satisfaction stands as a foundational factor propelling citizens' continuance usage intention. When citizens have their needs met and experience seamless interactions, they form a positive perception of both the services and the governing authorities providing them. Satisfied users tend to perceive the value and utility of e-government offerings, making them more inclined to maintain their usage. The seamless and enjoyable interaction with these services reinforces a sense of convenience, reliability, and effectiveness, fostering a desire to continue their use. Past studies also attested to this relationship (Mirkovski et al., 2023; Veeramootoo et al., 2018; Yap et al., 2021).

Lastly, our MGA findings confirm the impact of residential status on user satisfaction, their level of trust, and continuance intention. The disparities in the influence of SyQ and SQ on user satisfaction across different user segments suggest that a segmented approach to service provision may be beneficial. Recognizing that different user groups attach varying degrees of importance to different quality factors, organizations could tailor their strategies to suit the preferences and needs of each segment.

Given that the impact of SyQ is less pronounced among rural users, organizations might need to adopt distinct strategies for this group. They could focus on other aspects, such as addressing specific challenges faced by rural users, providing support for digital literacy, or offering personalized assistance to navigate e-government services. Customizing interventions based on the unique characteristics of rural users could lead to improved satisfaction and engagement.

IMPLICATIONS

THEORETICAL IMPLICATIONS

This study significantly advances the theory of user satisfaction and continuance usage intention of e-government services. To clarify user satisfaction and continuance intention, a synthesized model that combines TAM and ISSM has first been developed. Secondly, our research examines the connection between CT and user satisfaction with e-government services. Although the relationship between trust and the use of e-government services has been studied in the past, our analysis offers new information about how citizen satisfaction with governmental authorities can affect that relationship. The hypothesized relationship is supported empirically by our findings. Thirdly, by including the “continuance usage intention” construct in the model, our research adds to the existing body of knowledge. By illustrating how user satisfaction can affect the continuance usage intention of e-government services in India and other emerging economies, this expansion, in line with the perspective of ISSM, enhances the literature. Lastly, prior research suggests technological advancements and convenience drive e-government adoption. This study proposes a new theoretical lens, framing global pandemics as potential catalysts for rapid e-government adoption, driven by factors like increased reliance on online services and policy shifts. Given the governmental policies and investments in digital infrastructure, the research offers insights into how e-governance policy can align with evolving user behaviors. This theoretical examination provides a foundation for understanding the interplay between policy decisions, user experiences, and the broader context of digital governance in the post-COVID era.

MANAGERIAL IMPLICATIONS

The results provide significant insights and suggestions for e-government service providers. First, this study recommends the quality of service, information, and system of e-government portals significantly contribute to improving users' satisfaction. While designing e-government services, government authorities must prioritize the provision of accurate, comprehensive, and timely information within a secure and user-friendly digital environment, free from technological glitches. Deploying an interactive, user-friendly interface, ensuring 24×7 accessibility, reliability, and compatibility across various devices and operating systems, and implementing a swift query resolution mechanism can collectively improve users' satisfaction. Second, to enhance both the PU and PEOU, it is recommended that awareness and training initiatives be implemented. These programs will educate users on proficiently navigating e-government services and give valuable feedback for improvement. Furthermore, a seamless user experience can be ensured by establishing 24×7 access to online tutorials, helpdesks, and technical support systems, enabling swift and effective issue resolution. Integrating AI-driven customer service support, such as chatbots and virtual voice assistants, can empower citizens to skillfully engage with e-government portals (Hujran, Al-Debei, et al., 2023). Third, to lessen the PR associated with e-government services, governments should prioritize several measures, such as providing clear instructions and comprehensive FAQs guiding users through platform usage, task completion, and capturing user feedback to act on. Leveraging social influence, community engagement, social media campaigns, and diverse communication channels can greatly enhance user trust in e-government. Fourth, efforts should be made to improve user satisfaction. Successful e-government service adoption can be facilitated through strategies such as promotional campaigns, incentive programs, endorsements from early adopters, user testimonials, and leveraging the influence of social networks. Last, system administrators must ensure periodic updates and upgrades of e-government

platforms, preventing users from experiencing a sense of negligence. These concerted efforts hold the potential to augment citizens' trust in e-government, symbolizing a government's genuine concern for its citizens, its understanding of their needs, and its capacity to deliver effective services.

CONCLUSION AND FUTURE RESEARCH

With the rise of digitalization, public trust in the government, widespread accessibility of the Internet, and growing demand for transparent government operations, a considerable interest in e-government services has emerged within communities and governmental bodies. Consequently, there is a pressing need to examine the elements contributing to user satisfaction and their future intention to use similar services. This study employed a novel integrated approach that combined TAM and ISSM, alongside the consideration of PR, to delve into user satisfaction and the intention to continue using e-government services among Indians. The findings of the research unveil several significant relationships. The results highlight that higher user satisfaction with e-government services contributes significantly to citizen trust in government and fosters their intention to continue using. Researchers and policymakers should consider these findings while designing e-government services and ensuring user satisfaction.

There are some future research directions. First, this research was conducted in India; therefore, caution is advised when attempting to generalize the findings. Second, the survey questionnaire did not specify particular e-government services and portals, which imposed a cognitive burden on respondents, who might hold diverse perceptions regarding the value derived from various e-government portals and their satisfaction levels. Future researchers should carry out research on a specific e-government service or platform for greater precision. Thirdly, the sample size of 501 may not represent the entire population. Thus, future researchers can employ a more extensive dataset. Lastly, future studies can employ in-depth interviews and longitudinal studies with the aim of enhancing the validity and reliability of the results.

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APPENDIX: QUESTIONNAIRE FORM

Construct	Items	Sources
Information Quality	Information is accurate and easily accessible.	DeLone & McLean (1992); Ramdhony et al. (2023)
	Information is up to date.	
	Information is easy to read and understand.	
	It provides reliable and sufficient information.	
System Quality	It is easy to use system.	DeLone & McLean (1992); Li & Shang (2020)
	I can successfully visit the links provided on the homepage.	
	It is easy to navigate on system while performing tasks.	
	E-government portals are arranged in a user-friendly way.	
Service Quality	The service is reliable.	DeLone & McLean (1992); Ramdhony et al. (2023)
	It provides prompt service to my needs.	
	It improves the quality of interaction with government departments.	
	It processes my desired task in a reasonable time.	
Perceived Usefulness	e-government services are useful.	Davis (1989); Mensah, (2020); Xie et al. (2017)
	It enables me to access government services more quickly.	
	It enhances my effectiveness in accessing government services.	
Perceived Ease of Use	Services are easy to use.	Davis (1989); Xie et al. (2017)
	It provides clear and easy to follow procedures, processes, and instructions.	
	My interaction with e-government is clear & understandable.	
Perceived Risk	Providing personal information to e-government is risky.	Xie et al. (2017)
	I think that it is unsafe to use e-government because of security concerns.	
	I believe that there could be negative consequences of using e-government.	
Citizen Trust	I trust that citizens and their benefits have the highest priorities at governments departments.	Kurfalı et al. (2017); Venkatesh et al. (2016)
	I trust government departments' abilities to provide e-services effectively and securely.	
	I believe that government departments perform their roles very well.	
	e-government enhances my trust on government.	
User Satisfaction	I am satisfied with the convenience of access e-government anywhere and anytime	Li & Shang (2020); Mandari & Koloseni (2023)
	e-government have met my expectations.	
	I am satisfied with the service I received from e-government.	
	It satisfactorily meets my interaction needs with government departments.	
	Overall, I am satisfied with e-government.	
Continuance Use Intention	I intend to continue using e-government in the future.	Bhattacharjee, (2001); Rahim et al. (2023)
	I will continue to use e-government frequently.	
	I intend to continue using e-government rather than use alternative means (e.g., offline interaction).	

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