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## Article

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# e-Governance, citizen satisfaction and net benefits: the moderating effect of digital divide

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## ABSTRACT

This article aims to analyze the influence of three e-Governance information system (IS) quality dimensions – information, system and service quality on usage intention, citizen satisfaction and net benefits in Nepal and assess the moderating role of digital divide on the relationship. It contributes by integrating digital divide in the DeLone and McLean (D&M)'s IS success model (ISSM). The study is based on a cross-sectional field survey of 304 e-Governance platform users located in both rural and urban municipalities in Nepal. The analysis was undertaken through PLS-SEM using the SmartPLS version 4.0. The results of the study revealed that e-Governance system quality and service quality have positive influence on citizen satisfaction. Likewise, intention to use is also found to have positive impact on citizen satisfaction. Additionally, the study finds that usage intention and citizen satisfaction affect net benefits positively. Further analysis indicated that digital divide interacts positively on relationship between the three IS quality dimensions and citizen satisfaction. This study contributes to prior literature in area of e-Governance by providing further insights into citizen satisfaction and net benefits of e-Governance. The implications offer directions on how policymakers can enhance citizen satisfaction and net benefits of e-Governance platforms through improvements in system and service quality as well as undertaking measures to address digital divide.

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## JEL CLASSIFICATION

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## 1. Introduction

The integration of information technology (IT) into governance has significantly transformed public services, with governments increasingly offering online services (Latupeirissa et al., 2024). This transformation is driven by advancements in information communication technology (ICT), which has made the development and implementation of online services more cost-effective (Rehman et al., 2016). Additionally, the proliferation of internet, mobile devices and digital infrastructure has expanded the ways in which governments can connect with citizens (Lallmahomed et al., 2017). Citizens' growing reliance on digital technologies has further demanded for online government services (Kumar et al., 2017). E-governance has emerged as a significant approach utilizing ICT tools and digital platforms to deliver government services, aiming to improve efficiency, transparency and accessibility (Mishra & Geleta, 2020). Therefore, numerous studies have investigated the adoption and implementation of e-Governance (Hooda & Hooda, 2021; Singh et al., 2021; Tang et al., 2021). However, it is essential to recognize that the effectiveness of e-Governance hinges significantly on several factors, such as quality of information (Gupta & Mathur, 2024; Hooda et al., 2023; Kala et al., 2024; Hidayat Ur Rehman et al., 2023), system reliability (Al-Rahmi et al., 2022; Hooda et al., 2023; Kala et al., 2024; Mandari & Koloseni, 2023; Hidayat Ur Rehman et al., 2023), standard of services provided (Ilieva et al., 2024; Kala et al., 2024; Mao et al., 2023; Pham et al., 2023), user satisfaction (Alkrajji & Ameen, 2022; Chan et al., 2021; Kala et al., 2024; Hidayat Ur Rehman

et al., 2023) and the benefits it delivers to the citizens (Kala et al., 2024; Myint, 2022; Nookhao & Kiattisrin, 2023; Pham et al., 2023).

Recent studies in the area have increasingly focused on exploring citizen satisfaction from usage of e-Governance services (Al-Rahmi et al., 2022; Hooda et al., 2022; Rasool et al., 2020). However, there is a notable gap in understanding citizen satisfaction in developing countries (Javaid & Arfeen, 2017; Kumar et al., 2017; Rai et al., 2020) and the factors influencing satisfaction with e-governance services (Jermsittiparsert et al., 2022; Mensah, 2020; Zahid et al., 2022). Existing literature highlights the benefits of adopting and implementing e-Governance at organizational and social level (Alcaide-Munoz et al., 2017; Kumar et al., 2018; Rehman et al., 2016; Sun et al., 2015), but there is limited exploration of these systems' benefits at individual user level (Rasool et al., 2020; Stefanovic et al., 2016; Zahid & Din, 2019). Many studies have used the DeLone and McLean (D&M) model to assess the success of e-Governance information system (IS; Al-Rahmi et al., 2022; Hidayat Ur Rehman et al., 2023). However, empirical evidence on the relationship between e-Governance and citizen satisfaction remains inconclusive (Kim et al., 2024; Ma & Zheng, 2017).

Nepal is actively implementing e-Governance initiatives to enhance citizen satisfaction through improved efficiency, transparency and accessibility of government services (Bhagat et al., 2022). However, the country faces significant challenges as depicted by its ranking of 125th in the e-Governance development index and 143rd in the e-participation index which indicates that it lags behind in e-Governance infrastructure and citizen participation (United Nations, 2023). The low ranking indicates government initiatives for improvement. For it, there is a critical need to study the relationship between e-Governance services, citizen satisfaction, net benefits and intention to use within the Nepalese context (Budhacharya & Chatterjee, 2019; Pandey & Risal, 2020; Phuyal, 2024). Additionally, the country is also facing the problem of digital divide, posing a major hurdle to widespread adoption (Bhagat et al., 2022; Rai, 2022; Rai et al., 2020; Shakya, 2018). Although some prior studies in Nepalese context have focused on enhancing government-to-citizen (G2C) systems (Bhagat et al., 2022; Rai et al., 2020), research related to e-Governance system satisfaction and role of digital divide in it are scanty. Therefore, further exploration is needed on how e-governance, citizen satisfaction, net benefits and the digital divide interact in Nepal (Bhagat et al., 2022; Rai, 2022; Rai et al., 2020; Shakya, 2018).

There is a significant research gap in understanding how the digital divide, characterized by unequal access to and utilization of digital technologies, influences the realization of net benefits from e-Governance initiatives, especially in developing countries like Nepal (Phuyal, 2024; Rai, 2022). While previous studies have explored the digital divide's role in e-Governance adoption (Botric & Bozic, 2021), its impact on e-Governance quality and satisfaction remains insufficiently investigated (Malodia et al., 2021). Further research is needed to develop and validate a precise model addressing these dynamics (Azamela et al., 2022; Bhagat et al., 2022; Mensah, 2020; Rana et al., 2017). Therefore, this study attempts to fill this gap by employing the D&M framework to examine how information, system and service quality influence intention to use e-Governance services and citizen satisfaction. It also examines the effect of intention to use and citizen satisfaction on net benefits to citizens from e-Governance system usage. Additionally, the study investigates how digital divide moderates the effects of information, system and service quality on citizen satisfaction.

This article comprises six sections. The first section introduces the topic. The second section reviews pertinent literature and outlines hypotheses. Methodological considerations are detailed in the third section. Section 4 presents data analysis results and interpretations. Section 5 discusses findings and their implications. The final section includes conclusions, limitations and suggestions for future research.

## 2. Literature review and hypothesis development

### 2.1. e-Governance in Nepal

Since the early 2000s, the Government of Nepal (GoN) has been actively advancing e-Governance and digital transformation initiatives. The GoN introduced an IT policy in 2000 to support its e-Governance objectives (Kharel et al., 2014). This policy aims to leverage IT to improve service delivery and administrative processes, enhancing openness, efficiency and accountability as outlined in the Digital Nepal

Framework (DNF) (Digital Nepal, 2019). Many government agencies have transitioned to digital processes, yet challenges, such as inadequate ICT infrastructure, low digital literacy and a significant digital divide (Giri et al., 2018; Rai, 2022) continue to hinder effective implementation. The GoN has made strides in service delivery through initiatives like the 'Nagarik App' which translates to citizens app providing 45 integrated citizen services. However, full digital transition is still in progress. Challenges, such as ineffective ICT policies and slow service delivery affect access to essential services like smart licenses and National IDs. Further, Internet penetration in Nepal is 58% and digital literacy rate is 31% (Nepal Telecom Authority, 2024) which limits access of citizens to e-Governance services.

Empirical studies have examined aspects, such as the adoption of e-Governance and associated challenges (Giri et al., 2018; Phuyal, 2024; Sharma, 2020). For example, Sharma (2020) highlighted the need to improve infrastructure, public awareness and service accessibility. Giri et al. (2018) identified significant obstacles like inadequate infrastructure and digital divide. While the use of ICT has the potential to enhance governance in Nepal (Basyal et al., 2018), the current e-Governance system is largely supply-driven, leading to deficiencies in public service delivery (Kharel, 2018). There is a critical need for Nepal to shift focus from solely supply-side evaluations to exploring demand-side perspectives, particularly concerning citizen satisfaction with e-Governance services (Rai, 2022; Rai et al., 2020). These studies predominantly focus on supply-side aspects of e-Governance, neglecting demand-side perspectives crucial for understanding citizen satisfaction and improving governance effectiveness in Nepal (Rai, 2022; Rai et al., 2020). Therefore, there is an urgent need for research that investigates these dimensions and shifts focus toward the demand-side which reflects citizen usage, satisfaction and benefits to better address and improve e-Governance in Nepal.

## **2.2. e-Governance services and citizen satisfaction**

Prior studies have extensively explored citizen satisfaction with e-governance systems (Alkrajji, 2021; Alkrajji & Ameen, 2022; Biswas & Roy, 2020; Chan et al., 2021; Kala et al., 2024; Hidayat Ur Rehman et al., 2023; Wang & Teo, 2020). For example, Alkrajji (2021) applied the Technology Acceptance Model (TAM) and Seddon's model to Saudi university students, highlighting perceived usefulness as a key determinant of satisfaction. Alkrajji and Ameen (2022) found service quality and trust significantly influenced citizen loyalty to e-Governance services in their study. Biswas and Roy (2020) focused on Union Digital Centers (UDCs) in Bangladesh, emphasizing the impact of information, system and service quality on satisfaction. Chan et al. (2021) explored service design's influence on satisfaction through core, facilitating and supporting service perceptions. Kala et al. (2024) underscored information, service, and system quality's role in user satisfaction and trust. Hidayat Ur Rehman et al. (2023) integrated perceived usefulness and trust into the D&M IS Success Model (ISSM) to analyze e-governance in Pakistan, highlighting information and service quality's impacts.

## **2.3. e-Governance and digital divide**

Digital divide is characterized by unequal access to and utilization of digital technology (Harvey et al., 2023; Vassilakopoulou & Hustad, 2023). Factors influencing this disparity include socioeconomic status, education level, age, geographic location and infrastructure availability (Afzal et al., 2023; Mubarak et al., 2020). Studies on e-Governance utilization underscore the impact of the digital divide (Botric & Bozic, 2021; Khanra & Joseph, 2019; Malodia et al., 2021; Patergiannaki & Pollalis, 2024; Perez-Morote et al., 2020). Botric and Bozic (2021) explored e-Governance adoption patterns across EU countries, revealing varying usage trends influenced by age demographics. Khanra and Joseph (2019) found that the digital divide mediates the relationship between service quality and e-Governance adoption in India. Malodia et al. (2021) highlighted citizen orientation as pivotal for e-Governance success in India, noting the influence of the digital divide, economic factors and political stability. Patergiannaki and Pollalis (2024) investigated e-Governance service quality in Greek municipalities, emphasizing usability issues influenced by demographic factors and the digital divide. Similarly, Perez-Morote et al. (2020) analyzed European panel data, identifying income and education-related digital divides as significant factors affecting e-Governance service adoption rates.

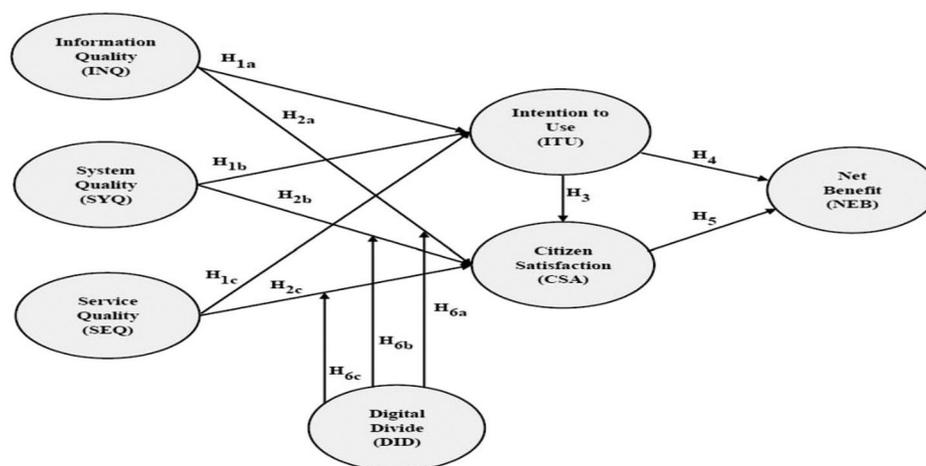


Figure 1. Research model.

## 2.4. DeLone and McLean's model

D&M's ISSM was originally introduced in 1992 with six variables, viz., system quality, information quality, IS use, user satisfaction, individual impact and organization impact. The model was updated in 2003 by adding service quality as new dimension and combining the two impact variables into a single variable termed net benefits. The model is widely accepted for evaluating success of IS. Wang and Liao (2008) state that the D&M model is appropriate for assessing e-Governance G2C process. Numerous studies have utilized the IS model to assess effectiveness of e-Governance systems (Al-Rahmi et al., 2022; Floropoulos et al., 2010; Hidayat Ur Rehman et al., 2023; Weerakkody et al., 2016). Studies have integrated diverse theoretical frameworks with the D&M model, revealing insights into user satisfaction, trust and system quality (Hooda et al., 2023; Irmawan & Muslim, 2023; Kilani, 2021; Rahi & Ghani, 2019). However, D&M have not provided the empirical validation of the updated model (Wang & Liao, 2008). Hence, studies in different context are required to provide further validation of the model.

The research framework of this study is based on the updated DeLone and McLean (2003) model to investigate the relationships among e-Governance IS quality dimensions (Information, system and service), intention to use, citizen satisfaction and net benefits. The study contributes by adding digital divide as a moderator in the D&M model. The research model of the study is shown in Figure 1.

## 2.5. Hypotheses development

### 2.5.1. Information quality and intention to use

Information quality refers to the ability of an IS to deliver timely, accurate, comprehensive, concise and relevant information (DeLone & McLean, 1992, 2003). Intention to use, on the other hand, reflects a user's readiness and inclination to adopt and engage with an IS for tasks or objectives (DeLone & McLean, 1992, 2003). Recent studies normally show a positive relationship between information quality and intention to use e-Governance services (Gupta & Mathur, 2024; Hooda et al., 2023; Kala et al., 2024; Hidayat Ur Rehman et al., 2023; Wang & Teo, 2020). Gupta and Mathur (2024) found that higher information quality enhances citizens' attitudes toward e-Governance mobile applications in India, promoting continued usage. Hooda et al. (2023) expanded the ISSM to include trust in e-Governance system, highlighting information quality, service quality and system quality as key drivers influencing intentions to use. Similarly, Kala et al. (2024) used the TAM and ISSM to demonstrate that quality information services enhance user satisfaction and trust in Indian e-Governance services, thereby increasing intentions for continued use. In Pakistan, Hidayat Ur Rehman et al. (2023) emphasized information quality's role in enhancing user satisfaction and promoting G2C e-Governance system usage. Wang and Teo (2020) found similar results in China, where information quality positively correlated with citizen satisfaction and

intentions to use mobile-Governance services. Overall, prior studies reveal positive impact of information quality on usage intention. Based on the above empirical evidence, the following hypothesis is proposed:

*H<sub>1a</sub>: Information quality influences intention to use positively.*

### **2.5.2. System quality and intention to use**

System quality in ISs refers to the optimal characteristics that enable users to perform tasks effectively (Seddon, 1997). This includes attributes like adaptability, availability, reliability and response time, all of which collectively enhance user satisfaction (DeLone & McLean, 2003). Users engaging with e-Governance services directly interact with service providers and facilities, allowing them to independently evaluate service quality (Tan et al., 2013). Recent studies (Al-Rahmi et al., 2022; Hooda et al., 2023; Kala et al., 2024; Mandari & Koloseni, 2023; Hidayat Ur Rehman et al., 2023;) confirm that system quality positively influences users' intentions to continue using e-Governance services. For instance, Al-Rahmi et al. (2022) emphasized system quality as a crucial factor influencing user adoption of e-Governance services, highlighting its role in enhancing user confidence and commitment. Similarly, Hooda et al. (2023) identified system quality as a significant predictor of future intentions to use e-Governance systems, underscoring the importance of robust system infrastructure and usability in fostering user trust. Kala et al. (2024) found that system quality enhances user satisfaction and increases intentions for continued use of government services. Mandari and Koloseni (2023) reinforced these findings, indicating that system quality positively impacts users' decisions to sustain e-Governance service usage. Hidayat Ur Rehman et al. (2023) also highlighted the substantial impact of system quality on e-Governance usage and user satisfaction, advocating for continuous improvements in system infrastructure. Based on these discussions, this study hypothesizes the following:

*H<sub>1b</sub>: System quality influences intention to use positively.*

### **2.5.3. Service quality and intention to use**

Government service quality is defined by its effectiveness in meeting citizen needs (Hu et al., 2014; Tan et al., 2013). Existing literature consistently identifies service quality as a critical predictor of e-Governance service usage (Chan et al., 2021; Ilieva et al., 2024; Kala et al., 2024; Li & Shang, 2020; Mao et al., 2023; Pham et al., 2023). For instance, Chan et al. (2021) and Ilieva et al. (2024) both confirm that higher service quality significantly influences users' intentions to use e-Governance systems. Kala et al. (2024) emphasize that superior service quality enhances user satisfaction and encourages continued usage of government services. Li and Shang (2020) suggest that perceived service value mediates the relationship between service quality and users' intentions to continue using e-Governance services. Additionally, empirical studies by Mao et al. (2023) and Pham et al. (2023) provide further evidence of the positive impact of service quality on users' intentions to use e-Governance services. Similar findings have been observed by Kumar et al. (2017) and Khanra and Joseph (2019), highlighting the consistent positive correlation between e-Governance service quality and user adoption intentions. Therefore, this study proposes the following hypotheses:

*H<sub>1c</sub>: Service quality influences intention to use positively.*

### **2.5.4. Information quality and citizen satisfaction**

Citizen satisfaction refers to the extent to which users feel their information needs are met by the system (Rana et al. 2017). The relationship between information quality and user satisfaction with e-Governance services has been extensively researched and documented in academic literature (Floropoulos et al., 2010; Petter & McLean, 2009; Wang & Liao, 2008; Weerakkody et al., 2016). Studies consistently demonstrate a positive correlation between information quality and user satisfaction in e-Governance services (Kala et al., 2024; Li & Shang, 2020; Noori, 2022; Veeramootoo et al., 2018). For example, Kala et al. (2024) emphasized the significant role of information quality in shaping user satisfaction. Li and Shang (2020)

highlight that high-quality information enhances user satisfaction. Noori (2022) stresses the importance of information quality in building trust and promoting continued use of e-Governance services. With these premises, the study proposed:

*H<sub>2a</sub>: The quality of information positively affects citizen satisfaction.*

### **2.5.5. System quality and citizen satisfaction**

Recent research has extensively explored the relationship between system quality and user satisfaction with e-Governance services (Alkrajji, 2021; Kala et al., 2024; Mbaidin, 2021; Sun & Zhang, 2020). For example, Alkrajji (2021) found that system quality strongly influences citizen satisfaction with e-Governance services. Similarly, Kala et al. (2024) underscored the importance of system quality in shaping user satisfaction. Mbaidin (2021) provided further evidence of a significant positive relationship between system quality and user satisfaction in e-Governance environments. Sun and Zhang (2020) also revealed a robust positive correlation between system quality, user satisfaction, and citizens' intentions to continue using e-Governance services. Other studies (Veeramootoo et al., 2018; Weerakkody et al., 2016) have similarly demonstrated the beneficial impact of system quality on enhancing user satisfaction with e-Governance services. Accordingly, the below hypothesis is formulated:

*H<sub>2b</sub>: System quality positively impact citizen satisfaction.*

### **2.5.6. Service quality and citizen satisfaction**

Research consistently shows that higher service quality results in increased user satisfaction with e-Governance platforms (Floropoulos et al., 2010; Lien et al., 2017; Rana & Dwivedi, 2015; Stefanovic et al., 2016; Venkatesh et al., 2014). When e-Governance services are perceived as efficient, reliable and responsive to citizen needs, satisfaction levels tend to be higher (Omar et al., 2011). This positive perception significantly enhances overall satisfaction with the services provided (Lien et al., 2017; Stefanovic et al., 2016). Recent studies also highlight that improving service quality not only boosts citizen satisfaction but also promotes greater adoption and usage of e-Governance services (Chan et al., 2021; Mellouli et al., 2020; Taufiqurokhman et al., 2024; Ye et al., 2023). Based on these premises, the following hypothesis was proposed:

*H<sub>2c</sub>: Service quality positively affects citizen satisfaction.*

### **2.5.7. Intention to use, citizen satisfaction and net benefits**

The relationship between intention to use, citizen satisfaction and net benefits is crucial for understanding the success of e-Governance services. When citizens perceive e-Governance services as effective, easy to use and responsive, their satisfaction increases, fostering continued usage and advocacy (Nookhao & Kiattisin, 2023). Net benefits encompass the positive outcomes derived from using ISs, focusing here on individual benefits. Studies consistently show that higher citizen satisfaction with e-Governance correlates with increased intention to continue using these services (Kala et al., 2024; Ma & Zheng, 2017; Myint, 2022). Similarly, research by Nookhao and Kiattisin (2023) and Pham et al. (2023) underscores that satisfied users are more likely to persist in using e-Governance services over time. Moreover, perceived net benefits, such as efficiency gains and improved service delivery, motivate users to adopt and regularly use e-Governance platforms (Al-Omairi et al., 2020; Hidayat Ur Rehman et al., 2023). Accordingly, the following hypotheses were incorporated into the study:

*H<sub>3</sub>: Intention to use affects citizen satisfaction positively.*

*H<sub>4</sub>: Intention to use affects net benefits positively.*

### 2.5.8. Citizen satisfaction and net benefits

Understanding the relationship between citizen satisfaction and the net benefits of using e-Governance services is crucial for assessing their overall success. When citizens experience higher satisfaction with these services, it often correlates with positive outcomes such as improved service delivery and better access to governmental information (Scott et al., 2016). Conversely, satisfied citizens tend to perceive greater net benefits from their interactions with e-Governance platforms (Zahid & Din, 2019). Several studies have explored this relationship. For example, research by Kala et al. (2024), Ma and Zheng (2017), Myint (2022), Nookhao & Kiasstisin (2023) and Pham et al. (2023) shows that higher levels of citizen satisfaction with e-Governance services lead to positive outcomes. When citizens perceive e-Governance platforms as efficient, reliable and user-friendly, their satisfaction increases which leads to increase in perceived net benefits (Al-Omairi et al., 2020). Based on these premises, this study assumes the following hypothesis:

*H<sub>5</sub>: Citizen satisfaction positively affects net benefits.*

### 2.5.9. Moderating role of digital divide

The digital divide, documented extensively in literature, highlights disparities in access to and utilization of digital technology (De Haan, 2004; DiMaggio et al., 2001). Factors, such as socioeconomic status, education level, age, geographic location and infrastructure availability contribute significantly to this inequality (Billon et al., 2009; Kraemer et al., 2005). Recent studies by Harvey et al. (2023), and Vassilakopoulou and Hustad (2023) highlight this disparity, emphasizing its impact on access to digital resources. Several prior studies have explored the link between the digital divide and citizen satisfaction with e-Governance services (Boksova et al., 2021; Botric & Bozic, 2021; Mesa, 2023). These investigations reveal that disparities in digital access, influenced by factors like age, income and education, significantly affect citizens' ability to utilize and benefit from e-Governance offerings. Malodia et al. (2021) identified the digital divide as a moderator that negatively affects e-Governance quality and user satisfaction. Khanra and Joseph (2019) found that the digital divide influences service quality and users' willingness to engage with e-Governance services. Moreover, Perez-Morote et al. (2020) highlighted the digital divide's substantial influence on the utilization and intent to use e-Governance services. Therefore, the following hypothesis was proposed:

*H<sub>6a</sub>: Digital divide moderates the relationship between e-Governance information quality and citizen satisfaction.*

*H<sub>6b</sub>: Digital divide moderates the relationship between e-Governance system quality and citizen satisfaction.*

*H<sub>6c</sub>: Digital divide moderates the relationship between e-Governance service quality and citizen satisfaction.*

## 3. Methodology

### 3.1. Nature of the study, sampling and data

The study is based on positivist research paradigm and adopts a deductive approach for verification of D&M IS model in e-Governance service context by adding digital divide as a moderating construct in the model. It is based on quantitative method employing survey strategy which offers an objective measure for collecting user opinion (Rahi, 2017a). The study adopted a cross-sectional survey due to its effectiveness in capturing opinion from respondents at a particular period in time, cost effectiveness and appropriateness for large samples (Rindfleisch et al., 2008). The study's target population comprised citizens using e-Governance system for services provided by GoN. A structured field survey questionnaire was employed for data collection and initially, 400 questionnaires were distributed to convenient sample. Convenience sampling method has been employed due to unavailability complete sampling frame (Bornstein et al., 2013). The study complies with Declaration of Helsinki statements for ethical principles of research. Ethical approval was taken from the Institutional Review Committee

(IRC) of Nobel College, Pokhara University. Accordingly, informed consent in written form was taken from the respondents before data collection. The respondents were clearly informed about study purpose, data collection procedure, confidentiality and anonymity, potential risks and benefits of participation. The reason for obtaining informed consent in written form rather than orally was to ensure that participants fully understood the research purpose and process, participants rights and associated risks, and the implications of their participation in the survey. It provides a clear and documented agreement that protects both the participants and the researchers. The approach ensured transparency and accountability required for maintaining ethical integrity of the study.

Out of the 400 participants, completed questionnaire was received from 317 respondents with response rate of 79.25%. A careful scrutiny of received questionnaire was undertaken, especially to examine incompleteness of information and responses straight lining and 13 improper responses were removed. Hence, study is based on 304 responses. Data collection was undertaken from January 2023 to March 2023. Sample size fulfills requirement of PLS-SEM (Hair et al., 2014) considering number of constructs, indicators and model complexity.

A self-administered questionnaire in English and Nepali language was used. It included three sections: first included basic information questions about the respondents' usage of e-Governance services and the second part included scales of e-Governance quality, use intention, satisfaction, digital divide and benefits. Finally, third section included questions on respondents' profile. Pre-testing of questionnaire with 30 respondents was done to ascertain goodness of the measurement instrument. During pre-testing feedback was collected on clarity of scale items. Additionally, for validating content and language structure of the questionnaire, suggestions from six experts in field of public administration was taken. The pre-testing and expert opinion collections were undertaken in Kathmandu, the capital city of Nepal. Thereafter, the questionnaire was finalized taking in consideration completeness of items for a construct, internal consistency and goodness of measure. The final questionnaire included 32 items of seven constructs related to e-Governance. To protect the privacy of research participants, personal data were de-identified by removing direct identifiers such as names and contact information.

Two biases were assessed to ascertain the possibility of measurement error in responses. First, non-response bias was examined to identify presence of disparities in opinion on e-Governance IS between participants and non-participants which can influence the accuracy of study results (Khan & Hinterhuber, 2024). For it, comparison of early and late responses was undertaken by dividing the final sample into the two groups, viz., early and late respondents. The late respondents who completed the survey only after follow-ups are used as proxies for non-participants (Sturm et al., 2023). The differences in responses provided by the two-groups were examined by Mann-Whitney U test (Blome et al., 2014) which did not reveal any statistically significant differences indicating absence of non-response bias. Second, common method bias (CMB) has been examined to ascertain absence of response bias in self-administered surveys when dependent and independent variables are captured by same response method at same point of time (Kock et al., 2021). The study was designed and survey was operationalized carefully to mitigate this bias. Specifically, clear and concise language was used in survey instrument, validated scales were used, respondents were ascertained of their anonymity and the scales of endogenous and exogenous constructs were kept in different sections of the questionnaire. Additionally, independent constructs were measured using 5-point Likert scale but dependent constructs were measured using 6-point Likert scales. Viswanathan and Kayande (2012) recommend applying varying scale to assess exogenous and endogenous constructs to minimize consistency motif among respondents and hence reduce CMB. Finally, single factor test of Harman (1976) and Kock (2015)'s full collinearity was used to test for presence of CMB.

### **3.2. Sample profile**

Of the 304 final respondents, female comprised 40.9% as depicted in Table 1. Majority (72.6%) used e-Governance a few times, are from urban area (67.5%), have masters level education (53.5%), are of age group 35–45 years (34.0%) and have intermediate computer literacy skills (48.0%). Results indicated usage of e-Governance facilities is low as cumulative sum of non-frequent e-Governance service users is high

**Table 1.** Description of sample respondents ( $n=304$ ).

Characteristic	<i>n</i>	%	Characteristic	<i>n</i>	%
<i>Age</i>			<i>Municipal type</i>		
16–25	62	20.5	Rural municipality	97	32.1
26–35	89	29.4	Urban municipality	204	67.5
36–45	105	34.0	<i>Computer literacy</i>		
Above 45	47	15.5	Illiterate	14	4.5
<i>Gender</i>			Basic	101	33.4
Male	179	59.1	Intermediate	145	48.0
Female	124	40.9	Advanced	42	13.9
<i>Education</i>			<i>Frequency of use of e-Governance services</i>		
School	36	11.9	Rarely	33	10.9
Higher school	49	16.2	Sometimes	220	72.6
Bachelors	56	18.5	Frequently	50	16.5
Masters	162	53.5			

**Table 2.** Operationalization of constructs.

Construct	Operational definition	Items (scale)	Source
Information quality	Ability of e-Governance system to provide citizens with accurate, timely, concise, sufficient, relevant, convenient and needy information.	7 (Five-point Likert)	Wang and Liao (2008); Rai et al. (2002)
System quality	Ability of e-Governance system to provide navigation, features and functions in user-friendly and easy manner to citizens.	4 (Five-point Likert)	Wang and Liao (2008); Rai et al. (2002)
Service quality	Ability of e-Governance system to provide service to citizens through problem solving, transaction security and customized attention.	3 (Five-point Likert)	Wang and Liao (2008)
Intention to use	Ability of e-Governance system to influence citizens to use it frequently on continuous basis.	3 (Six-point Likert)	Venkatesh and Davis (2000)
User satisfaction	Satisfaction citizens get from information provided, service quality, and fulfillment of expectations by e-Governance system.	4 (Six-point Likert)	Taylor and Todd (1995); Mandari and Koloseni (2023)
Digital divide	The divide in use of e-Governance system caused by lack of access, connection stability, digital literacy, skills and awareness among citizens.	5 (Five-point Likert)	Anwer et al. (2016); Khan et al. (2012)
Net benefits	Benefits provided by e-Governance system to citizens by making their task easier, increasing productivity, and by saving users' time and cost.	4 (Six-point Likert)	Gable et al.(2008); Wang and Liao (2008)

(83.5%). The users of e-Governance generally tend to be educated and possess computer skills. The results are as expected because the majority of users of e-Governance reside in urban areas where IT infrastructure is relatively developed and educated citizens with higher computer literacy have relatively higher access e-Governance services in terms of awareness, skills and resources.

### 3.3. Operationalization of constructs

The study is based on seven constructs and their inter-relationships as posited by the DeLone and McLean (2003) model. It includes six dimensions of the model and additional digital divide construct. Scale items were adopted from prior research studies with minor modification. The operational definition and details of scales used in depicted in Table 2. The study adds digital divide as moderating variable propositioning its interaction effect on IS quality and citizen satisfaction. The Likert scales comprised five- or six-point response anchors (1 = Strongly disagree to 5/6 = Strongly agree). Out of seven constructs, three use six-point Likert scale.

### 3.4. Data analysis procedure

Data were analyzed using PLS-SEM with SmartPLS version 4.0 package developed by GmbH company, Hamburg, Germany. The model is established method for analysis of complex interrelationships among exogenous and endogenous latent constructs (Gudergan et al., 2008). In social science research, PLS-SEM is a developing multivariate data analysis tool that can estimate complex models and data violating normality assumption (Hair et al., 2014). This method works better when the research incorporates intricate model structures and tries to test hypothesized inter-relationships (Ringle et al., 2022).

Different justification has been discussed for use of PLS-SEM in prior literature. It is a useful technique for simultaneous estimation of inter-relationships among multiple latent constructs including mediating and moderating effects (Hair et al., 2019; Rahi, 2017b). The study is based on examining hypothesized relationships among seven latent constructs including moderating effect of digital divide resulting in model complexity. SEM can be undertaken using two approaches. First is the covariance-based SEM which is based on normality assumption and next is variance-based SEM which does not require assumption of multivariate normality (Rahi, 2017b; Ringle et al., 2018). The study is based on variance-based PLS-SEM as the data violates multivariate normality assumption. The technique also includes bootstrapping option for determining statistical significance of the model parameters. The study employs bootstrapping method with 5000 resamples for producing reliable and robust estimates of path coefficients, standard errors and confidence intervals (Hair et al., 2019).

Measurement model specification and structural model evaluation are two stages of analysis included in PLS-SEM (Rahi, 2017b; Ringle et al., 2022). In first stage, measurement model estimation validates composite reliability, convergent and discriminant validity and indicator loadings of constructs used. Similarly, in second stage significance of path coefficients are evaluated using the bootstrapping method for testing the study hypotheses. Finally, Preacher and Hayes' (2008) approach was used to examine moderation effect since it is more rigorous method to examine moderation effects (Hayes, 2009) and is better suited for usage with PLS-SEM (Hair et al., 2014).

## 4. Results

### 4.1. Common method bias

For examining CMB, the study uses two approaches. It may occur as all scales used to collect data were present in same questionnaire and cross-sectional survey was employed (Podsakoff et al., 2012). First, Harman's test has been used for examining if the majority of variance is explained by a single factor. For it exploratory factor analysis (EFA) was conducted by constraining for single factor extraction in unrotated matrix. Total variance explained by single factor should be below 50% for absence of CMB (Harman, 1976). The result EFA showed that total variance explained by a single factor is 28.639% of total variance. Therefore, the bias is absent and does not affect the results. Second, as suggested by Podsakoff et al. (2003), VIF values of constructs can be used for assessing CMB. The study uses collinearity test by Kock (2015) who recommend VIF values of constructs to be below 3.3 for ascertaining absence of CMB. As all VIF values ranged from 1.109 to 1.572 (Table 3) below the threshold value, it indicates absence of the bias.

### 4.2. Measurement model

Hair et al. (2014) suggest a two-step approach for conducting SEM which comprises of measurement and structural model. Before structural modeling, measurement model should be assessed for examining dimensionality of latent constructs, significance of indicator factor loadings, reliability and validity (Rahi, 2017b). Hence, first the measurement model comprising seven reflective latent constructs was examined. The model examined reliability and validity by assessing the linkage between the observed item indicators and associated latent constructs (Hair et al., 2014).

As per Hair et al. (2019), loadings above 0.5 and 0.7 are considered acceptable and desirable respectively. All item factor loadings in Table 3 are larger than 0.6 supporting reliability. Value of Cronbach's alpha which is a measure of inter-item consistency normally lies between 0 and 1. As per Hair et al. (2014), values greater or equal to 0.80, 0.70 and 0.60 represent good, mediocre and acceptable reliability respectively. Composite reliability is an alternative measure as Cronbach's alpha under or overestimates reliability (Ringle et al., 2022). The values of composite reliability also range from 0 to 1. Rahi (2017b) recommends the values equal or more than 0.7 as indication of internal consistency. Table 2 shows that all the values of Cronbach's alpha more than 0.6 and composite reliability values exceed 0.7 which establishes the reliability of the measurement model.

**Table 3.** Reliability and validity.

Constructs	Indicators	Items	<i>M</i>	<i>SD</i>	$\lambda$	<i>A</i>	<i>CR</i>	<i>AVE</i>	<i>VIF</i>
Information Quality (INQ)	Provides accurate information	INQ1	3.557	0.981	0.631	0.824	0.869	0.512	1.362
	Provides timely information	INQ2	3.562	0.954	0.773				
	Provides concise information	INQ3	3.396	0.903	0.652				
	Provides sufficient information	INQ4	3.309	0.931	0.691				
	Provides relevant information	INQ5	3.493	0.891	0.752				
	Provides convenient information	INQ6	3.486	0.987	0.756				
	e-Governance services meet my need	INQ7	3.441	0.893	0.622				
System quality (SYQ)	e-Governance system is user friendly	SYQ1	3.258	0.936	0.780	0.722	0.826	0.543	1.572
	e-Governance system is easy to use	SYQ2	3.326	0.858	0.672				
	Includes necessary features and functions	SYQ4	3.293	0.873	0.730				
	e-Governance website is easy to navigate	SYQ5	3.164	0.915	0.762				
	e-Governance system solves my problem	SEQ1	3.023	0.918	0.834				
e-Governance system transactions are safe	SEQ2	3.271	0.854	0.670					
e-Governance system gives me individual attention	SEQ3	3.053	0.883	0.757					
Intention to use (ITU)	I intend to use e-Governance services	ITU1	4.490	1.246	0.888	0.893	0.933	0.823	1.193
	I plan to use e-Governance services frequently	ITU2	4.410	1.137	0.939				
	I intend to continue using e-Governance services	ITU3	4.692	1.085	0.894				
Citizen satisfaction (CSA)	I am satisfied with information provided	CSA1	3.678	1.188	0.836	0.872	0.913	0.723	1.109
	I am satisfied with service quality	CSA2	3.690	1.187	0.865				
	e-Governance system meets my expectation	CSA3	3.691	1.139	0.839				
	Overall, I am satisfied with e-Governance services	CSA4	3.762	1.144	0.861				
Digital divide (DID)	I can easily access the internet	DID1	3.583	1.058	0.788	0.600	0.769	0.568	1.256
	My internet connection is stable	DID2	3.376	1.002	0.724				
	The cost of internet is high (R)	DID3	2.349	0.931	0.718				
	I have basic IT knowledge	DID4	3.443	0.956	0.856				
	I have necessary skills to use e-Governance system	DID5	3.515	0.960	0.834				
Net benefits (NEB)	e-Governance services make my task easier	NEB1	4.621	0.991	0.754	0.815	0.879	0.645	1.237
	e-Governance services increase my productivity	NEB2	4.334	1.137	0.784				
	e-Governance services save my time	NEB3	4.807	0.952	0.840				
	e-Governance services save my cost	NEB4	4.721	0.951	0.830				

Note: *M*: mean; *SD*: standard deviation;  $\lambda$ : factor loadings;  $\alpha$ : Cronbach's alpha; *CR*: composite reliability; *AVE*: average variance extracted  
Indicators SYQ3 and DID6 were dropped from the model due to low factor loadings.

**Table 4.** Discriminant validity.

	<i>M</i>	<i>SD</i>	INQ	SYQ	SEQ	ITU	CSA	DID	NEB
INQ	3.459	0.554	<b>0.699</b>	0.578	0.406	0.424	0.376	0.502	0.447
SYQ	3.261	0.665	0.445	<b>0.737</b>	0.696	0.371	0.681	0.413	0.446
SEQ	3.115	0.670	0.286	0.487	<b>0.757</b>	0.201	0.669	0.195	0.427
ITU	4.533	1.049	0.363	0.312	0.14	<b>0.907</b>	0.347	0.656	0.717
CSA	3.702	0.995	0.325	0.549	0.506	0.313	<b>0.850</b>	0.383	0.452
DID	3.250	0.618	0.415	0.321	0.100	0.556	0.322	<b>0.754</b>	0.591
NEB	4.621	0.807	0.368	0.347	0.299	0.615	0.386	0.484	<b>0.803</b>

Note: Bold faced and italicized diagonal values are square roots of AVE. Lower off-diagonal values are inter-construct correlations. Upper off-diagonal elements are HTMT values.

**Table 5.** Structural model path coefficients.

Hypotheses	Relationship	$\beta$	<i>SE</i>	<i>t</i> -Value	<i>LCI</i> (2.5%)	<i>UCI</i> (97.5%)	<i>F2</i> Effect size
H <sub>1a</sub>	INQ → ITU	0.118	0.088	1.343	−0.052	0.288	0.015
H <sub>1b</sub>	SYQ → ITU	0.103	0.071	1.461	−0.037	0.237	0.010
H <sub>1c</sub>	SEQ → ITU	0.008	0.062	0.128	−0.112	0.130	0.001
H <sub>2a</sub>	INQ → CSA	0.031	0.055	0.557	−0.084	0.136	0.001
H <sub>2b</sub>	SYQ → CSA	0.335	0.059	5.703***	0.218	0.449	0.120
H <sub>2c</sub>	SEQ → CSA	0.313	0.055	5.644***	0.190	0.416	0.123
H <sub>3</sub>	ITU → CSA	0.155	0.051	3.051**	0.058	0.257	0.034
H <sub>4</sub>	ITU → NEB	0.548	0.04	11.695***	0.448	0.631	0.465
H <sub>5</sub>	CSA → NEB	0.214	0.049	4.393***	0.119	0.309	0.071

*R*-squared (ITU = 0.161, CSA = 0.415 and NEB = 0.419).

Note: *N* = 304. Bootstrap samples = 5000, Confidence interval method (bias corrected accelerated (*Bca*) method).

*LCI*: lower confidence interval; *UCI*: upper confidence interval

\*\**p* < 0.01; \*\*\**p* < 0.001.

For further assessment of measurement model, convergent validity has been examined in the study. To examine convergent validity, average variance extracted (AVE) has been used which examines extent to which the indicators truly represent the construct. For establishing convergent validity of a construct, the values should exceed 0.5 (Ringle et al., 2022). Table 3 reveals the values of AVE fall in range of 0.512–0.823 which meet the threshold requirement to establish convergent validity of the measurement model.

Measurement model was estimated initially with 32 indicators of seven latent constructs. Indicators with low and insignificant loadings were not retained in subsequent re-specified model. The measurement model re-specification was undertaken until all factor loadings were significant and above 0.60 (Hair et al., 2019). However, care was taken to retain items considered theoretically significant and their effect on values of AVE and CR considered. The final model included 30 items after dropping two indicators with insignificant factor loadings.

Finally, to examine discriminant validity, Fornell and Larcker method and Heterotrait–Monotrait Method (HTMT) were used. Discriminant validity is examined to assess distinctiveness of a construct from other constructs which ensures that each construct measures a unique concept (Rahi, 2017b). Results presented (Table 4) show discriminant validity is established as square root of AVEs shown in diagonal values are more than inter-construct correlations shown in lower off-diagonal values (Fornell & Larcker, 1981). Additionally, study also uses the HTMT ratio of the correlations for assessing discriminant validity. The resulting HTMT values depicted in upper off-diagonal matrix in Table 4 are estimates of inter-construct correlations and are below specified values of 0.85 (Henseler et al., 2015) for establishing validity. As the above results establish measurement model's reliability and validity, the next step is to examine the structural model.

### 4.3. Structural model

Table 5 presents path coefficients, associated *t*-values and bootstrap confidence interval of structural model. Significance and sign of path coefficients are used to test study hypotheses. *R*-square values of endogenous constructs depict explanatory power of model. Results reveal five relationships as represented by direct path coefficients were significant, and four relationships were not significant. Study

**Table 6.** Moderation effect.

Hypotheses	Moderating effect of DID on	$\beta$	SE	t-Value	p Value	LCI (2.5%)	UCI (97.5%)
H6a	INQ and CSA	0.386	0.072	5.355***	0.000	0.239	0.529
H6b	SYQ and CSA	0.319	0.059	5.373***	0.000	0.202	0.431
H6c	SEQ and CSA	0.226	0.077	2.950***	0.003	0.087	0.396

\*\*\* $p < 0.001$ .

hypotheses were tested in two phases. First phase examined direct effects of e-Governance IS quality dimensions on intention to use and citizen satisfaction. Thereafter, direct effects of intention to use on citizen satisfaction and net benefits, and direct effect of citizen satisfaction on net benefits were examined. The significance of structural model's paths and estimated standard errors are determined using bootstrap method with 5000 resamples.

Table 5 depicts results of hypotheses testing the direct relationships. According to the result, significant positive effect of system quality on citizen satisfaction ( $b=0.031$ ,  $p < 0.001$ ) is found supporting  $H_{2b}$ . In similar manner, the results reveal service quality positively affects citizen satisfaction ( $b=0.313$ ,  $p < 0.001$ ) offering empirical support for  $H_{2c}$ . Furthermore, positive direct effect of intention to use on citizen satisfaction ( $b=0.155$ ,  $p < 0.001$ ) and net benefits ( $b=0.548$ ,  $p < 0.001$ ) is found supporting  $H_3$  and  $H_4$ , respectively. Finally, positive and significant direct relationship of citizen satisfaction on net benefits is found ( $b=0.214$ ,  $p < 0.001$ ). Therefore,  $H_5$  is accepted.

Results revealed  $R$ -squared figures of 0.161, 0.415 and 0.419 for the endogenous constructs intention to use, citizen satisfaction and net benefits, respectively.  $R$ -squared values show structural model's predictive power. Hair et al. (2014) suggest that  $R$ -squared figures of 0.75, 0.50 and 0.25 can be labeled substantial, moderate and weak. Hence, model's explanatory power for citizen satisfaction and net benefits is found to be moderate. Similarly,  $f$ -squared effect size allows for examining exogenous construct's contribution on  $R$ -squared value of endogenous construct. The  $f$ -squared figures of 0.35, 0.15 and 0.02 specify, respectively, large, medium and small effect (Hair et al., 2014). Results reveal one  $f$ -squared value is greater 0.35 and four  $f$ -squared values are larger than 0.02 indicating presence of medium and small effect size.

#### 4.4. Moderation effect

Table 6 presents moderating effect of digital divide using Preacher and Hayes's (2008) method. Significance of moderating effects is examined using bootstrap procedure with 5000 resamples (Ringle et al., 2022).

Results revealed that digital divide has significant and positive interaction on relationship of information quality and citizen satisfaction ( $b=0.458$ ,  $t=7.275$ ,  $p < 0.001$ ), system quality and citizen satisfaction ( $b=0.319$ ,  $p < 0.001$ ), and service quality and citizen satisfaction ( $b=0.226$ ,  $p < 0.001$ ), supporting  $H_{6a}$ ,  $H_{6b}$  and  $H_{6c}$ , respectively. Hence, the results depict that digital divide moderates relationship of e-Governance IS quality and citizen satisfaction. Effect of quality on satisfaction is higher when the digital divide is lower.

## 5. Discussion and implications

### 5.1. Discussion

The study investigated the influence of information, system and service quality on citizen satisfaction and intention to use e-governance services, alongside the role of net benefits and the moderation effect of the digital divide. Using PLS-SEM, several significant findings emerged. First, system quality was found to positively impact citizen satisfaction, consistent with previous research (Alkrajji, 2021; Kala et al., 2024; Mbaidin, 2021; Sun & Zhang, 2020), highlighting its role in enhancing user experiences with e-Governance services. Second, service quality also showed a significant positive relationship with citizen satisfaction, aligning with findings from prior studies (Chan et al., 2021; Mellouli et al., 2020; Taufiqurokhman et al., 2024; Ye et al., 2023), underscoring the importance of effective service delivery in fostering satisfaction among users. However, the study did not find significant relationships between information, system and

service quality and intention to use e-Governance services. This suggests that while these quality dimensions contribute to user satisfaction, they may not directly drive users' decisions to adopt e-Governance services, potentially due to other prioritized factors like usability and accessibility (Abdurahman & Kabanda, 2024; Desmal et al., 2022; Rahim et al., 2023; Uthaman & Vasanthagopal, 2023). Moreover, the study revealed a positive direct effect of intention to use on citizen satisfaction, indicating that higher intention to use e-Governance services leads to increased satisfaction, consistent with existing literature (Kala et al., 2024; Ma & Zheng, 2017; Myint, 2022; Nookhao & Kiattisin, 2023; Pham et al., 2023). This underscores the importance of user motivation in enhancing satisfaction and engagement with e-Governance platforms. Furthermore, net benefits, representing the perceived gains from using e-Governance services, were positively associated with intention to use, reflecting users' recognition of value in their interactions with these services. This finding aligns with prior research indicating that perceived benefits drive users' intentions to adopt and continue using e-Governance services (Al-Omairi et al., 2020; Hidayat Ur Rehman et al., 2023). Lastly, the study demonstrated that the digital divide moderates the relationships between information quality, system quality, service quality and citizen satisfaction. Specifically, these quality factors exerted a stronger positive influence on satisfaction when the digital divide was less pronounced. This underscores the persistent impact of factors, such as socioeconomic status, education level, age and infrastructure availability on individuals' ability to access and utilize e-Governance services effectively (Harvey et al., 2023; Vassilakopoulou & Hustad, 2023). Disparities in digital access hinder citizens' ability to fully benefit from e-Governance initiatives, as highlighted in prior studies (Afzal et al., 2023; Mubarak et al., 2020). Additionally, research has consistently shown that the digital divide affects citizen satisfaction with e-Governance services, emphasizing the need to address these inequalities to ensure equitable access and usage among diverse demographic groups (Boksova et al., 2021; Botric & Bozic, 2021; Mesa, 2023).

## **5.2. Implications**

### **5.2.1. Theoretical implications**

The study provides several theoretical and practical insights based on its findings. First, it highlights the critical role of IS quality in shaping positive user experiences within e-Governance contexts, validating theoretical frameworks that emphasize service delivery and system reliability. Second, the study reinforces the link between intention to use e-Governance services and citizen satisfaction. Higher intentions to use relate with increased satisfaction, supporting models that connect behavioral intentions with user satisfaction and highlighting the importance of user engagement in shaping satisfaction levels. Third, it demonstrates that perceived net benefits positively influence intention to use e-Governance services, expanding theoretical understanding by emphasizing the role of perceived value in driving adoption intentions. This emphasizes the need for user-centric approaches in e-Governance strategies, focusing on communicating and enhancing the benefits perceived by users. Lastly, the study identifies the digital divide as a significant moderator affecting how information, system and service quality impact citizen satisfaction. It suggests that digital disparities amplify the effects of quality dimensions on satisfaction, highlighting the importance of inclusive e-Governance strategies. Theoretical implications stress the impact of digital inequalities on service utilization and satisfaction across diverse demographic groups.

### **5.2.2. Practical implications**

The implications of the study results are significant for e-Governance platform makers, policy makers and users. First for platform developers, the findings highlight the need to focus on system quality and service quality as these factors are crucial determinants of user satisfaction. It reveals that they have to prioritize development of user-friendly, reliable and robust e-Governance system. Clear communication of benefits and user-friendly interfaces can encourage greater utilization of e-Governance services. Second, policymakers should formulate policies, procedures and guidelines as well as allocate adequate resources in developing and maintaining high-quality e-Governance systems. Policies should focus on

promoting actual benefits to increase adoption intentions and address usability and accessibility concerns. Prudent monitoring and evaluation of the system on continuous basis and incorporating users feedback for improvement is crucial. Additionally, government should undertake initiatives to promote digital inclusion. Addressing digital disparities through improved infrastructure and digital literacy programs is crucial. Finally, citizens should be aware about the e-Governance services and advocate for better service through active engagement. They should be participative by providing feedback based on their usage experience for enhancing net benefits of e-Governance to wider public. Collaboration and involvement of the three parties in addressing the issues will enhance effectiveness of e-Governance system in Nepal leading to increased user satisfaction and overall benefits to the public.

## **6. Conclusion, limitations and future research directions**

### **6.1. Conclusion**

This study examined the role of information, system and service quality of e-Governance system on usage intention, customer satisfaction and net benefits in Nepal incorporating digital divide as a moderating variable. The results reveal significant insights on dynamics of e-Governance system success. System and service quality were found to significantly affect user satisfaction. In contrast, information quality was found not to influence usage intention and user satisfaction. Therefore, prioritizing high-quality, user-friendly e-Governance systems are crucial for meeting citizen expectations and enhancing satisfaction levels. In similar manner, assurance of responsive and reliable service is essential for user satisfaction. Moreover, the study highlights that citizen satisfaction positively influences perceived net benefits. Designing e-Governance platforms to deliver these benefits effectively can foster greater engagement and satisfaction among citizens. Additionally, the research extends the D&M model by incorporating the digital divide as a moderating factor. The significant effect found highlights the necessity to improve digital literacy and access for ensuring effective utilization and broader reach of e-Governance services. Governments should implement inclusive policies to ensure equitable access and maximize the benefits of e-Governance initiatives for all citizens. In conclusion, this study offers valuable insights for designing effective e-Governance systems that enhance citizen satisfaction, trust and public administration efficiency in the digital era. These insights are essential for guiding future research and shaping policies aimed at achieving inclusive and effective e-Governance systems globally.

### **6.2. Limitations and future research directions**

This study has several limitations. First, research was conducted within the context of Nepal, where IT infrastructure, awareness, skill and knowledge that foster e-Governance are relatively lower. Future studies could encompass diverse contexts to provide an understanding of the moderating role of digital divide. For example, future studies can focus on gaining more insight into the challenges of delivering e-Governance services by conducting research in other developing nations where English is used in most e-Governance platforms, even if the majority of people do not use it as their first language. Second, in terms of methodology, this study is a cross-sectional survey. The study's closed-ended questionnaire may not be appropriate for collecting all the information and deeper insights that might have been gained from interviewing the users. Therefore, future studies can explore these phenomena through qualitative methodologies. Similarly, an empirical study using longitudinal data may show how users of e-Governance services change in terms of how they respond to government initiatives. In addition, this study employed convenience sampling, thus increasing possibility of sampling bias. Hence, caution should be exercised when generalizing these findings. Furthermore, a multigroup analysis of rural and urban municipalities may provide practical implications for further examining the role of the digital divide.

This study focuses primarily on the relationship between IS quality, citizen satisfaction, net benefits and digital divide. Moreover, the study includes only the individual dimensions of net benefits and excludes the organizational and social dimensions. Hence, future research can be undertaken by incorporating additional variables to further advance the understanding of the dynamics between e-governance,

the digital divide and satisfaction. Future research could explore additional variables, such as user experience, personal innovativeness, social influence, trust, security and privacy concerns, for a comprehensive understanding of factors shaping citizen satisfaction and intention to use e-governance. Additionally, future studies can further probe into different digital divide dimensions, such as digital self-efficacy, digital literacy and their specific impact.

### Informed consent statement

Informed consent in written form was taken from the respondents.

### Authors contributions

Surya Bahadur G.C.: Conceptualization, data curation, design, methodology, data analysis, writing – original draft and revision. Santosh Kumar Gurung: Data collection, writing – original draft, revision and editing. Subarna Bir Jung Bahadur Rana: Data collection, writing – original draft. Bharat Ram Dhungana: Project administration, supervision and editing. All authors agree for accountability for all aspects of this research work.

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## Data availability statement

Data will be available upon request to corresponding authors after valid reason.

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