Journal of Computer Science

Research Article

e-Governance Practices in Nepal: Opportunities, Challenges, and Strategies from the Local Level

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Article history
Received: 20-04-2025
Revised: 22-08-2025
Accepted: 03-09-2025

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Abstract: This research explores the integration of digital tools for e-governance at local levels in Nepal, with a particular emphasis on the current state of digitalization and the opportunities and challenges encountered at the local level. We collected data using a qualitative research methodology, conducting semi-structured interviews and reviewing relevant documents. The findings reveal substantial advancements in digital tools for public service delivery within revenue and taxation systems. However, persistent challenges remain, particularly in infrastructure, human resource capabilities, and data security. The study identifies opportunities such as improved service delivery, greater transparency, and cost efficiency while noting challenges like the digital divide, regulatory shortcomings, and resistance to technological change. To address these issues, the study suggests investing in digital infrastructure, enhancing human resource capacity, and implementing strong cybersecurity protocols. Recommendations also include scaling up effective systems, bridging infrastructure gaps, and reinforcing governance frameworks to realize the potential of e-governance fully. Highlighting the necessity for Artificial Intelligence (AI)-driven strategies, the research emphasizes the importance of deploying ethical Artificial Intelligence (AI) and developing the workforce to achieve efficient, transparent, and citizen-focused services. The study concludes that digital tools, when paired with artificial intelligence (AI), have the potential to transform public service delivery and improve governance results such as revenue growth 15%, process automation rate 90%, and citizen satisfaction (9/10). Addressing infrastructure and regulatory hurdles remains essential for successful implementation. Future studies should look at long-term research to assess how digital tools impact e-governance over time and examine specific digital projects to improve e-governance in places with limited resources like Nepal. This paper explores the current state of e-governance practices in Nepal from the local governance perspective, identifies key opportunities and challenges, and proposes strategic measures for effective and inclusive implementation.

Keywords: e-Governance, Digitalization, Artificial Intelligence, Public Service Delivery, Nepal

Introduction

Nepal, a landlocked country nestled between two major neighbours, India and China, has made significant strides toward modernizing its governance through e-Governance in the three tiers of government of Nepal (Kyle & Resnick, 2016). The journey toward digital governance began in 2000 AD with the introduction of the Information Technology (IT) policy, supported by the Government of Nepal (GoN). However, despite efforts like the e-Government Master Plan of 2006, which was prepared with the assistance of KOICA, South Korea, the initial push for digital transformation faced significant challenges in execution.

The GoN endorsed the Ministry of Information and Communication, 2015 report, which outlined the government's commitment to enhancing online service

delivery and increasing the adoption of Information and Communication Technology (ICT) across all government sectors. This was followed by the formulation of the Digital Nepal Framework (Giri, 2018), a strategic initiative designed to leverage digital technologies for socio-economic transformation. The framework follows a model known as "1:8:80," emphasizing one nation, eight domains, and 80 initiatives. These eight domains include crucial sectors such as Digital Foundation, Agriculture, Health, Education, Energy, Tourism, Finance, and Urban Infrastructure, with the goal of unlocking the potential of these sectors for the benefit of the Nepalese population.

In alignment with vision of Digital Governance budget for the fiscal year 2024 highlights the country's potential to become an IT hub. With the ambitious goal of exporting IT services worth Rs. 30 billion over a decade and creating a substantial number of jobs, Nepal is positioning itself as a key player in the global IT landscape. The fiscal plan, designated as the "IT Decade," also emphasizes the development of a regulatory framework to integrate the latest IT advancements, including Artificial Intelligence (AI), into Nepal's digital governance.

Aburumman (2021) has applied the empirical research on the acceptance of e-government services by citizens in Hungary and Jordan. It draws inspiration from developing nations' low levels of individual acceptance of e-government systems. Public use of e-government technologies is necessary before they can improve the quality of public services. Thus, the main objective of this study is to gain a better knowledge of the variables influencing people's use of e-government services. Finding those variables can raise awareness of the elements that facilitate or hinder the adoption process, which in turn can boost the likelihood of these programs becoming more widely accepted.

As illustrated by Asiligwa (2016), in his study on the adoption of e-Governance in Nairobi City County, factors such as social influence, performance expectancy, effort expectancy, and facilitating conditions play a significant role in the successful adoption of digital governance. Research on Nepal's digital governance journey aligns with these insights, underscoring the importance of creating an enabling environment that supports the integration of digital technologies.

A case study design was applied by Oseni (2024), at local entity of Nigeria, the research aimed to determine the obstacles to the adoption and implementation of e-services at the local level. This thesis employed action research and an interpretive framework. It included an online survey of government personnel, online focus groups, an extensive field study in Nigeria (interviews), and assessments of government papers and E-Service projects. According to the study, the main obstacles to the growth of e-services in Nigeria were corruption and the question of autonomy at the local environment level.

Over the last decade, Nepal has advanced its digital governance practices through the adoption of key policies, including the Information Technology Policy 2072, the Digital Nepal Framework 2019, and the National Cyber Security Policy 2080. These policies collectively aim to harness digital technologies to transform essential sectors such as education, health, agriculture, and urban infrastructure.

While progress has been made, there are still areas requiring improvement. A study by Phuyal (2024), on digital services in Dhankuta District highlighted mixed satisfaction levels among citizens. Digital services such as online income payments and land map printing received medium-high scores, indicating positive responses, while areas like digital awareness, data security, and service quality scored medium-low, revealing room for further development. The report emphasizes the need for enhancing public awareness, strengthening security measures, and improving service reliability.

To find out how electronic governance affects human resource management, Badu (2024), the study took a descriptive approach. Time reduction, error rate reduction, and administrative corruption reduction were the three main research problems. "Is there an impact of electronic governance on human resources or not?" was the research topic. About 200 respondents were selected from the University of Babylon as the study sample. According to the correlation analysis's findings, training and the adoption of e-governance have a positive and statistically significant correlation (r = 248), and training and the adoption of e-governance (service delivery) have a positive and statistically significant correlation (r = 269).

Nepal's journey toward a fully integrated e-Governance system is a work in progress. The government's efforts to digitize public services and promote digital literacy reflect a growing recognition of the transformative potential of digital technologies. As Nepal continues to advance in its digital governance journey, the adoption of AI and other cutting-edge technologies will be pivotal in achieving the nation's vision of becoming a leading IT hub and ensuring efficient, accessible, and secure public services for all.

Service delivery, technology, processes, and people are the four pillars upon which the conceptual architecture of Nepalese local-level e-government rests (Fig. 1). Digital governance that is both effective and sustainable relies on these interdependent and recursive components. Technology, including enabling infrastructure, digital platforms, and communication systems, is central to the strategy and plays an essential role in delivering services. When government agencies and individuals engage in frontline digital interactions with the goal of providing accessible, transparent, and efficient services, the practice is called service delivery.

Optimized procedures back those goals up by automating jobs, simplifying workflows, and cutting down on bureaucratic red tape. People, both in government and among the general public, need to be tech-savvy, involved, and flexible for these procedures to operate.

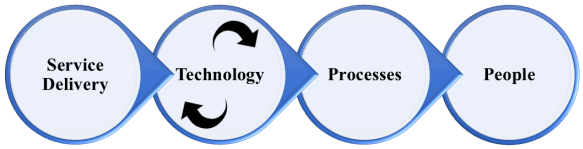

Fig. 1: Architecture for Local Level e-Governance in Nepal

Previous research on Nepal's e-governance practices has mostly concentrated on the country's policy frameworks and institutional preparedness. This study, on the other hand, combines descriptive and exploratory research with practical implementation insights to provide a novel integration of community-level opportunities, challenges, and strategies within the Nepalese context. This method fills in the gaps in local e-governance while simultaneously handling the operational and technological aspects.

Research Objectives

The primary aim of this study is to investigate the integration of Artificial Intelligence (AI) within Nepalese e-governance systems. More specifically, this research aims to address the following research questions:

- To explore the current state of digitalization in public service delivery at local level
- To identify the opportunities and challenges of e-Governance implementation
- To suggest strategies that facilitate e-Governance practices

By examining the intersection of digital tools and e-governance, this study seeks to contribute to the growing body of literature on digital governance and provide insights into the transformative potential of digital tools in advancing good governance practices in Nepal.

Literature Review

Governments' interactions with residents, corporations, and internal operations have been revolutionized by the implementation of e-governance. According to Heeks (2005), e-governance is widely acknowledged as an essential instrument for enhancing accountability, transparency, and the efficiency of service delivery on a global scale. Bhatnagar (2004) argues that e-governance has the ability to improve service delivery, increase participatory governance, and promote socio-economic development in underdeveloped nations like Nepal. But research shows that institutional, sociopolitical, and infrastructure obstacles typically make successful implementation difficult.

In terms of e-governance maturity, the United Nations E-Government Development Index (EGDI) shows that developed and developing nations are significantly different (UN DESA, 2022). Estonia and South Korea are only two examples of the kind of countries that have shown how digital governance can make government more open and focused on the people. According to Rituraj (2018), two regional examples of large-scale digital transformation in South Asia include the National e-Governance Plan (NeGP) of India and the Digital India program. Developing infrastructure, increasing digital literacy, and integrating services are key components of these projects, all of which are extremely pertinent to Nepal's situation.

The Information Technology Policy of 2000, the e-Governance Master Plan of 2006, and most recently, the Digital Nepal Framework 2019, all served to establish the groundwork for e-governance in Nepal. Education, healthcare, agriculture, and local government were among the many areas that these programs sought to improve via the use of information and communication technologies (MoCIT, 2019). There is a large chasm, however, between the theoretical development of policies and their actual execution, according to research (Dhami & Futó, 2010).

Shrestha et al. (2015) state that local e-governance initiatives in Nepal have made very little headway compared to their federal counterparts. Although decentralization of digital governance was a possibility due to federal reorganization after the 2015 Constitution, local governments frequently lacked the necessary human capital, financial resources, and technological expertise to execute e-governance successfully (Acharya, 2018).

There are several chances to increase e-governance in Nepal at the local level, according to recent research. Vital services like birth registration, property records, and social security payments may be better accessed by local governments since they are closer to the residents and can use ICT to do so (Neupane, 2024). There is a tremendous potential for the deployment of mobile-based governance apps because of the high prevalence of mobile phones, particularly in rural regions (TRC Nepal, 2020).

In addition, several towns have embraced online technologies for meetings, information distribution, and public involvement because of the COVID-19 pandemic's acceleration of digital adaptation (Rayamajhee et al., 2021). The necessity for ongoing investments in digital infrastructure and human resources is underscored by this change, which shows an increasing preparedness for digital transformation.

Despite the potential, several studies highlight the obstacles that local e-government growth faces. Rural and urban areas exhibit disparities in digital literacy and internet access (Dixit and Shaw, 2023). Dhami & Futó (2010) cite bureaucratic opposition to change, problems with interoperability, and a lack of standardized digital

systems. Municipal employees lack proper IT training, and local administrations lack specialized ICT experts (Acharya, 2018). A lack of a strong legislative framework and rising worries about data privacy are major issues (MoCIT, 2019).

Several academics have argued that e-governance would be best implemented in stages that are both inclusive and decentralized. Dangal (2025) argues that community involvement, policy change, and institutional improvement are all necessary companions to digital infrastructure development. In addition, PPPs can alleviate the effects of limited public resources and provide new ideas to public service delivery (Neupane, 2024). Another key factor is the importance of international collaboration and the sharing of information. For local-level implementation, Nepal could potentially learn valuable lessons from nations that have successfully implemented decentralized e-government systems.

Methodology

We employed a hybrid coding framework, integrating both inductive and deductive approaches, to manually code the qualitative data. To ensure inter-coder reliability, two researchers independently coded the data before comparing their results and resolving any discrepancies through discussion. An overview of the complete research process is illustrated in Fig. 2.

Fig. 2: Framework for research methods based on expert and policy theme analysis

Research Design

This research used a qualitative method to explore the use of digital tools for e-governance, considering its opportunities and challenges, especially in the context local government in Nepal. A qualitative approach is used for this research as it prioritizes understanding the perspectives of stakeholders, examining underlying themes, and interpreting phenomena within a specific context (Creswell & Poth, 2016). The methodology incorporates a descriptive research design to analyze and interpret, in a systematic way, existing practices, policies, and stakeholder experiences related to the utilization of digital tools in e-governance.

The study employs descriptive and exploratory research design. Descriptive research is utilized to describe current status, challenges, and opportunities regarding the use of digital tools in e-governance. It is integrated with exploratory approaches to identify emerging themes and patterns that give us deep insights into the issue. This combination of design allows us to carry out a sophisticated analysis of both theoretical and practical aspects of digital tools utilization in the e-governance framework in Nepal.

Data Collection Methods

The research utilizes a combination of primary and secondary data sources to ensure a holistic understanding of the topic.

Primary Data Collection

Semi-structured interviews were conducted with key stakeholders, including policymakers, IT professionals, local government officials, and academicians. This method was chosen to gather in-depth qualitative data and to explore participants' perceptions of digital tools's role in e-governance. A purposive sampling technique was employed to select respondents with relevant expertise and experience in AI and e-governance.

A purposive sampling method was employed to select participants for interviews. This non-probability sampling technique ensured that respondents with specific knowledge and experience relevant to digital tool and e-governance were included. The sample included: Policymakers and government officials at local level. IT professionals and developers working on e-Governance. Academicians and researchers specializing in digital governance and AI, public administration.

Secondary Data Collection

The study reviewed government policy documents, including the e-Government Master Plan (2006), Electronic Transaction Act (2008), IT policy (2015), Digital Nepal Framework (2019), the National Artificial Intelligence Policy (2024), and the to assess the institutional framework and strategic direction for e-Governance materialization in Nepal. Scholarly articles, reports, and publications from renowned journals were examined to identify global best practices and their applicability to Nepal. These secondary sources provided a theoretical foundation for understanding the broader implications of digital tools in e-governance.

Data Analysis

The collected qualitative data were analyzed using thematic analysis, a method suitable for identifying, analyzing, and reporting patterns (themes) within data (Braun & Clarke, 2006). The following steps were

undertaken: Familiarization with Data, coding, Theme development and Interpretation.

Ethical Considerations

Ethical considerations were prioritized throughout the research process to ensure the integrity and credibility of the study.

Limitations of the Study

The research focuses on exploring state of e-Governance practices at local level in Nepal, which may limit the generalizability of findings to other contexts. The reliance on qualitative methods introduces a degree of subjectivity, although measures were taken to minimize bias.

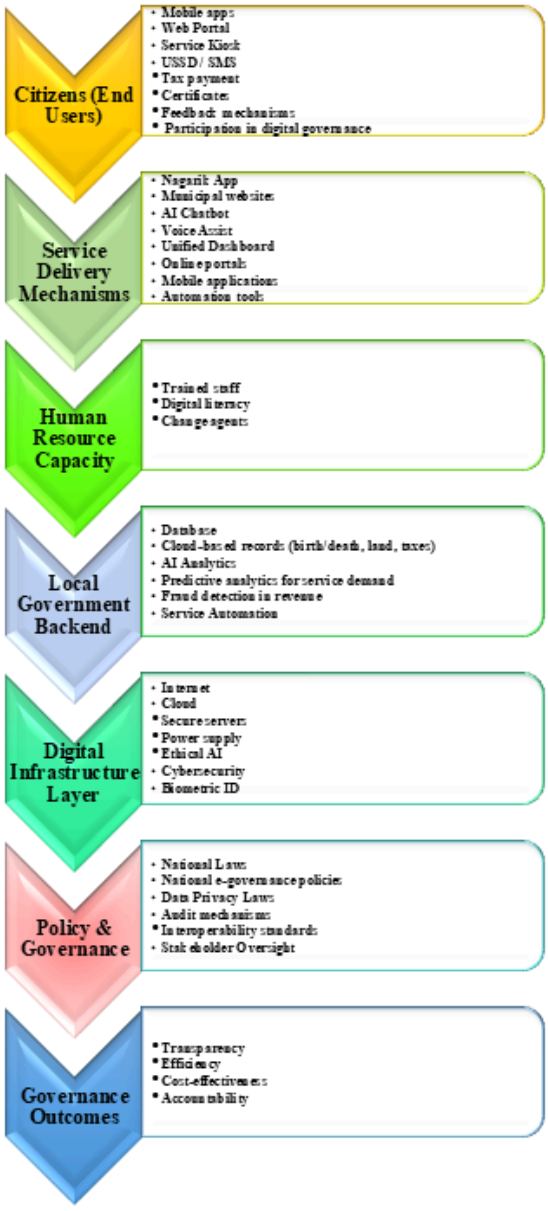

Fig. 3: Proposed Model for Local Level e-Governance in Nepal

Proposed Model

Figure 3 depicts the seven interconnected parts that make up the suggested model. These parts work together to propel efficient digital governance at the local level in Nepal. Any digital solution must have a solid Digital Infrastructure that includes dependable internet access, a steady power supply, and necessary hardware systems. Human Resource Capacity is also critical; it entails training government employees to use technology effectively, increasing public digital literacy, and creating agents of change who can advocate for technology adoption. Thorough legal backing, strong data protection legislation, and interoperability standards to enable system integration are the pillars upon which e-governance rests, according to the Policy & Governance. To make digital governance a reality, Service Delivery Mechanisms implement user-friendly platforms, including portals, apps for mobile devices, and automation technologies to improve accessibility and simplify public services. At the heart of the strategy are Citizens, who encourage community engagement in digital governance processes, public awareness campaigns, and feedback systems to ensure that everyone has a chance to participate. Local government backend is essential for supporting smart and secure digital operations; they permit the moral use of AI in decision-making, guarantee the protection of personal data, and protect systems from cyber threats. All of these parts work together to make sure that the public service is delivered in an accountable, transparent, efficient, and cost-effective manner, which is called Governance Outcomes.

Results and Discussion

Current State and Practices of Digital Tool Utilization for e-Governance

The findings indicate a significant increase in digitalization for e-governance practices at the local level in Nepal, particularly following the adoption of a federal structure. An examination of the current status of digital tools utilization for e-governance practices at local levels reveals the following insights.

Table 1 reveals a comparative analysis of various public service delivery systems, highlighting different levels of success across several key metrics, identified across different local levels in Nepal. It also indicates current status of diverse digital tools, employed for e-Governance purposes. One of the commonly used digital service, the Revenue & Taxation System demonstrates a notable 15% revenue growth, closely followed by the Building Permit Management system at 20%. In contrast, other systems like Education Information Management and Judicial Management show no revenue growth, indicating potential areas for strategic improvement. Significant administrative cost savings are noted in the Revenue & Taxation System, which achieves a 50%

reduction, whereas the Building Permit Management realizes a modest 20% saving. High process automation rates are evident in the Building Permit Management (95%) and Appointment Scheduling System (100%), suggesting effective technology integration, with other systems showing room for enhancement in this area. Citizen satisfaction remains high for most systems, particularly the Revenue & Taxation System and Building Permit Management, each scoring 9 out of 10, while the Education Information Management and Judicial Management systems, scoring 7, highlight the need for further improvements to meet user expectations. The Revenue & Taxation System boasts impressive efficiency with an average service time of 1 day, in stark contrast to the 15 days required by the Building Permit Management, which could benefit from streamlined processing times. Furthermore, the Revenue & Taxation System serves the largest number of citizens at 400,000, with 200 service providers, reflecting its extensive reach. Additionally, the ability to save time per user is significant; the Revenue & Taxation System saves 30 minutes per user, while the Appointment Scheduling System offers an impressive 0.5 days, enhancing service accessibility. Overall, these findings underscore varying degrees of success among the systems, emphasizing the need for operational efficiency and user engagement improvements. This analysis provides a solid basis for strategic discussions aimed at optimizing service delivery, resource allocation, and further technological integration to elevate public administration outcomes. Future initiatives could prioritize reducing service times and enhancing satisfaction scores across all systems.

Table 1: Status of Digital tools utilization for e-Governance practices at Local levels

System Name	Revenue Growth (%)	Admin Cost Savings (%)	Process Automation Rate (%)	Citizen Satisfaction (1-10)	Avg. Service Time (Days)	Citizens Benefited	Service Providers	Time Saved/User
Revenue & Taxation System	15	50	90	9	1	400,000	200	30 minutes
Building Permit Management	20	20	95	9	15	20,000	20	10 days
Education Information Management	0	10	70	7	1	35,000	2	5 days
Judicial Management	0	5	80	7	15	5,000	2	3 days
Registration & Recommendation System	10	2	80	9	1	300,000	3	1 day
Personnel Information System	0	8	90	7	1	500	50	1 day
Fixed Asset Management	0	30	90	9	1	1,000	50	2 days
Planning Management System	0	18	90	9	2	5,600		3 days
Appointment Scheduling System	0	10	100	8	1	5,000		1/2 day

Opportunities and Challenges of e-Governance Implementation

Empirical data from digital tools deployed across local governments in Nepal highlights their impact on revenue growth, administrative efficiency, citizen satisfaction, and service delivery.

By leveraging these opportunities, local governments in Nepal can enhance their e-governance services, making them more efficient, transparent, and citizen-centric.

The adoption of e-governance practices at local levels in Nepal presents several opportunities. These opportunities are outlined in key themes, including automation, which streamlines administrative processes, reduces errors, and provides 24/7 accessibility, thereby improving public service delivery. Digital tools enhance transparency and accountability through real-time monitoring, easy access to information, and audit trails. Citizen engagement is fostered through interactive platforms, online consultations, and social media integration. Cost savings and efficiency are achieved by reducing operational costs and optimizing resources, with digital platforms offering scalability to meet growing demands. Data-driven decision-making is supported by data analytics and AI, providing insights for policy-making and proactive issue management. Improved infrastructure and connectivity are essential, with digital tools necessitating robust infrastructure development and broadband expansion to bridge the digital divide. Enhanced security and data protection are ensured through advanced cybersecurity measures, data encryption, and compliance with regulations. By leveraging these themes, local governments in Nepal can make their e-governance services more efficient, transparent, and citizen-centric (Table 2).

Adopting e-governance in Nepal faces several challenges. Many local areas lack the necessary digital infrastructure, such as reliable internet connectivity and

modern IT equipment, leading to a significant digital divide between urban and rural areas. There is also a shortage of skilled personnel to develop, implement, and maintain digital systems, necessitating continuous training and capacity building. Additionally, digital systems are vulnerable to cyber-attacks, posing risks to data privacy and security. Financial constraints, including high initial implementation costs and the challenge of sustaining digital projects long-term, further complicate the adoption process. The regulatory and legal framework is insufficient, with existing laws often not conducive to digital technology adoption, requiring updates and reforms. Cultural and social barriers also play a role, as government employees and citizens may resist new technologies due to unfamiliarity or fear of change, compounded by low levels of digital literacy. Political instability and frequent changes in government can disrupt the continuity of digital initiatives, while a lack of coordination among government agencies can lead to fragmented implementation. Technical challenges include the complexity of integrating new digital tools with existing legacy systems and the need to keep pace with rapid technological advancements, requiring continuous updates and adaptations (Table 3).

Table 2: Opportunities

Theme	Sub-theme	Remarks
Enhanced Public Service Delivery	Streamlined Processes	Digital tools can automate and streamline administrative processes, reducing the time and effort required for service delivery.
	24/7 Accessibility	E-government platforms can provide round-the-clock access to services, making it convenient for citizens to interact with the government at any time.
	Improved Accuracy	Automation reduces human errors, ensuring more accurate and reliable service delivery
Increased Transparency and Accountability	Real-Time Monitoring	Digital tools enable real-time tracking and monitoring of government activities, enhancing transparency.
	Public Access to Information	E-government platforms can provide citizens with easy access to information, promoting transparency and accountability.
	Audit Trails	Digital systems create audit trails that can be used to track and verify transactions, reducing the risk of corruption.
Citizen Engagement and Participation	Interactive Platforms	Digital tools can create interactive platforms for citizens to provide feedback, participate in decision-making, and engage with government officials.
	E-Consultations	Online consultations and surveys can gather citizen input on various policies and initiatives, fostering a participatory governance model.
	Social Media Integration	Leveraging social media can enhance communication between the government and citizens, increasing engagement and responsiveness.
Cost Savings and Efficiency	Reduced Operational Costs	Digital tools can significantly reduce the costs associated with paper-based processes, physical infrastructure, and manual labor.
	Resource Optimization	E-government systems can optimize the use of resources by automating routine tasks and improving workflow efficiency.
	Scalability	Digital platforms can be easily scaled to accommodate growing populations and increasing demand for services.
Data-Driven Decision Making	Data Analytics	Digital tools can collect and analyze large volumes of data, providing insights that inform policy-making and strategic planning.
	Predictive Analytics	AI and machine learning can predict trends and outcomes, helping governments to proactively address issues and allocate resources effectively.
	Performance Metrics	E-government systems can track performance metrics, enabling continuous improvement and accountability.
Improved Infrastructure and Connectivity	Digital Infrastructure Development	Implementing digital tools necessitates the development of robust digital infrastructure, which can benefit other sectors as well.
	Broadband Expansion	Expanding broadband connectivity to rural and remote areas can bridge the digital divide and ensure equitable access to e-government services.
	Smart City Initiatives	Digital tools can support smart city initiatives, improving urban management and quality of life for residents
Enhanced Security and Data Protection	Cybersecurity Measures	Digital tools can incorporate advanced cybersecurity measures to protect sensitive government and citizen data.
	Data Encryption	Implementing data encryption ensures that information is secure and accessible only to authorized users.
	Compliance with Regulations	Digital systems can help ensure compliance with data protection regulations, enhancing trust in e-government services.

Table 3: Challenges

Theme	Sub-theme	Remarks
Infrastructure and Technological Readiness	Insufficient Infrastructure	Many local areas lack the necessary digital infrastructure, such as reliable internet connectivity and modern IT equipment, which hampers the implementation of digital tools.
	Digital Divide	There is a significant gap between urban and rural areas in terms of access to digital technologies, leading to unequal service delivery
Human Resource and Capacity Building	Lack of Skilled Personnel	There is a shortage of trained professionals who can develop, implement, and maintain digital systems.
	Continuous Training Needs	Ongoing training and capacity building are required to keep government employees updated with the latest digital tools and technologies.
Data Privacy and Security	Cybersecurity Threats	Digital systems are vulnerable to cyber-attacks, which can compromise sensitive government and citizen data.
	Data Protection	Ensuring the privacy and security of data is a major challenge, especially with the increasing amount of data being collected and stored digitally.
Financial Constraints	High Implementation Costs	The initial costs of setting up digital infrastructure and systems can be prohibitive for local governments with limited budgets.
	Sustainability	Ensuring the long-term sustainability of digital projects, including maintenance and upgrades, can be financially challenging.
Regulatory and Legal Framework	Insufficient Regulations	There is a lack of comprehensive regulations and policies governing the use of digital tools in e-governance.
	Legal Barriers	Existing laws and regulations may not be conducive to the adoption of digital technologies, requiring updates and reforms.
Cultural and Social Barriers	Resistance to Change	Government employees and citizens may resist adopting new digital technologies due to a lack of familiarity or fear of change.
	Digital Literacy	Low levels of digital literacy among the population can hinder the effective use of e-government services.
Political and Institutional Challenges	Political Instability	Frequent changes in government and political instability can disrupt the continuity and consistency of digital initiatives.
	Institutional Coordination	Lack of coordination and cooperation among different government agencies can lead to fragmented and inefficient implementation of digital tools.
Technical Challenges	System Integration	Integrating new digital tools with existing legacy systems can be complex and time-consuming.
	Rapid Technological Changes	Keeping up with the fast pace of technological advancements can be challenging, requiring continuous updates and adaptations

Strategies for Purposed e-Governance Implementation

In order to overcome the obstacles to e-governance adoption in Nepal, the following driven by digital tools strategies strive to improve e-governance procedures at the local government level:

1. Readiness for Technology and Infrastructure
    i. Invest in Digital Infrastructure: Even in remote locations, use AI-powered network optimization techniques to improve internet access and contemporary IT hardware. Private-public collaborations can aid in closing the digital divide.
    ii. Increase Broadband Access: To pinpoint underserved areas and maximize efforts to provide broadband.
2. Building Human Resources and Capacity
    i. Create Training Programs: Provide government employees with ongoing training that keeps them updated of the newest digital tools and technology by utilizing AI-powered e-learning platforms.
3. Security and Privacy of Data
    i. Put Cybersecurity Measures in Place: Use AI-based cybersecurity technologies, such as frequent software updates and security protocol training for staff members, to detect, prevent, and respond to threats in real time.
    ii. Data Protection Policies: To ensure the security and privacy of sensitive data, use AI to monitor and enforce data protection laws.
4. Budgetary Restrictions
    i. Explore Various Financing Models: To maximize resource allocation and budgeting for digital infrastructure projects,
    ii. Sustainable Budgeting: Assure the long-term viability of digital systems.
5. Update Legal Frameworks and Regulatory Frameworks
    i. Review and update current laws and rules to make sure they encourage the use of digital technology in e-governance.
6. Social and Cultural Barriers

i. Enhance Digital Literacy: Establish in place driven by AI digital literacy initiatives to teach the public and government employees the advantages and applications of digital tools.
ii. Initiatives for Change Management: To overcome reluctance to change and emphasize the benefits of digital transformation, run awareness campaigns using AI-powered communication platforms.

7. Institutional and Political Barriers
    i. Maintain Political Stability:
    ii. Improve Institutional Coordination
8. Technical Challenges
    i. Adopt Integration Solutions.
    ii. Stay Updated with Technology: Employ AI to monitor technological advancements and recommend updates, keeping systems current and efficient.

By integrating these strategies, local governments in Nepal can overcome challenges and successfully adopt e-governance practices, leading to more efficient, transparent, and citizen-centric services.

Recommendations

To optimize the potential of e-governance in Nepal, a multifaceted strategy is essential. This strategy should prioritize the expansion of high-impact systems, enhance non-revenue systems, address infrastructure gaps, strengthen governance frameworks, and build workforce capacity.

Scaling High-Impact Systems

One of the primary recommendations is to scale high-impact systems. The Revenue and Taxation System, which has shown success in certain areas, should be expanded to all 753 local governments with a particular focus on rural municipalities. This expansion can utilize predictive analytics to identify tax evasion hotspots, thereby improving revenue generation. Additionally, the replication of Building Permit Automation is crucial. Integrating geospatial AI for urban planning compliance can significantly reduce approval times to less than seven days, enhancing administrative efficiency.

Enhancing Non-Revenue Systems

Another critical area of focus should be the enhancement of non-revenue systems. For instance, in Education Information Management, developing AI interfaces in vernacular languages such as Nepali and Maithili can support rural educators. Collaborations with NGOs to provide offline AI tools for schools without internet access can bridge the digital divide. In the realm of Judicial Management, implementing transparent AI algorithms with public audits can build trust in AI-driven decisions. Training judges on interpreting AI recommendations is also essential for the successful integration of these technologies.

Addressing Infrastructure Gaps

To address infrastructure gaps, accelerating the National Broadband Policy to achieve 80% internet penetration in rural areas by 2030 is imperative. Establishing municipal-level servers can reduce latency for systems like Asset Management and Planning, ensuring smoother and more efficient operations.

Strengthening Governance Frameworks

Strengthening governance frameworks is crucial for the ethical deployment of AI. Drafting AI ethics guidelines that mandate fairness audits for systems impacting citizen rights, such as the judiciary and permit systems, can ensure ethical AI usage. Incorporating real-time rating mechanisms in all AI systems can continuously monitor and improve citizen satisfaction.

Building Workforce Capacity

Building workforce capacity is another essential component of this strategy. Implementing comprehensive AI training programs to train over 10,000 local government staff by 2025, with a focus on high-automation systems such as taxation and permits, is necessary. Public awareness campaigns using community radios and local influencers can educate rural citizens on the benefits of AI, promoting broader acceptance and usage.

Ensuring Sustainable Financing

Finally, sustainable financing models are vital for the long-term success of AI in e-governance. Public-Private Partnership (PPP) models can be leveraged to fund non-revenue systems like education and judiciary in exchange for data-sharing agreements. Additionally, collaborating with international donors such as the World Bank and UNDP can pilot AI projects in marginalized municipalities, providing the necessary financial support for these initiatives.

Conclusion

The incorporation of digital tools into e-governance presents both revolutionary prospects and daunting challenges, as indicated by the findings of this study. Answering the thesis statement of the study, the research findings show that implication of digital tools has the potential to transform public service delivery, enhance decision-making processes, and improve transparency and accountability in governance, such as revenue growth 15%, process automation rate 90%, and citizen satisfaction (9/10). These findings are in close alignment with the research objectives of the study. The results and the analysis of the data have indicated that digitalization

along with upgradation into Artificial Intelligence (AI)-powered technologies further steer the governance practices in local level to desired ways and expectation of publics and in a global context. Besides, the importance of digital infrastructure, data privacy, and the preparedness of the workforce in the successful implementation of Artificial Intelligence (AI) technologies should be given special space at local level.

Unlike previous research, which offered a policy-oriented overview, this study combines descriptive and exploratory research with practical implementation insights to provide a novel integration of community-level opportunities, challenges, and strategies within the Nepalese context.

The study does also identify the most pressing challenges that require immediate attention, for instance, gaps in infrastructure, ethical issues, and the digital divide in countries with limited resources, such as Nepal. Possible directions for future research include longitudinal studies for measuring the impacts of digital tools e-governance over time, along with exploring the sector-wise applications of digitalization in maximizing the potential of e-Governance.

Acknowledgment

The authors would also like to express our sincere gratitude to the contributions of anonymous experts from industry, government, and academia, who took their valuable time.

Funding Information

The research work was conducted without any funding from any funding agency, private or any government institution.

Authors Contributions

Reg Bahadur Bhandari: Contributed to conceptualization, methodology, analysis, data collection, and draft preparation.

Nirav Bhatta and Gajendra Sharma: Contributed to methodology, data correction, manuscript reviewing, supervision and project administration.

Youba Raj Poudyal: Contributed literature review, editing, arranging, visualization, manuscript. All authors have read and agreed with the manuscript before its submission and publication.

Ethics

There are no human subjects, private information, or delicate ethical issues in this study. Therefore, there was no need for official ethical approval, and this article is original and unpublished. Corresponding authors confirm that all other authors have read and agree that the manuscript does not involve ethical issues.

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