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Abstract: Digital transformation has increasingly reshaped public administration in Pakistan, with e-governance initiatives aimed at improving service delivery, transparency, efficiency, and citizen-state interaction. However, the expansion of digital government does not automatically ensure inclusive access. This study examines the technological capability gaps and digital divide affecting e-governance in Pakistan, with particular attention to disparities between higher-level government institutions, local administrative bodies, and digitally disadvantaged citizens. The analysis identifies six major themes: digital transformation of public administration, technological capability gaps within government institutions, the digital divide among citizens, institutional and human capacity constraints, unequal access and digital exclusion, and the need for inclusive e-governance. The findings indicate that inadequate infrastructure, unreliable connectivity, limited digital literacy, language barriers, insufficient technical skills, weak institutional capacity, and poor data representation can restrict equitable access to digital public services. The study argues that technology alone cannot resolve underlying administrative inequalities and may reproduce existing socioeconomic disparities if local capacities and citizen accessibility are neglected. It recommends strengthening local institutional capacity, expanding reliable digital infrastructure, improving digital literacy, ensuring accessible and localized platforms, and establishing robust data-quality standards for more inclusive and effective e-governance in Pakistan.

Introduction

The transition of world from paper work to digitalize automated mode developed a new era of public administration. The goal of this system is to improve public service delivery, to eradicate corruption and to limit the gap between the citizen and state. The most and foremost aim of this new mechanism is to vanish the barriers made by bureaucracy. ScienceDirect Research Cluster, 2025; Malik & Mansoor, 2024).

Technology has become a social motorist for socio economic progress in the digital age, offering nations unprecedented opportunities for growth and governance transformation. For developing countries like Pakistan

From the last two decades Pakistan is working on digital transformation under legal framework of Digital the transition of world from paper work to digitalize automated mode developed a new era of public administration. The goal of this system is to improve public service delivery, to eradicate corruption and to limit the gap between the citizen and state. The most and foremost aim of this new mechanism is to vanish the barriers made by bureaucracy. Technology has become a social motorist for socio economic progress in the digital age, offering nations unprecedented opportunities for growth and governance transformation. Pakistan work hard on development of infrastructure, unified data exchanges, digital identities and centralized payment methods. This system empowered consumer app like citizen portal, biometric identification and Raast payment gateways etc. But this speedy process of digitization created an unequal socio technical landscape (Raza, 2018; UNFPA Pakistan, 2025).

The offices at national and federal level are using highly advance technology and infrastructure while the rural and local areas are still using backward electronics devices with less internet facilities

Problem statement

The Introduction of this new technology doesn't finish the gap remained between high level policy design and ground level implementation. This issue exist in multi-layer digital infrastructure In Developing countries still high level offices using high speed internet along highly advance technology, While lower levels are unable to navigate and take benefit from online system due to limited internet and gaps in data literacy, technical expertise and language access (Raza, 2018; UNFPA Pakistan, 2025).

E-governance in developing economies such as Pakistan faces a significant gap between technological advancement and institutional capacity. Sophisticated front-end digital portals increasingly provide citizens with access to government services, yet these systems often operate alongside inadequately resourced back-end administrative structures. Infrastructure constraints, limited internet connectivity, and gaps in citizens' digital knowledge can restrict equitable access to federal e-services, particularly among digitally disadvantaged populations. At the institutional level, limited technological competency within local municipal bodies can further hinder the effective integration and centralization of national digital public infrastructure (Chima & Ibrahim, 2025; Distor & Neumann, 2026).

These challenges demonstrate that digital transformation cannot be achieved through advanced portals alone; it requires capable institutions, adequately trained personnel, reliable infrastructure, and inclusive digital skills. Therefore, structural policy measures are necessary to bridge both the citizen-level digital divide and the institutional technological competency gap, ensuring that e-governance reforms translate into accessible, efficient, and equitable public service delivery. Furthermore situation is worsened by bureaucratic inertia, limited finance and lack of skill.

Literature Review

The Theoretical Evolution of the Digital While a fully developed e-governance infrastructure significantly modernizes public administration; its implementation can paradoxically deepen socioeconomic inequalities by inadvertently locking out citizens who lack digital access and literacy. This digital digitalis not only caused by only one factor rather than it is a combination of social many factors like social vs economic rural vs urban. Even when an e-governance system is flawlessly developed it can paradoxically widen the digital divide if the underlying social layers are ignored it will create large scale digital divide. Instead of making public service delivery fair it is flooring the wealthy class of the society and pushing the vulnerable population more into margins.

Most of the research shows digital divide just as a physical issue. The digital divide in Pakistan can be formally categorized into three sequential levels, moving from basic physical access to advanced socio-economic outcomes.

1. **First-Level Divide:** inequality in physical access to devices and stable telecommunications.
2. **Second-Level Divide:** Gaps in digital knowhow, mental capabilities, and understanding required to use technology productively.
3. **Third-Level Divide:** Variations in the institutional outcomes achieved by different groups of people using identical digital technologies.

In public administration, an unaddressed digital divide causes digital exclusion. Automated systems can disadvantage the affected group of the society who don't have digital skill and facilities at all (Raza, 2018; UNFPA Pakistan, 2025).

E-Governance in Developing Economies

Developing economies increasingly view digital technologies and e-governance as important instruments for improving public-sector efficiency, transparency, and accessibility. However, the adoption of advanced technologies does not automatically produce institutional transformation. Research on technological development in low-income countries suggests that technological catch-up depends not only on access to software and digital infrastructure but also on institutional capacity, human capital, appropriate policies, and the ability of governments to adapt technologies to local contexts (Khan et al., 2024). In countries where administrative institutions remain weak, the introduction of digital systems without corresponding institutional reforms may therefore reproduce existing administrative problems rather than resolve them. Effective digital transformation requires the strengthening of institutional structures and administrative capacities alongside technological innovation. ❖ (ScienceDirect Research Cluster, 2025; Malik & Mansoor, 2024; Distor & Neumann, 2026). Furthermore, digitalization should not be understood simply as the replacement of paper-based procedures with electronic platforms. E-governance can improve service delivery and transparency only when digital systems are supported by effective institutions, capable public officials, adequate infrastructure, and citizen accessibility. Where these conditions are absent, digital platforms may create additional procedural layers while leaving underlying administrative weaknesses and opportunities for discretionary practices unresolved. Thus, the success of e-governance in developing economies depends on the interaction between technological innovation and broader institutional reform.

The Pakistani Context: Barriers and Pathologies

Pakistan provides an important case for examining the challenges associated with e-governance in developing economies. Although the country has introduced various digital government initiatives, significant barriers continue to affect citizens' ability to access and effectively use digital public services. These challenges include the digital divide, inadequate infrastructure, limited digital skills, language barriers, and institutional resistance to technological change. Recent assessments of Pakistan's digital environment emphasize that disparities in digital access and capabilities continue to limit the inclusive delivery of digital services (Pakistan Research and Advocacy Council [PRAC], 2024).

Language and design barriers represent an important dimension of this problem. Government digital platforms that rely heavily on English or use complex interfaces can create difficulties for citizens with limited English proficiency or digital literacy. Consequently, the availability of an online government service does not necessarily mean that all citizens can access or benefit from it equally.

Infrastructure deficits constitute another major constraint. Unequal access to reliable internet connectivity and digital infrastructure particularly affects rural and underserved populations. Such infrastructural inequalities can limit citizens' ability to access online government services consistently and may consequently reinforce existing socioeconomic and geographical inequalities (PRAC, 2024).

Bureaucratic and institutional resistance is also important in understanding the implementation of e-governance in Pakistan. Digital transformation changes established administrative procedures, patterns of authority, and opportunities for discretionary decision-making. Therefore, the introduction of automated systems may encounter resistance where officials are accustomed to conventional paper-based procedures. This demonstrates that technological reform cannot be separated from organizational and institutional change.

Overall, the Pakistani experience demonstrates that e-governance is not merely a technological intervention but a process of institutional and administrative transformation. The effectiveness of digital government depends on whether technological systems are accompanied by institutional capacity, adequate infrastructure, citizen-oriented design, digital literacy, and reforms in administrative practices. These issues are particularly relevant to the digitization of land and revenue administration, where accessibility, institutional trust, accuracy of digital records, and public acceptance are central to the success of e-governance.

Discussion

Thematic Analysis of Technological Capability Gaps and the Digital Divide in Pakistan's E-Governance

The study highlights the challenges of e-governance in Pakistan extend beyond the availability of digital platforms. Institutional capability deficits can significantly weaken the implementation of digital government. Where local offices face unreliable electricity, outdated technological equipment, and insufficient IT training, employees may continue using paper-based records alongside digital systems. Although maintaining parallel systems may provide a temporary administrative backup, it can also create duplication of work, inconsistencies between records, delays in updating information, and fragmented data flows. Consequently, the existence of a centralised digital system does not necessarily ensure effective digital governance at the local level. The success of e-governance therefore depends on strengthening local administrative capacity, infrastructure, technical skills, and institutional coordination.

The issue of data quality and algorithmic blind spots represents a further challenge. Digital government systems and AI-based decision-making depend heavily on the quality and completeness of the data on which they operate. When rural and socially marginalized populations are inadequately represented in government databases, automated systems may reproduce these existing patterns of exclusion. In this sense, digitization can potentially transform an existing administrative inequality into a digital inequality. Incomplete or geographically uneven datasets may affect planning, service delivery, welfare targeting, and other government decisions because groups that are poorly represented in the data may become less visible to automated systems. Therefore, technological modernization should be accompanied by systematic data-quality mechanisms, regular updating of databases, inclusive data collection, and human oversight of algorithmic decisions. This is particularly important in Pakistan, where significant differences in digital access and administrative capacity exist between urban and rural areas.

Land-record digitization research in District Mardan, this analysis is particularly relevant: if rural landowners, women, or other less digitally connected citizens are inadequately represented in digital records or face difficulties accessing digital services, digitization may not automatically produce greater transparency or inclusion. Instead, the effectiveness of digital land governance depends on the quality of records, accessibility of services, capacity of local officials, and public trust in the accuracy of digital information.

All this discussion has the following themes:

Theme 1: Digital Transformation of Public Administration

The shift from traditional paperwork to digital and automated systems represents a major transformation in public administration. E-governance is intended to improve the efficiency, transparency, accessibility, and quality of public services while reducing unnecessary barriers between citizens and the state.

Theme 2: Technological Capability Gap within Government Institutions

A major challenge is the unequal technological capacity of government institutions. While federal institutions may possess relatively advanced digital infrastructure, local and municipal bodies often face shortages of technological resources, skilled personnel, and institutional capacity. This creates a gap between the development of national digital systems and their effective implementation at the local level.

Theme 3: Digital Divide among Citizens

Digital transformation does not automatically guarantee equal access to government services. Citizens with limited digital literacy, inadequate internet access, poor technological resources, or language barriers may struggle to use online government platforms. Consequently, citizens who are already socially or economically disadvantaged may experience greater difficulties accessing e-services.

Theme 4: Institutional and Human Capacity Constraints

The effectiveness of e-governance depends not only on technology but also on the capacity of government employees to operate and manage digital systems. Insufficient training and technological competency among public officials can hinder implementation and reduce the effectiveness of digital reforms.

Theme 5: Unequal Access and Digital Exclusion

The technological capability gap within government and the digital divide among citizens reinforce each other. When local institutions lack the capacity to provide effective digital services, citizens with limited technological knowledge are further excluded. Thus, digitalization can unintentionally reproduce existing inequalities rather than eliminate them.

Theme 6: Need for Inclusive E-Governance

The analysis suggests that Pakistan's e-governance reforms should focus not merely on introducing advanced technologies but also on developing institutional capacity, improving digital literacy, strengthening infrastructure, and ensuring citizen-friendly access. Sustainable digital transformation requires both technological development and human/institutional development.

The central finding is that Pakistan's e-governance challenge is not simply a technological problem; it is also an institutional and social problem. The gap between technologically capable government institutions and citizens who remain digitally excluded can limit the effectiveness of digital public services. Therefore, successful e-governance requires a coordinated approach that addresses infrastructure, digital skills, institutional capacity, accessibility, and citizen inclusion simultaneously.

Policy Recommendations & Conclusion

Policy Matrix for Inclusive E-Governance

To bridge these gaps, Pakistan's digital strategy should move away from high-end software additions and focus on foundational, local institutional reform.

- **Implement "Build Rails, Not Products" Core Policies:** Shift state resources away from standalone apps. Focus instead on expanding fiber connectivity and secure, open data pipelines that local offices can reliably access.

- **Establish Localized GovTech Support Centers:** Deploy trained technical staff to rural municipal nodes, run by the Pakistan Digital Authority (PDA), to upskill desk workers and reduce bureaucratic resistance.
- **Mandate Omni-Channel & Universal Interface Accessibility:** Require all citizen-facing state platforms to feature voice-assisted, low-bandwidth, and localized language designs to remove literacy barriers.
- **Enact Data Quality Standards:** Set strict statutory guidelines for data completeness before using algorithmic or automated workflows for public resource allocation.

Conclusion

Pakistan's digital push has created highly modern centralized systems, yet the grassroots administrative layers and citizens remain largely disconnected. This dynamic demonstrates that technology alone cannot fix underlying structural issues. If e-governance platforms are launched without addressing local literacy limits and municipal infrastructure deficits, they risk reinforcing socio-economic divides rather than closing them. For digital transformation to succeed, top-down infrastructure investments must be closely integrated with hyper-local capability building.

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