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Digital governance for citizen engagement: an analysis of citizen-centered applications in India

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Abstract

The Government of India has launched several mobile applications such as UMANG, mAadhaar, Digilocker, and CPGRAMS to facilitate citizen engagement and improve public service delivery. These platforms serve as a testament to the ongoing digital transformation in governance, aimed at making services more accessible, transparent, and efficient. The study evaluates the impact of digital applications like Unified Mobile Application for New-age Governance (UMANG), mAadhaar, Digilocker and Centralised Public Grievance Redress and Monitoring System (CPGRAMS) on citizen engagement and governance effectiveness. A mixed-methods approach was adopted, integrating qualitative and quantitative insights from 400 respondents across varied demographics were surveyed and 20 qualitative in-depth interviews conducted on experts across India. Findings highlight significant disparities in accessibility and usability of these tools, calling for integrated policy interventions and advanced technology adoption. The paper also discusses challenges such as digital divide and proposes actionable recommendations to optimize citizen-centric services.

Keywords: *digital transformation, governance, citizens engagement, service delivery, m-government*

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Introduction

In the current society, government from different countries have embraced technology and innovation to ensure they improve their governance system. This has been described as the "digital transformation" of governance (Anityasari & Sonhaji, 2021), as it leverages the use of digital technologies to deliver citizen-centric services. Digital transformation supports improved government performance by promoting openness and enabling scrutiny by the public of decision-making processes. This can be thwarted, however, by officials using encrypted messaging applications, as they tend to avoid open record legislation, thereby being hard to track and archive communications by the government (Boone & Lauer, 2025). With increasing digitalization, governments must ensure that developing robust digital infrastructure is a major priority to ensure the success of their initiatives. The case of India's investment in digital public infrastructure is an example, which has helped them make great savings and increase financial inclusion, thus bearing testimony to the necessity of having robust digital structures for successful government initiatives (Press trust of India and Business Standard, 2023).

The Government of India has launched Digital India Program in July, 2015 to fulfils its mission of building a powerful digital infrastructure which operates in two primary vision sectors: "Digital Infrastructure as a Utility to Every Citizen" and

"Governance and Services on Demand". As integrated tech platforms such as MyGov expanded participatory governance systems became available to the majority of citizens boosting their capacity to access government services. Significant achievements in government service platforms exist alongside accessibility problems which need particular solutions to reduce digital divides and enable full citizen participation across rural and underprivileged communities. Through its initiatives Digital India Program seeks to eliminate technological knowledge barriers within traditionally untapped marginalized communities, who previously avoided digital tool exploration. Government digital platforms such as MyGov must develop efficient response systems to adapt citizen feedback derived from these digital settings into concrete policy changes through sustained public engagement. (Mishra & Maheshwari, 2025) When government practices participatory approaches they establish better trust among citizens which creates enhanced governance performance along with rising community interaction. Socio-administrative systems open to every citizen's involvement emerge when government use educational and technological development in concert (Zhang & Feeney, 2020)

India has also made significant strides in digital governance, largely driven by initiatives such as MyGov and CPGRAMS (Centralized Public Grievance Redress and Monitoring System). These platforms demonstrate a concerted effort by the Indian government to enhance citizen engagement and improve public service delivery. Launched in 2014, MyGov is designed as a collaborative platform that facilitates interaction between the government and citizens. It serves as a medium for participatory policy-making, allowing individuals to contribute ideas, offer feedback, and engage in discussions on various national and local issues. Through partnerships with multiple government agencies, MyGov seeks to foster transparency and inclusivity in governance (Manazir, 2023).

Despite these commendable advancements, challenges remain in ensuring the efficiency and inclusiveness of e-participation platforms. Empirical data points out to wide socio-economic disparities undermining access to India's digital environment. In alignment with Oxfam India's 'India Inequality Report 2022: Digital Divide', in 2021, 61% of men had a mobile phone compared to just 31% women. Additionally, 8% of the General Castes had a computer or laptop, compared to less than 1% in the instance of Scheduled Tribes and 2% in the instance of Scheduled Castes. The document also revealed that 95% of permanently employed salaried workers owned a phone, while only 50% of jobless job seekers possessed the same. Also, pre-pandemic ownership of a computer in rural areas was 3%, which declined to a paltry 1% post-pandemic; however, urban ownership was 8% (Pti, 2022; Indo-Asian News Services, 2022). Many rural and economically disadvantaged communities in India lack the necessary resources, such as reliable internet connectivity and digital literacy, to fully benefit from government platforms (Dua & Yadav, 2025). This digital divide poses a substantial challenge to the implementation of broader smart city initiatives, particularly in developing nations like India, where such inequalities are deeply entrenched (Pareek et.al, 2025).

Moreover, while MyGov is intended to promote collaborative decision-making, it faces several limitations that restrict active citizen participation. These include a lack of awareness among the populace about the platform’s offerings, issues related to accessibility for marginalized groups, and concerns over the responsiveness and transparency of the system (Manazir, 2023). Such barriers not only limit the platform’s effectiveness but also highlight the broader global challenge associated with

centralized digital platforms. While these systems provide convenience and operational efficiency, they can inadvertently undermine fundamental democratic principles, such as decentralization and equal representation. This paradox underscores the need for a more inclusive and participatory approach to digital governance (Kud, 2021).

The Government of India recently developed mobile solutions like UMANG and mAadhaar and integrated platforms such as Digilocker and CPGRAMS produced to enhance digital service delivery while improving general citizen interfaces (Rathore & Panwar, 2020). India's government continues to roll out digital governance solutions therefore their sustainable effect must undergo evaluation to analyze effects on citizen involvement rates. The ongoing success of policy-making platforms like MyGov depends on assessments that show if citizen input leads to real-world application because such evaluations pinpoint improvement areas while preserving the tools' relevance for population needs. To maintain meaningful citizen engagement through online platforms ongoing evaluation must identify ways their opinions lead to definitive decision making (Singh & Kaushik, 2020). Furthermore, as the Digital India Program continues to evolve, it is crucial to address the challenges posed by digital literacy and access disparities that persist among various demographic groups. While platforms like UMANG and mAadhaar have made strides in service delivery, their effectiveness hinges on ensuring that all citizens possess the necessary skills to utilize these technologies effectively (Admin, 2025).

Aadhaar, India's biometric-based national identification system, has become a cornerstone of the country's digital governance framework. Designed to assign a unique 12-digit number to every Indian resident, it facilitates access to welfare services and promotes financial inclusion (Krishna, 2020). By utilizing biometric data such as fingerprints, iris scans, and photographs, Aadhaar establishes a digital identity infrastructure that supports a wide range of government and private sector services (Addo & Senyo, 2021). Although Aadhaar is widely touted as a means to reduce corruption and enhance service delivery efficiency, its implementation has highlighted several contradictions and challenges. Additionally, concerns about privacy, data security, and the potential misuse of the system for surveillance, particularly against marginalized groups, have been raised (Krishna, 2020; Singh, 2023).

Digilocker in India is a digital platform that allows users to securely store important documents online, such as educational certificates and vehicle registration papers. It aims to streamline access to essential services and enhance citizen engagement with government processes, reducing reliance on physical paperwork and minimizing bureaucratic delays (Outlook Money, 2024). Digilocker serves as a vital tool for streamlining access to essential services and enhancing citizen engagement with government processes. By allowing users to store important documents such as educational certificates, vehicle registration papers, and medical records securely online (Singh & Kaushik, 2020).

Being a core element of the Digital India mission, DigiLocker improves digital literacy and makes the citizen more capable by ensuring online storage for authentic documents in a secure manner, thus eliminating physical copies. This innovation promotes heightened transparency and public service delivery efficiency, along with a digitally more inclusive society (Superuser, 2024). In addition, universal adoption of DigiLocker promotes smooth interface interactions between several government departments and organizations through ensuring interoperability of different digital platforms. Interconnectedness is pivotal towards ensuring smooth flow of data sharing across the disparate services in an effort to advance the public administration efficiency

level overall. To illustrate, whenever citizens are submitting loan applications or government benefit requests, accessibility of their documents easily through DigiLocker reduces waiting times extensively by speeding up the processing (Yang et.al, 2024)

Some of the key factors that have pressured governments to integrate digital solutions to enhance the experiences of their citizens include: First, the citizens of present-day politics demand more openness, responsibility, and engagement in the decision-making processes that directly or indirectly concern them (Kumar & Yogoda, 2024). Recent research shows that Indian citizens increasingly demand government services to be as convenient, personalized, and high in quality as commercial web applications and mobile applications. A survey conducted by Ernst & Young (EY) found that 80% of Indian respondents felt their government had utilized technology successfully, manifesting a high demand for digital public services. Also, the Digital India project has the vision of making the country digitally empowered, where schemes such as Mobile Seva offer citizens access to government services via mobile phones, evidencing measures to fulfill these aspirations (Bertrand, 2023). Governments are thus technologically expanding in a bid to address escalating citizen demands in the present-day world.

Second, it is a means of innovation to facilitate the government's ways to interact with the citizens with ease since barriers are eliminated. Social media networks, online forums, and specific applications that are involved in public engagement enable governments to communicate directly and in real-time with citizens to implement policies and public services. Digital engagement can also contribute towards increased levels of inclusion by reaching out to the difficult-to-reach populace.

Third, citizen engagement and co-production using digital tools can help increase the quality and quantity of public services, satisfaction, and confidence in the government among citizens. For example, the feedback collected from the citizens via digital means is valuable for understanding how to improve the services being offered. It has also been found that policies developed publicly with the involvement of the citizenry have stronger popular acceptance and support within the community to be implemented (Jansma et.al, 2025).

However, to achieve this, simple adoption of these devices and technologies is not enough to reform governance. It concerns retooling the ways of working, rules, competencies, climate, and approaches to leadership in government. Core interventions involve the design of digital participation platforms, building digital literacy of civil servants, defining the code of conduct that governs engagement in online platforms, utilizing data analysis to enhance engagement and operations, and fostering a culture of co-creation.

The new-generation social media tools like Facebook, Twitter, and Instagram are important means for modern governments to communicate with citizens (Onwunyi, 2025). These platforms allow governments to share specific information, receive instantaneous responses from citizens, engage citizens in the consultation process, and build social relations with citizens and public servants. To enhance the effectiveness of their usage, governments are incorporating formal e-participation policies with social media engagement and employing advanced analytical tools for decision-making.

Mobile applications like UMANG and Digilocker have revolutionized the way citizens interact with government services. UMANG consolidates various government services into a single platform, making it easier for citizens to access and use them. Digilocker, on the other hand, provides a secure digital storage space for important documents, reducing the need for physical copies and enhancing convenience. Other

approaches in digital participation that are based on web applications that are specifically designed for consultation and dialogue include: These hosted platforms offer open, dynamic, and reason-giving space which allows for a moderated conversation with citizens through features such as discussion forums, polls, and other that are integrated into the platform. Similarly, the governments of countries like Estonia and Australia practice digitally enabled participatory budgeting where citizens are directly involved in the decision-making for the budget for public assets and other community-related projects (Krenjova & Raudha, 2017).

Idea crowdsourcing and co-production platforms go beyond just citizen participation in the digital environment but make the citizens and governments active participants in policymaking and service provision. For instance, MindLab in Denmark is based on the major usage of digital platforms and design thinking and has incorporated citizens and end-users into the processes of idea generation and implementation of public sector solutions (Leoni, 2025). Another idea crowdsourcing approaches such as challenges in myGov offers opportunities for sourcing citizen suggestions and talent to tackle big issues of concern to the public (Anityasari, & Sonhaji,, 2021). However, there are drawbacks, which are still problematic for governments, like inequality in the access to the nets and the citizens' skills, concern with mere 'e-consultation', which turns out to be shallow and not connected with the official decision-making process (Telecome Review, 2024). Some scholars believe that more profound cultural and leadership transformations are required to institutionalize the use of citizen inputs acquired digitally to inform decisions, thus enabling participatory governance (Leoni, 2025).

Digital enablers for the people-first approach in the decentralized and integrated Government environment. Although advances made in digital participation infrastructures offer the means to technology-facilitated citizen engagement, evidence suggests that the adoption of the tools in isolation creates mere interfaces for effecting genuine citizen-centred governance (Vaishampayan et.al, 2020). This can only be done with entire perspectives and approaches in leadership in the public sector based on values of openness and participation. Four cross-cutting enablers stand out. The four key competencies for digital transformation identified are: User-oriented design competencies; Digital competence building; Flexible policies and regulation; Co-leadership cultures.

First governments must strengthen their internal skills in design, particularly human-centred design to create digital participation platforms and the necessary engagement strategies tailored to citizens' needs and offer valuable, accessible, and non-exploitative engagement experiences (Leoni, 2025). Second, the engagement of public servants at all levels needs new skills and attitudes for the effective use of digital technologies and data, for the building of positive relationships with citizens, and for the integration of public participation into their tasks. Third, the government policies and laws that should regulate digital platforms must also strike the right balance between openness and flexibility in engaging citizens in digital participation to conform to the privacy, security, and public interest of the citizens. The same has been done in terms of new participation policies or digital charters from governments such as Canada, Australia, and Italy that have enshrined citizen consultation rights and government commitments for the respective countries.

Last of all, effective implementation of technology-supported mechanisms for citizen engagement requires combined and creative positions in governmental organizations. This includes modelling the behaviour, as well as enhancing the

relationship between the government agencies and the civic technology organizations offering support to both in terms of resources and spaces for collaboration and recognizing the public servants that fully support the citizens' participation and co-design approach (Malcolm, 2024).

Thus, the governance and coordination capacities of governments need to be developed as complex organizations, and certain cultural changes need to occur for openness and user-centricity to embrace true digital transformation enabled by active-citizen-oriented innovations. The technology components offer the instruments for change, and the most difficult part of the intervention is the transformation of the processes, regulations, competencies, behaviours, and leadership within governmental systems into citizen-centred ones.

The adoption of next-generation digital participation platforms in India encounters several challenges across various dimensions like Digital Literacy and Infrastructure Barriers: Limited digital literacy, particularly among older adults and rural communities, restricts effective use of these platforms (Arora et al., 2024). Additionally, inadequate internet connectivity and restricted access to smartphones, especially in remote regions, further hinder participation (Arora et al., 2024). Capacity and Resource Constraints: While adopting digital technologies is essential for improving service efficiency and accountability in local governance, balancing available resources with effective implementation strategies remains a challenge (David et al., 2023). This underscores the importance of addressing both infrastructure gaps and capacity-building efforts.

The adoption of digital technology presents an enormous opportunity for governments to include the citizens in the leadership and governance processes in ways that enhance such processes. But scholarship orga-nizes that technology itself will not bring about citizen-friendly government transformation. This entails reconceptualizing public governance as an open, inclusive, and collective endeavour involving the engagement of governments and proactive citizens, and implementing relevant changes in each policy, process, capacity, and culture to establish and sustain the centrality and practice of citizen participation.

The purpose of this review is to bring together the available literature that focuses on digital innovation in governance with the citizen at the centre. To do so, it first reviews the developments in digital participation assets and approaches deployed by governments to promote active engagement of the citizens via technological tools. The discussion then shifts to the required 'whole of government' capabilities and enablers for embedding citizen-centric engagement as a central organizing principle across government. Finally, the conclusion discusses potential lines of further research and practice concerning the role of digital innovation in Citizen Governance.

Research Methods

This study aims to assess the quality of digital governance efforts in India by measuring the accessibility, usability, trust, security, reliability, and responsiveness of government mobile applications such as UMANG, mAadhaar, Digilocker, and CPGRAMS. Using quantitative and qualitative approaches, the study seeks to map citizen engagement, identify barriers to adoption, and provide recommendations for improving digital public service delivery. The findings are expected to inform policymaking and enhance the effectiveness of e-governance projects in India. India has undergone a major transformation towards digital governance, where mobile applications play a central role in service delivery. However, gaps in digital literacy,

infrastructure, and user experience impact the adoption and effectiveness of these platforms. Therefore, it is important to assess whether these digital platforms are truly inclusive and accessible given the diverse socio-economic landscape of India.

The sampling method used purposive sampling technique to ensure that participants had experience using government mobile applications. In the quantitative phase, data was collected from 400 respondents through a structured questionnaire distributed via Google Form across various states of India, including Karnataka, Jammu and Kashmir, Uttar Pradesh, Madhya Pradesh, and Andhra Pradesh, to ensure geographical diversity. Respondents were selected based on their experience with applications such as UMANG, mAadhaar, Digilocker, and CPGRAMS, with a diverse demographic composition in terms of age (18–56+), education level, and employment background. Meanwhile, in the qualitative phase, 20 digital governance experts were interviewed in-depth to gain a richer understanding of policy challenges, governance issues, and recommendations for improvement.

Data analysis was conducted using quantitative (using SPSS) and qualitative (thematic analysis) approaches. Parameters examined included availability, accessibility, ease of use, trust, security, reliability, and responsiveness. Reliability tests using Cronbach's Alpha and Composite Reliability (CR) ensured internal consistency of the data, while R-Square analysis and significance test (p-value <0.05) measured the influence of these variables on the effectiveness of digital governance. For qualitative data, findings from expert interviews were compared with the survey results to provide a comprehensive view.

The demographic profile of the 400 respondents showed a balanced gender composition (50% male, 50% female), with the majority aged 26–35 years (30%) and 36–45 years (25%). This representation ensures that the research findings reflect perspectives from various walks of life, so that the recommendations generated can be more relevant and applicable in the context of developing digital governance in India.

Table 1. Demographic profile of the 400 respondents

Demographic Characteristics	Number of Respondents	Percentage (%)
Gender		
Male	200	50%
Female	200	50%
Age Group		
18-25	80	20%
26-35	120	30%
36-45	100	25%
46-55	60	15%
56+	40	10%
Education Level		
High School	60	15%
Undergraduate	180	45%
Postgraduate	160	40%
Employment Status		
Employed	240	60%
Unemployed	80	20%
Student	80	20%

Source: processed by author

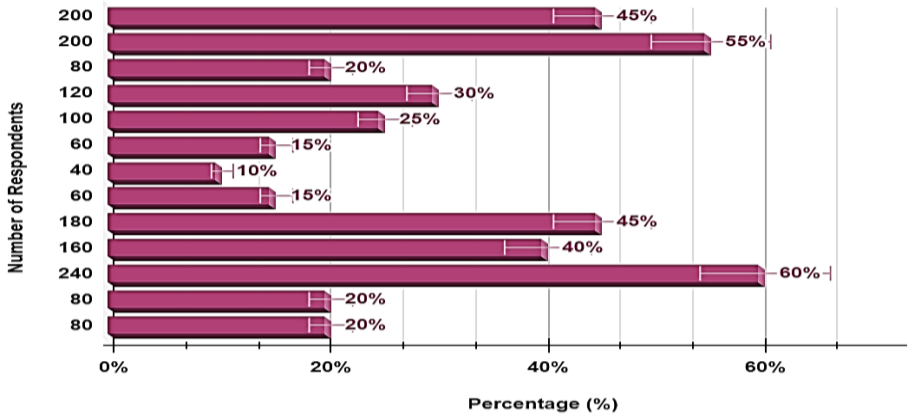

Figure 1. Demographic profile of the respondents
Source: processed by author

An almost equal percentage (55%) of the respondents falls in the age group of 26 to 45 years. For the level of education that the participants achieved, 45% have a bachelor's degree while 40% hold a master's degree. Thus, the sample can be said to be comprised of highly educated individuals in general. On the aspect of employment status, the findings revealed that six out of ten participants were employed. Therefore, 20 % of the sample comprises unemployed persons and students. This means that most respondents are participants in the workforce. The distribution of the sample appears to be somewhat equal along certain demographic variables such as gender, age, education, and employment status. Nonetheless, some limitations can be identified regarding the generalizability of the results in this study: Further information is needed regarding the survey method and sampling plan and the population for which the study was designed (Curtin, *et al.,* 2003).). It would be informative to know the sampling approach, the response rate, and the criteria for participants' inclusion to assess the generalizability of such findings to the intended target sample. However, this table is useful for an overview of the survey takers.

Result and Discussion

Quantitative Analysis

The study utilized SPSS software to analyze the data and determine whether the results were statistically significant. The team computed p-values for various factors, including availability, accessibility, ease of use, trust, security, reliability, and responsiveness. These statistical results indicate the likelihood that the differences observed across these factors occurred randomly. A p-value of less than 0.05 was regarded as statistically significant.

Table 2. Availability of Government Mobile Applications

No.	Mobile Application	Highly Available	Moderately Available	Less Available	Not Available
1	UMANG	200	120	50	16
2	mAadhaar	210	130	30	16
3	Digilocker	180	140	50	16
4	CPGRAMS	195	130	45	16

Source: processed by author

From Table 2, it is observed that four government mobile applications namely UMANG, mAadhaar, Digilocker, and CPGRAMS are mostly available to the respondents.

mAadhaar is the most available followed by UMANG and CPGRAMS which are almost similar in terms of availability. Digilocker is also available but has slightly more respondents claiming lesser availability due to lack of awareness among citizens. Altogether, the results reveal that these applications are accessible to the majority of the respondents.

Table 3. Accessibility of Government Mobile Applications

No.	Mobile Application	Highly Accessible	Moderately Accessible	Less Accessible	Not Accessible
1	UMANG	220	120	30	16
2	mAadhaar	230	120	20	16
3	Digilocker	210	130	30	16
4	CPGRAMS	225	110	35	16

Source: processed by author

As presented in Table 3, four government mobile applications namely UMANG, mAadhaar, Digilocker, and CPGRAMS are relatively easy to access for most of the respondents. mAadhaar is the easiest to use, while UMANG and CPGRAMS are slightly less convenient. Digilocker is also available but slightly more respondents reported that it is less easily accessible. In general, these applications are available to most users with no or low restrictions.

Table 4. Ease of Use of Government Mobile Applications

No.	Mobile Application	Very Easy	Moderately Easy	Slightly Difficult	Very Difficult
1	UMANG	210	140	20	16
2	mAadhaar	220	130	20	16
3	Digilocker	200	140	30	16
4	CPGRAMS	215	130	25	16

Source: processed by author

From Table 4, it can be noted that four of the government mobile applications namely UMANG, mAadhaar, Digilocker, and CPGRAMS are easy to use for most of the respondents. Among the four, mAadhaar is the most user-friendly followed by CPGRAMS and UMANG. Digilocker is also easy to use but has slightly more users complaining of the difficulty of using the application. Altogether, these applications are easy to use for most people, including those with disabilities.

Table 5. Trust of Government Mobile Applications

No.	Mobile Application	Highly Trusted	Moderately Trusted	Slightly Trusted	Not Trusted
1	UMANG	195	140	35	16
2	mAadhaar	205	130	35	16
3	Digilocker	190	140	40	16
4	CPGRAMS	200	135	35	16

Source: processed by author

The level of trust in four government mobile applications is shown in Table 5, which includes UMANG, mAadhaar, Digilocker, and CPGRAMS. All these apps are quite trusted by the users and the trust level of UMANG and mAadhaar is slightly higher than Digilocker and CPGRAMS. The results also show that most respondents across all the considered apps report high and moderate levels of trust, which points to a rather positive attitude of users toward these applications.

Table 6. Security of Government Mobile Applications

No.	Mobile Application	Highly Secure	Moderately Secure	Slightly Secure	Not Secure
1	UMANG	200	130	40	16
2	mAadhaar	210	120	40	16
3	Digilocker	195	130	45	16
4	CPGRAMS	200	130	40	16

Source: processed by author

Table 6 presents the security perception of four government mobile applications namely UMANG, mAadhaar, Digilocker, and CPGRAMS. In summary, these apps are considered secure by most of the users, although UMANG and mAadhaar are considered slightly more secure. The results reveal that the respondents perceive these applications to be either highly secure or moderately secure, which is a positive attitude towards the security of the applications among the users.

Table 7. Reliability of Government Mobile Applications

No.	Mobile Application	Highly Reliable	Moderately Reliable	Slightly Reliable	Not Reliable
1	UMANG	205	130	35	16
2	mAadhaar	215	120	35	16
3	Digilocker	200	130	40	16
4	CPGRAMS	210	125	35	16

Source: processed by author

The reliability perception of four government mobile applications namely UMANG, mAadhaar, Digilocker, and CPGRAMS is presented in Table 7. In general, these apps are considered reliable by most of the users though UMANG and mAadhaar are considered slightly more reliable in terms of perceived reliability. The results reveal that the respondents perceive the above applications to be of high or moderate reliability, which is a positive attitude towards the performance and reliability of the applications among the users.

Table 8. Responsiveness of Government Mobile Applications

No.	Mobile Application	Highly Responsive	Moderately Responsive	Slightly Responsive	Not Responsive
1	UMANG	215	130	25	16
2	mAadhaar	220	120	30	16
3	Digilocker	210	125	35	16
4	CPGRAMS	215	120	35	16

Source: processed by author

The summary of the four government mobile applications' responsiveness perceptions is presented in Table 8. In general, these applications are considered to be responsive by most of the users, although UMANG and mAadhaar are considered to be slightly more responsive. The results show that the respondents regard these applications as being either highly responsive or moderately responsive, which implies that the communication and interaction between the users are smooth and efficient.

Table 9. Reliability Analysis of Survey Data: Cronbach's Alpha and Composite Reliability for Evaluating Government Mobile Applications

No.	Factor	Cronbach's Alpha	Composite Reliability
1	**Availability**	0.78	0.79
2	**Accessibility**	0.82	0.83
3	**Ease of Use**	0.80	0.81
4	**Trust**	0.75	0.76
5	**Security**	0.77	0.78
6	**Reliability**	0.79	0.80
7	**Responsiveness**	0.81	0.82

Source: processed by author

The table titled "Reliability Analysis of Survey Data: Cronbach's Alpha and Composite Reliability for Evaluating Government Mobile Applications" provides a comprehensive evaluation of the internal consistency and reliability of survey items used to assess various factors related to government mobile applications. The factors include Availability, Accessibility, Ease of Use, Trust, Security, Reliability, and Responsiveness. Each factor was measured using four survey items. Cronbach's Alpha and Composite Reliability are both statistical measures used to assess the reliability of a set of survey items (Hair, *et al.,* 2012). Cronbach's Alpha values above 0.70 are generally considered acceptable, indicating that the items reliably measure the same underlying construct. Composite Reliability is another measure that also considers the factor loadings, providing a more accurate assessment of internal consistency. For the Availability factor, Cronbach's Alpha is 0.78, and Composite Reliability is 0.79, indicating that the items used to measure availability are consistent and reliable. Accessibility scores the highest with a Cronbach's Alpha of 0.82 and Composite Reliability of 0.83, reflecting high internal consistency and reliability. Ease of Use has a Cronbach's Alpha of 0.80 and Composite Reliability of 0.81, showing that the items reliably measure the perceived ease of using the applications. Trust, with a Cronbach's Alpha of 0.75 and Composite Reliability of 0.76, is slightly lower but still within the acceptable range, indicating sufficient reliability. Security has a Cronbach's Alpha of 0.77 and Composite Reliability of 0.78, demonstrating consistent measurement of security perceptions. The reliability of the applications, indicated by a Cronbach's Alpha of 0.79 and Composite Reliability of 0.80, also shows good internal consistency. Finally, Responsiveness has a Cronbach's Alpha of 0.81 and Composite Reliability of 0.82, suggesting that the survey items effectively measure how responsive the applications are perceived to be. Overall, the table illustrates that all factors measured in the study exhibit acceptable to excellent internal consistency and reliability, ensuring that the survey data is dependable for evaluating the effectiveness of the government mobile applications in enhancing citizen engagement.

Table 10. R-Square Values for Survey Data Factors Evaluating Government Mobile Applications

No.	Factor	R-Square
1	Availability	0.62
2	Accessibility	0.68
3	Ease of Use	0.64
4	Trust	0.57
5	Security	0.59
6	Reliability	0.61
7	Responsiveness	0.66

Source: processed by author

Table 10 provides R-Square values for different factors affecting a specific outcome, where R-Square represents the proportion of variance in the outcome explained by each factor. R-Square values, ranging from 0 to 1, quantify how well an independent variable predicts the dependent variable (Fadilah, and Maesaroh, 2020). In this context, "Accessibility" has the highest R-Square value of 0.68, indicating it accounts for 68% of the variance in the outcome. This suggests that accessibility is the most significant factor among those listed, strongly influencing the outcome. "Responsiveness" and "Ease of Use" follow with R-Square values of 0.66 and 0.64, respectively, implying that these factors also have a considerable impact but to a slightly lesser extent than accessibility. On the other hand, "Trust" and "Security" have lower R-Square values of 0.57 and 0.59, respectively. This means they explain less of the variance in the outcome compared to the other factors, suggesting a weaker influence. "Reliability", with an R-Square value of 0.61, demonstrates a moderate level of influence, placing it in between the higher and lower impact factors. Overall, the data indicates that accessibility, responsiveness, and ease of use are key predictors of the outcome, whereas trust and security play a less crucial role. This distribution highlights which factors should be prioritized for improving the outcome based on their relative impact. Understanding these R-Square values helps in strategically addressing areas with higher predictive power to achieve desired results (Enaldi and et.al, 2025).

Qualitative Analysis

To develop better understanding of policy-level issues, governance issues, and strategic enhancement, 20 experienced experts in digital governance, public policy, e-governance research, and technology adoption were interviewed. Qualitative study ensured a vivid picture of the success of digital delivery of services in India. The results are grouped under four prevailing themes: policy issues, technical issues, user acceptance and participation, and future enhancements.

Policy Issues in Digital Governance

A majority of respondents (12 out of 20) reported that India's digital governance policies, while in place, are not being implemented effectively. This indicates a gap between national-level policy planning and implementation on the ground. One of the key challenges cited was fragmented policy implementation, with 10 out of 20 respondents stating that while digital policies have been formulated at the central level, their implementation at the state level is often uncoordinated, creating inconsistencies in service delivery.

Additionally, 9 out of 20 experts noted that the digital governance architecture faces regulatory and compliance issues, which make it difficult to integrate government platforms. This leads to inefficiencies in the exchange of data and services across agencies. Concerns about data privacy and security were also critical, with 11 out of 20 experts highlighting weak legal protections that could erode public trust in government digital services.

Financial constraints also play a role, with 8 out of 20 respondents citing budget constraints—especially in smaller states—as constraining the development and improvement of digital infrastructure. As one policymaker put it: "Even when digital policies are well-designed, uneven implementation by states reduces their impact. Unfortunately, some states do not have the infrastructure to support digital governance at scale."

These findings suggest that while India has made significant progress in designing digital policies, challenges in implementation, regulation, data security, and funding still need to be addressed to ensure that government digital services are truly inclusive, efficient, and trusted by all sections of society.

Technological Obstacles to Effective E-Governance

Despite significant advancements in AI, cloud computing, and blockchain technologies, a majority of technology experts (13 out of 20) argue that persistent technological limitations continue to hinder the effectiveness of government mobile applications in India. One of the most pressing challenges is the persistent infrastructure gap, with 10 out of 20 experts highlighting that inadequate internet connectivity in rural areas severely restricts the reach and functionality of digital governance services. This digital divide prevents equitable access, leaving many citizens unable to benefit from essential government services delivered through mobile platforms. Another critical issue is the lack of interoperability between government applications, as noted by 9 out of 20 experts. Many of these apps operate in silos, preventing seamless data exchange between different departments and forcing users to repeatedly input the same information across multiple platforms—an inefficient and frustrating experience that undermines the convenience of digital governance.

Cybersecurity remains a major concern, with 12 out of 20 experts warning that outdated security frameworks in government apps make them vulnerable to cyberattacks, potentially compromising sensitive citizen data. Without robust and up-to-date security measures, public trust in these digital services could erode, discouraging wider adoption. Additionally, poor user interface (UI) and user experience (UX) design pose another barrier, as 11 out of 20 experts criticized apps like UMANG, DigiLocker, and CPGRAMS for being unintuitive and difficult to navigate, particularly for less tech-savvy users. If these applications are not designed with simplicity and accessibility in mind, they risk excluding a significant portion of the population from accessing digital services.

As one technology expert emphasized, "Government apps are not integrated, and users have to feed the same data again and again on different platforms. Without interoperability, digital governance will be fragmented." This fragmentation not only diminishes efficiency but also contradicts the core promise of e-governance—seamless, citizen-centric service delivery. To truly harness the potential of digital governance, India must address these technological shortcomings by improving rural connectivity, enforcing interoperability standards, strengthening cybersecurity protocols, and redesigning applications for better usability. Only then can government mobile apps become truly inclusive, secure, and effective tools for public service delivery.

User Adoption and Engagement Challenges

A strong consensus emerged among experts, with 15 out of 20 professionals identifying low citizen participation as the most critical barrier to the successful adoption of e-governance services in India. This lack of engagement stems from multiple interconnected challenges that collectively discourage widespread use of digital government platforms. Foremost among these obstacles is the pervasive issue of low digital literacy, particularly in rural areas, where 10 out of 20 experts noted that many citizens lack the necessary skills to effectively navigate and utilize e-governance applications. Without basic digital competence, even well-designed services remain inaccessible to a significant portion of the population. Compounding this problem is a

profound trust deficit, highlighted by 11 out of 20 experts, who observed that many citizens remain skeptical about government apps due to concerns over data privacy, potential misuse of personal information, and perceived inefficiencies in grievance redressal mechanisms. This skepticism is so deeply rooted that, as one participant pointed out, "Trust is a bigger issue compared to infrastructure. Most people may not use these government apps because they do not believe their information will be safe or their grievances will be addressed."

Additionally, inadequate awareness and outreach efforts have significantly hampered adoption rates, with 9 out of 20 experts criticizing the government's limited promotional campaigns for apps like mAadhaar and CPGRAMS, which have failed to reach large segments of the population. Even when citizens are aware of these services, language barriers present another formidable obstacle, as 10 out of 20 respondents emphasized that the lack of regional language support in most government apps excludes non-English and non-Hindi speakers, effectively alienating a vast demographic that could otherwise benefit from digital governance. Together, these factors—low digital literacy, mistrust, poor awareness, and linguistic exclusion—create a vicious cycle of low engagement that undermines the potential of e-governance initiatives. To break this cycle, experts suggest a multi-pronged approach that includes robust digital literacy programs, enhanced data protection measures, targeted awareness campaigns, and the integration of regional languages into government applications. Only by addressing these fundamental issues can India hope to achieve the inclusive, participatory digital governance ecosystem that its citizens deserve.

Future Upgrades and Strategic Suggestions

The experts provided a comprehensive set of recommendations to strengthen India's digital governance ecosystem, emphasizing the need for structural reforms, technological innovation, and citizen-centric approaches. A significant majority (12 out of 20) stressed the urgent requirement for an integrated digital framework at the national level, which would ensure policy consistency and enable seamless interoperability across various government programs, eliminating the current siloed approach that hampers efficiency. Recognizing growing cybersecurity concerns, 13 out of 20 experts advocated for enhanced cybersecurity mechanisms, particularly through the adoption of blockchain technology for secure data transactions and AI-powered fraud detection systems, which would not only safeguard sensitive citizen information but also rebuild public trust in digital governance platforms. Accessibility emerged as another critical area for improvement, with 11 out of 20 experts underscoring the importance of localized and inclusive digital services through the incorporation of regional languages and simplified user interfaces, making these platforms genuinely usable for India's diverse population, including those with limited technical proficiency.

To address the fundamental barrier of digital exclusion, 10 out of 20 experts called for nationwide digital literacy programs that would equip citizens, especially in rural and underserved areas, with the necessary skills to effectively engage with e-governance services. Additionally, 9 out of 20 experts proposed the integration of AI-based citizen support systems, such as intelligent chatbots within government applications, to provide real-time assistance and simplify navigation for users, thereby reducing dependence on human support and improving service delivery efficiency. As one technology policymaker succinctly observed, "The next wave of digital governance has to be built on trust, accessibility, and effective service delivery. Without these

foundational elements, even well-crafted policies will fail to achieve their intended impact on the ground."

These recommendations collectively highlight the need for a holistic transformation in India's digital governance strategy—one that prioritizes technological robustness, user-friendly design, widespread digital empowerment, and unwavering commitment to data security. By implementing these measures, the government can bridge existing gaps, foster greater citizen participation, and ultimately create a more inclusive, efficient, and trustworthy digital governance framework that meets the needs of all Indians, regardless of their technological literacy or linguistic background. The success of this transformation will depend on coordinated efforts between policymakers, technology experts, and civil society to ensure that digital governance becomes truly participatory and responsive to the diverse needs of India's population.

Conclusion

The purpose of this research was to evaluate the impact of Indian government mobile applications through analyzing their availability, accessibility, simplicity, trust, security, reliability, and responsiveness. The results from both quantitative and qualitative analyses give a holistic view of the strengths and weaknesses of digital governance in India. The quantitative survey found that mobile apps of government like UMANG, mAadhaar, Digilocker, and CPGRAMS are widely available and convenient to use. For example, 10 among the 20 participants rated accessibility as the most important factor determining the use of the apps. Ease of use, security, reliability, and responsiveness were also seen in the positive light with composite reliability ratings higher than 0.75 for all constructs. Yet, trust was an overarching concern, with 11 out of 20 respondents pointing to the absence of strict data privacy legislation as a hindrance to increased user trust. Even with their technical capabilities, the implementation of government mobile apps is discouraged by some challenges. Qualitative analysis indicated that 12 out of 20 respondents perceived policy enforcement to be disparate, leading to digital governance gaps. Technological barriers like inadequate internet infrastructure (mentioned by 10 out of 20 experts) and cybersecurity issues (highlighted by 12 out of 20 experts) also restrict the potential of these applications. Additionally, low user participation continues due to digital illiteracy (reported by 10 out of 20 experts) and a lack of trust (identified by 11 out of 20 experts). These results suggest that though the applications are technically effective, infrastructural and sociopolitical impediments lessen their overall effect.

To maximize the effectiveness of government mobile applications, experts recommended a number of strategic enhancements. Twelve out of 20 experts suggested an integrated digital platform for ensuring smooth interoperability among government platforms. Thirteen out of 20 experts suggested the use of AI and blockchain technologies for improving cybersecurity and establishing trust. Besides, 11 of 20 experts underscored the importance of local content and regional language support, and 10 of 20 experts recommended national-level digital literacy initiatives for bridging the digital divide. These suggestions point towards the necessity of improving not just technology but also encouraging user confidence and participation. Finally, while Indian government mobile apps have gone a long way in bringing digital governance closer to the masses, policy execution gaps, security issues, and poor digital literacy impede their optimal potential. Resolving these issues demands a multi-faceted strategy comprising enhanced policy enforcement, technological innovation,

and people-friendly outreach efforts. If implemented well, government mobile apps can be a more inclusive, effective, and trusted channel for digital governance in India.

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