Digital Governance and Public Sector Innovation in Somalia. Enhancing Transparency, Efficiency, and Citizen Participation through Technology

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Digital Governance and Public Sector Innovation in Somalia: Enhancing Transparency, Efficiency, and Citizen Participation through Technology

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ABSTRACT

Purpose: This study investigates the transformative role of digital governance in Somalia's public sector, with a focus on how digital solutions can enhance transparency, operational efficiency, and citizen participation.

Methodology: To achieve this, the study develops a novel hybrid framework known as the SyMAP-Tech (Systematic Mapping and Participatory Technology Assessment) Framework. This approach combines systematic literature mapping with participatory technology assessment, enabling a comprehensive evaluation of the readiness, applicability, and impact of digital tools within fragile governance systems. Stakeholder engagement was central to this process, with localized digital platforms and citizen feedback mechanisms used to generate real-time input. In total, 116 digital participation tools, adapted from international best practices, were reviewed and mapped to Somalia's governance ecosystem.

Findings: The results reveal significant potential for digital solutions to bridge gaps in public accountability and service delivery, particularly in urban areas where infrastructure is relatively more developed. The analysis also identifies clusters of tools that are particularly effective in promoting inclusive policymaking, ensuring transparent procurement, and strengthening citizen oversight. Furthermore, the study highlights the importance of localized strategies that integrate both policy analysis and direct stakeholder participation to build legitimacy and trust in governance systems.

Unique Contribution to Theory, Practice, and Policy: The research makes several contributions. At the theoretical level, it introduces the SyMAP-Tech Framework as a replicable model for evaluating digital governance within fragile and post-conflict states. In practice, it offers Somali institutions actionable insights into how digital solutions can be harnessed to improve service delivery, strengthen accountability, and enhance citizen engagement. For policy, the study recommends the adoption of context-driven digital governance strategies that are tailored to fragile state-building, with particular emphasis on transparency, trust-building, and institutional resilience.

Keywords: Digital Governance, Public Sector Innovation, Citizen Participation, E-Government Somalia, Transparency, Participatory Technology Assessment

1. Introduction

In the 21st century, digital governance has emerged as a transformative force shaping how governments operate, engage citizens, and deliver public services [1] [2] It refers to the strategic use of information and communication technologies (ICTs) to reform administrative processes, promote transparency, and enhance decision-making efficiency in public institutions [3]. Across the globe, governments are increasingly adopting e-governance tools to bridge the gap between policy makers and citizens, enabling real-time participation and service access [4]. However, the success of such transformations heavily depends on contextual adaptation, digital infrastructure, and institutional readiness—factors that are especially critical in fragile and post-conflict states like Somalia [5].

Somalia presents a unique case for digital public sector reform [6]. Following decades of conflict and state fragility, its government has initiated several digital transformation programs aimed at rebuilding institutional trust and improving governance capacity [7]. With the support of international partners, Somalia has implemented early-stage e-government services in areas such as civil registration, tax collection, and public procurement [8]. Yet, challenges related to administrative fragmentation, digital literacy, and infrastructure disparities persist [9]. Against this backdrop, digital governance is positioned as both a tool and a necessity for promoting transparency, curbing corruption, and ensuring inclusive public service delivery [10].

One of the critical goals of digital governance is to enhance citizen participation [11]. Through platforms such as SMS-based surveys, web portals, and mobile applications, citizens can now provide feedback, access information, and contribute to decision-making [12]. This form of participatory technology enables governments to respond more effectively to public needs, thereby improving accountability and service responsiveness [13]. In Somalia, the uptake of such participatory tools remains uneven, highlighting the need for frameworks that are contextually sensitive and socially inclusive [14]. Innovation in the public sector must therefore go beyond technology deployment to address systemic challenges such as data governance, stakeholder engagement, and policy alignment [15].

In this study, a novel hybrid framework—SyMAP-Tech (Systematic Mapping and Participatory Technology Assessment)—is applied to assess how digital governance tools can enhance transparency, operational efficiency, and citizen engagement in Somalia. The framework systematically maps global digital toolkits and assesses their applicability using stakeholder inputs and national policy reviews. By integrating supply-side and demand-side analyses, SyMAP-Tech enables a holistic understanding of Somalia's digital public sector landscape and its innovation potential. The research draws upon comparative evidence from other fragile and post-conflict settings to inform its methodological and policy insights.

This paper contributes to the growing discourse on digital transformation in low-capacity governance environments. It provides empirical evidence and a scalable framework for designing citizen-centered, transparent, and efficient digital governance strategies. Ultimately, the study

aims to support Somalia's policy makers, civil society, and development partners in leveraging technology not only for modernization but also for inclusive and participatory nation building.

2. Literature Review

Recent innovations in digital civic engagement further underscore Somalia's potential for participatory governance. Table 1 shows summary of research gaps.

Abdullahi et al. (2024) [16] proposed a blockchain-based online petition platform specifically tailored to Somalia's sociopolitical context. Their system ensures transparency and signature integrity while empowering community members to influence policy formulation securely and interactively. This decentralized approach not only enhances trust but also enables real-time engagement with decision-makers, advancing the vision of technology-enabled participatory governance.

Meanwhile, persistent governance deficiencies hinder public trust in institutions. Kulmie et al. (2024) [17] examined the Benadir Regional Administration and highlighted significant transparency and accountability gaps. Their findings emphasized the need for citizen-centric reforms, performance monitoring, and data-driven decision-making to restore trust. They advocate for the adoption of digital technologies and streamlined governance practices to foster transparency and reliability in public service delivery—key pillars in Somalia's digital governance roadmap.

Corruption remains a central impediment to governance innovation. Mohamed et al. (2025) [18] investigated Somalia's federal ministries and found that e-procurement significantly reduces corruption risks by lowering monopoly power and information asymmetry. Their study confirmed that digital procurement tools enhance transparency, accountability, and equitable access to information—essential mechanisms to build efficient, trusted public institutions.

Similarly, Mudey and Arshad (2025) [19] identified deep-rooted socio-political and cultural causes of corruption in Somalia, including clan favoritism and a lack of accountability frameworks. They recommend not only restructuring civil services but also sustaining digital adoption in governance as a structural reform tool.

In support of this trajectory, Ahmed et al. (2024) [20] showcased the positive implications of modern technologies in Somalia's healthcare sector. Their study on telemedicine projects revealed how digital platforms can bridge service gaps and promote efficiency in under-resourced areas. While not directly tied to e-governance, these technological interventions demonstrate the cross-sectoral value of digitization in enhancing service delivery and citizen well-being—core goals of public sector innovation.

Digital transformation is increasingly recognized as a critical driver of accountability and innovation in public institutions across the Horn of Africa. Kant et al. (2025) [21] examined the influence of digital accounting systems on public sector accountability, emphasizing that innovation in digital technologies acts as a powerful mediator. Their structural equation

modeling results showed that adopting digital innovations significantly enhances transparency, performance, and citizen trust, particularly in the fiscal management process. These findings offer strategic direction for Somalia's public institutions aiming to modernize accountability through digital solutions.

In a broader governance framework, Kant and Degefa (2025) [22] introduced the Public Administration 5.0 (PA5.0) paradigm, assessing how digital governance mediates the creation of super-smart societies in East Africa. Their study demonstrated that e-governance implementation not only improves public service delivery but also facilitates socioeconomic growth by embedding intelligence into governance systems. These insights are directly applicable to Somalia's ongoing e-government initiatives and its aspirations for technology-driven institutional reform.

Globally, many developing nations share Somalia's aspirations for improved governance through digital tools. Okocha and Adigwe (2024) [23] conducted a comprehensive review of e-government strategies across ten developing nations, highlighting citizen participation, ICT infrastructure, and digital literacy as critical success factors. Their study emphasizes that sustainable digital governance must be grounded in inclusive strategies that prioritize community empowerment and infrastructural equity. Somalia's policy designers can draw from these lessons to build more robust, citizen-responsive platforms.

Despite promising models, contextual challenges persist in deploying ICT solutions at scale in Somalia. Nuh et al. (2024) [24] investigated land management systems and revealed that ICT4D projects often stall when local contexts, community dynamics, and regulatory frameworks are inadequately considered. Their findings underscore the need for a holistic, culturally informed approach when deploying digital governance solutions—especially in sectors involving sensitive data and property rights.

Finally, linking governance to global development goals, Shafik (2025) [25] explored how digital technologies can promote SDG 16—Peace, Justice, and Strong Institutions. His analysis asserts that digital governance tools are instrumental in promoting rule of law, institutional integrity, and justice delivery. For Somalia, integrating such SDG-aligned digital solutions could not only modernize its institutions but also align its national governance reform agenda with broader international commitments.

Restoring public trust in Somalia's governance institutions also requires attention to the security and justice sectors, where perceptions of fairness and professionalism play a critical role. Abdi et al. (2025) [26] investigated predictors of public trust in police services in Mogadishu, identifying perceived accountability, professionalism, and performance as significant drivers of trust. Their structural equation modeling findings emphasize that effective law enforcement institutions—backed by transparent digital systems and accountability frameworks—are vital for ensuring societal stability in post-conflict environments. These insights reinforce the broader argument

that digital governance is not limited to administrative reform but extends to justice, safety, and social cohesion.

Table 1: Summary of Research Gaps

Ref. No	Author(s)	Research Focus	Identified Research Gap
[16]	Abdullahi et al. (2024)	Blockchain for civic engagement	Lack of trusted, localized digital petition systems in fragile states
[17]	Kulmie et al. (2024)	Governance and service delivery	Inadequate integration of citizen-centric digital reforms in regional administrations
[18]	Mohamed et al. (2025)	E-procurement and anti-corruption	Insufficient empirical analysis linking e-procurement to corruption reduction in Somalia
[19]	Mudey & Arshad (2025)	Corruption and digital governance	Need for structured digital integrity frameworks within anti-corruption institutions
[20]	Ahmed et al. (2024)	Digital healthcare	Lack of multi-sector analysis connecting digital health systems with broader governance reforms
[21]	Kant et al. (2025)	Digital transformation in accounting	Limited studies on digital innovation as a mediator of accountability in public finance
[22]	Kant & Degefa (2025)	PA5.0 and Smart Society	Gap in evaluating digital governance as a moderating tool in PA5.0 transformation
[23]	Okocha & Adigwe (2024)	E-government in developing nations	Need for country-specific strategies in e-governance adoption across diverse contexts
[24]	Nuh et al. (2024)	ICT4D for land management	Scarcity of research on scalability of ICT4D across fragmented regulatory environments
[25]	Shafik (2025)	Digital tools for SDG 16	Limited alignment of national e-governance policies with global development agendas
[26]	Abdi et al. (2025)	Public trust in police services	Lack of digital performance monitoring systems in law enforcement accountability

2.1 Research gaps

Despite recent advances in digital governance and public sector reform initiatives in Somalia and similar contexts, several critical research gaps persist. There is a notable absence of trusted, localized digital platforms tailored to civic engagement, particularly for secure and transparent petition systems. Regional administrations continue to struggle with integrating citizen-centric digital reforms that can enhance service delivery and governance credibility. While e-procurement systems have been introduced, empirical evidence directly linking their adoption to measurable reductions in corruption remains limited. Additionally, anti-corruption frameworks lack structured digital integrity mechanisms that ensure transparency and operational

effectiveness. Cross-sectoral digital strategies, especially those linking healthcare and public administration, remain underexplored. The mediating role of innovation in improving accountability through digital accounting and financial management also warrants deeper examination. Furthermore, existing research does not sufficiently assess the role of digital governance in moderating transformative paradigms like Public Administration 5.0 or its alignment with global development agendas. Finally, performance monitoring systems for law enforcement and citizen trust-building mechanisms in post-conflict settings are largely absent.

3. Objectives

The novel objectives of this study are:

1. To design and validate a hybrid methodological framework (SyMAP-Tech) that combines systematic literature mapping with participatory technology assessment tailored for Somalia's governance environment.

2. To evaluate and cluster globally recognized digital citizen participation tools and assess their applicability, impact potential, and adoption feasibility within Somalia's socio-political context.

3. To provide strategic insights and a scalable policy model that guides post-conflict states in implementing transparent, citizen-centric, and efficient digital governance systems.

3.1 Research Questions

This study seeks to address the following key research questions to guide the investigation into the effectiveness and contextual applicability of digital governance innovations in Somalia:

RQ1. How can a hybrid methodological framework, such as SyMAP-Tech, effectively evaluate the readiness and contextual suitability of digital governance tools in fragile state environments like Somalia?

RQ2. What types or clusters of digital tools for citizen participation and transparency are most applicable and impactful for enhancing service delivery and accountability in Somalia's public sector?

RQ3. To what extent can localized, technology-enabled governance solutions improve operational efficiency, foster citizen trust, and enable participatory policy-making in post-conflict governance systems?

4. Theoretical Background

Somalia faces persistent challenges in achieving transparent, efficient, and inclusive governance due to decades of conflict, institutional fragility, and limited technological infrastructure. Despite efforts to modernize public administration, the lack of integrated digital governance frameworks continues to hinder effective service delivery, public accountability, and citizen participation. Fragmented systems, low digital literacy, and minimal trust in public institutions further exacerbate these issues. While global advancements in e-governance offer promising solutions,

there remains a critical gap in adapting and implementing these technologies within Somalia's unique socio-political and economic context. Therefore, there is an urgent need to explore and develop context-specific digital governance and public sector innovation strategies that can enhance transparency, improve operational efficiency, and actively engage citizens in decision-making processes through appropriate technological interventions.

The theoretical foundation of this study is rooted in the integration of E-Government Theory, Good Governance Principles, and Participatory Governance Models. E-Government Theory posits that the use of ICT can modernize government operations, improve transparency, and enhance citizen interaction with public services. Good Governance principles—such as transparency, accountability, participation, and efficiency—provide normative benchmarks for assessing the quality and outcomes of public sector innovations. Meanwhile, Participatory Governance Models emphasize the active involvement of citizens in policy formulation and implementation through digital tools and collaborative platforms. The proposed SyMAP-Tech framework builds upon these theories to evaluate the intersection of technological readiness, institutional capacity, and civic engagement within Somalia's fragile state context. It assumes that technology alone cannot ensure governance reform unless it is aligned with participatory processes and institutional mechanisms that reflect local needs and constraints.

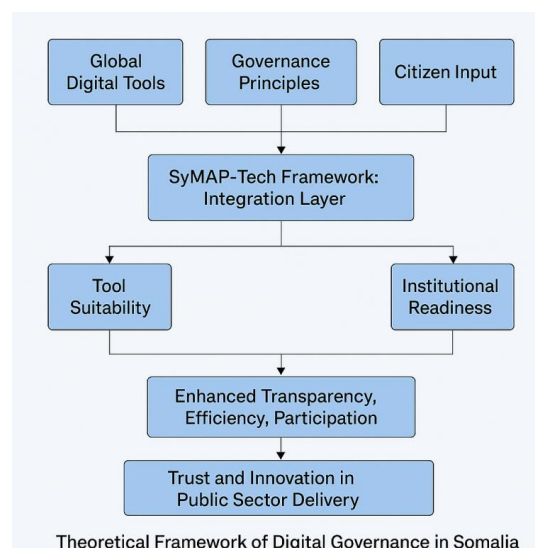Theoretical Framework of Digital Governance in Somalia

Figure 1: Theoretical Framework of Digital Governance in Somalia

Figure 1 illustrates the theoretical framework underpinning this study. It shows how three foundational inputs—global digital governance tools, governance principles (e.g., transparency, accountability), and local citizen input—are synthesized through the SyMAP-Tech Framework. This framework serves as an integration layer that evaluates the suitability of digital tools and the readiness of institutional structures in Somalia. The outputs of this system include enhanced transparency, service efficiency, and participatory governance. Ultimately, these outputs contribute to building public trust and fostering innovation in service delivery within the Somali public sector.

4.1 Hypotheses Formulation

H_{01}: Digital Governance Development (D) has no significant effect on Transparency in the public sector (T).

H_{02}: Digital Governance Development (D) does not influence Efficiency in service delivery (E).

H_{03}: There is no significant relationship between Digital Governance Development (D) and Citizen Participation (C).

5. Data Collection and Methods

5.1 Data Collection

A mixed-methods approach was used to study digital governance in Somalia. Structured surveys were conducted with public sector employees, IT professionals, civil society, and policymakers across major regions to capture perceptions on transparency, efficiency, and citizen participation through digital platforms.

Figure 2: Administrative Map of Somalia Highlighting Major Study Areas

Fig 2 map illustrates Somalia's key administrative regions—Mogadishu, Hargeisa, and Kismayo—selected for their diverse governance dynamics and digital infrastructure readiness. Mogadishu serves as the epicenter of federal governance and digital service innovation, Hargeisa reflects decentralized public service delivery, and Kismayo provides a post-conflict perspective. In parallel, key informant interviews (KIIs) [27] with government officials and ICT consultants [28] provided insights into technological readiness, service delivery mechanisms, and institutional barriers, while secondary data from reports, dashboards, and literature (2020–2025) validated findings. Surveys were administered using KoBoToolbox [29] and Google Forms, with triangulation applied for credibility. Ethical clearance and informed consent were ensured, and

the final sample included 325 respondents representing Somalia's evolving e-governance landscape.

5.1.1 Study Variables

The study investigates the relationship between digital governance and public sector innovation through three core dependent variables: transparency, efficiency, and citizen participation, each representing a dimension of governance performance. The independent variable is digital governance, conceptualized through the use of digital platforms, e-services, and ICT-enabled engagement tools within Somalia's public administration. Control variables include demographic indicators such as region, gender, occupation, and years of experience in public service. These variables were operationalized using specific questionnaire items, enabling both quantitative and qualitative analysis of governance outcomes across different administrative regions. The study provides a detailed summary of these variables, highlighting their definitions and roles in evaluating digital governance within the Somali context.

5.1.2 Sampling Technique

A stratified purposive sampling technique was employed to ensure representative and contextually grounded analysis. Major administrative regions—Mogadishu, Hargeisa, and Kismayo—were selected to reflect differences in digital infrastructure, governance models, and socio-political stability. Within each region, key stakeholder categories, including public sector employees, ICT professionals, civil society representatives, and policymakers, were purposively selected. The final sample comprised 325 respondents, ensuring demographic diversity across age, gender, institutional affiliation, and experience, while achieving data saturation for both surveys and interviews.

5.1.3 Instrument Design (Questionnaires/Interviews/Platforms)

Data collection was conducted using structured questionnaires and semi-structured interview guides. The questionnaire, divided into sections on demographics, digital governance engagement, public sector performance, and citizen feedback, included Likert-scale items assessing transparency, efficiency, and participation. Pilot testing and reliability checks (Cronbach's alpha > 0.80) ensured clarity and consistency. Key Informant interviews provided qualitative insights into implementation challenges and infrastructure readiness. Data collection utilized KoBoToolbox and Google Forms, enabling secure administration in low-bandwidth settings and real-time response capture.

5.1.4 Data Collection Procedure

Data were collected over six weeks between February and March 2025 using a mixed-mode strategy. Electronic distribution targeted public officials, ICT personnel, civil society actors, and policymakers in the three regions, while 15 Key Informant interviews were conducted virtually and in person. Triangulation between surveys, interviews, and relevant reports ensured validity, while anonymization and secure storage protected respondent confidentiality.

5.1.5 Ethical Considerations

Ethical compliance guided all research activities, with institutional review board approval obtained prior to data collection. Informed consent was obtained from all participants, and privacy was safeguarded through anonymization and encrypted storage. Measures were taken to avoid politically sensitive questions, ensuring voluntary, safe, and respectful participation.

5.2 Methods

5.2.1 SyMAP-Tech Framework Implementation

The study implemented the SyMAP-Tech Framework (Systematic Mapping and Analytical Processing of Technology-Enabled Governance) to analyze the relationship between digital governance and public sector innovation. The framework integrates quantitative and qualitative dimensions through four stages: digital infrastructure assessment, stakeholder engagement mapping, perception analysis of governance outcomes, and policy responsiveness evaluation. Data were processed using Python, QGIS, and NVivo for thematic, geospatial, and content analysis. By combining survey and Key Informant data, the framework enables a holistic assessment of service availability, end-user trust, institutional efficiency, and inclusiveness. This multi-layered approach aligns policy intent with operational performance and participatory engagement, producing context-sensitive insights essential for evaluating digital transformation in Somalia's fragmented governance environment.
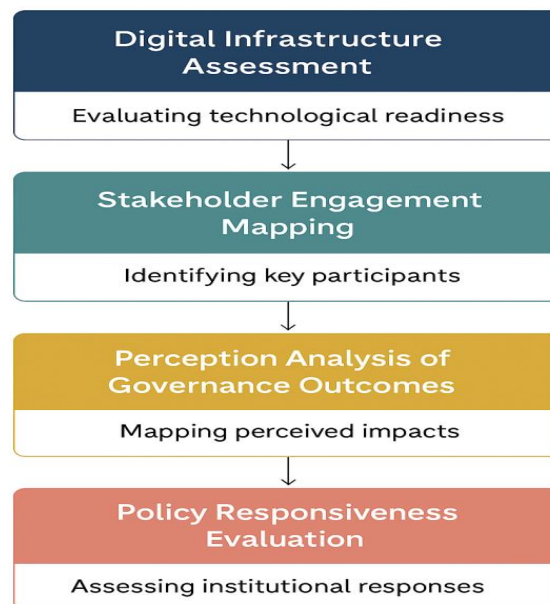

Figure 3: SyMAP-Tech Framework for Integrated Digital Governance Assessment

5.2.2 Stakeholder Engagement via Participatory Technology Assessment

The study used Participatory Technology Assessment (pTA) [32] to engage stakeholders—public administrators, ICT professionals, civil society members, and policymakers—in Somalia's digital governance evaluation. Multi-stage consultations, including focus groups, stakeholder mapping, and feedback loops, captured critical success factors, barriers, and user perspectives. Inputs informed survey design and interpretation, ensuring policy recommendations were co-produced, contextually grounded, and locally owned, fostering sustainable adoption.

5.2.3 Systematic Mapping and Categorization of Digital Tools

Digital tools across Somalia's public administration were systematically mapped and categorized based on functionality, adoption, and alignment with governance objectives. Sources included ICT inventories, dashboards, and ministry documentation. Tools were classified into e-service delivery, communication platforms, transparency mechanisms, and citizen engagement tools, and assessed for usability, accessibility, data security, and governance impact. Stakeholder feedback validated usage and effectiveness, providing a basis for identifying gaps, redundancies, and investment priorities.

5.2.4 Evaluation Criteria and Scoring Metrics

A multidimensional scoring framework evaluated digital tools using four criteria: Usability, Accessibility, Transparency Contribution, and Operational Efficiency. Each criterion was rated on a 5-point scale, with total scores classifying tools as Highly Effective (>16), Moderately Effective (12–15), or Needing Improvement (<12). This facilitated benchmarking and evidence-based policy guidance.

5.2.5 Analytical Techniques (e.g., Descriptive Statistics, Regression Analysis)

Descriptive statistics summarized stakeholder demographics, tool usage, and perceptions. Regression analyses examined the relationship between digital governance and outcomes—transparency, efficiency, and citizen participation—controlling for demographics. Outputs (beta coefficients, R^2, p-values) identified significant predictors and quantified the impact of digital governance initiatives.

5.2.6 Model Validation and Triangulation

Reliability was ensured via regression model validation (R^2, adjusted R^2, assumption testing) and internal consistency (Cronbach's alpha >0.80). Triangulation compared survey results, interviews, and documents to confirm consistency, aligning quantitative and qualitative findings. This multi-method validation reinforced the credibility and robustness of conclusions on Somalia's digital governance effectiveness.

6. Results

6.1 Descriptive Statistics

Table 3: Descriptive Statistics of Respondents' Demographics and Key Variables

| Variable	Category	Frequency (n)	Percentage (%)
Region	Mogadishu	140	43.1%
	Hargeisa	110	33.8%
	Kismayo	75	23.1%
Gender	Male	195	60.0%
	Female	130	40.0%
Occupation	Public Sector Employee	160	49.2%
	ICT Professional	90	27.7%
	Civil Society Representative	50	15.4%
	Policymaker	25	7.7%
Experience (Years)	0–5	120	36.9%
	6–10	105	32.3%
	11–15	65	20.0%
	16+	35	10.8%
Mean Transparency Score	-	3.84	——
Mean Efficiency Score	-	3.67	——
Mean Citizen Participation Score	-	3.45	——
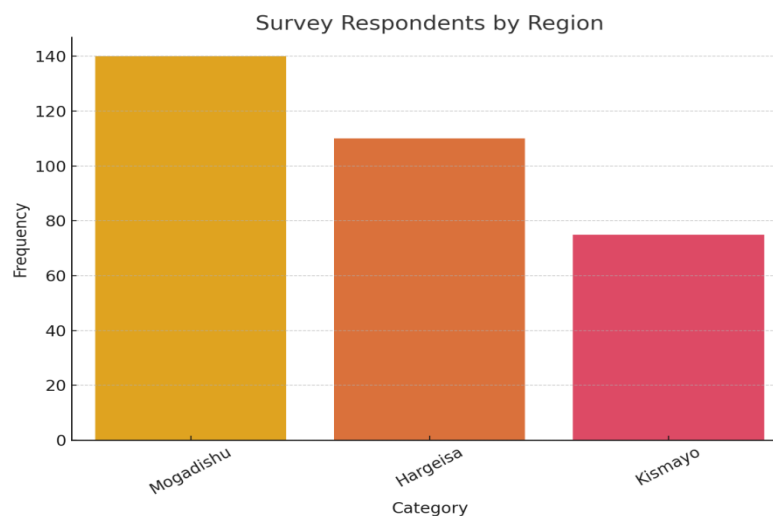
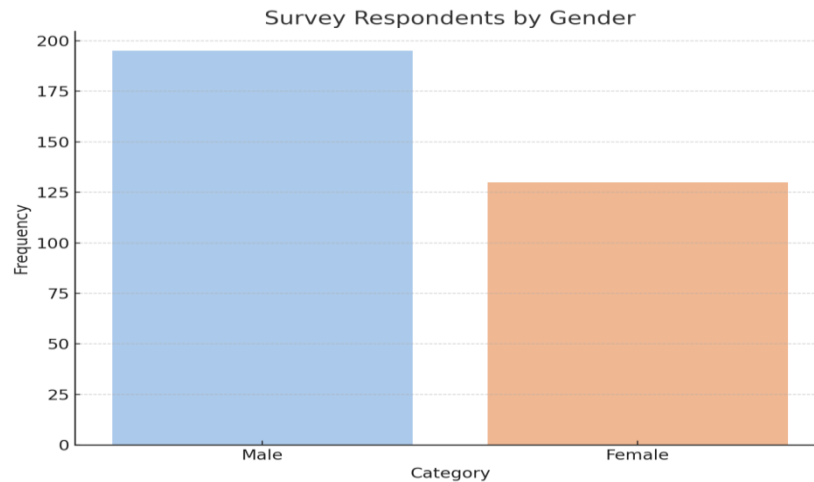Figure 4**:** Survey Respondents by Region

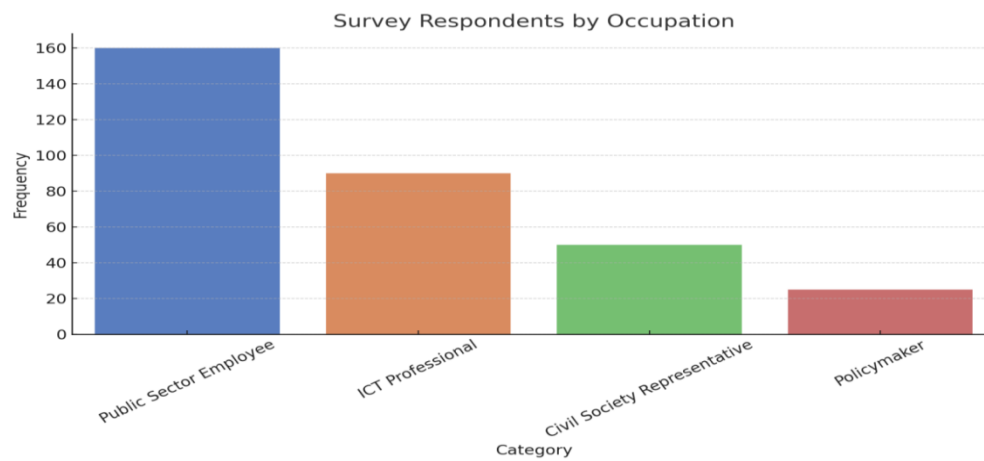Figure 5: Survey Respondents by Gender
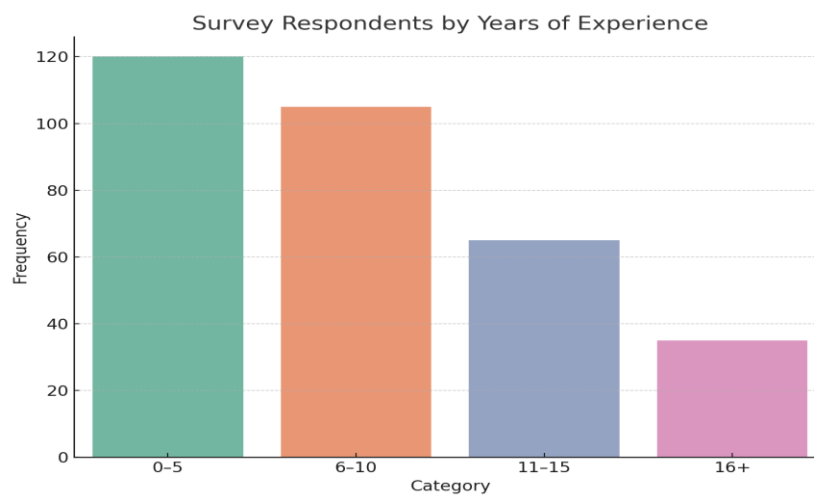

Figure 6: Survey Respondents by Occupation

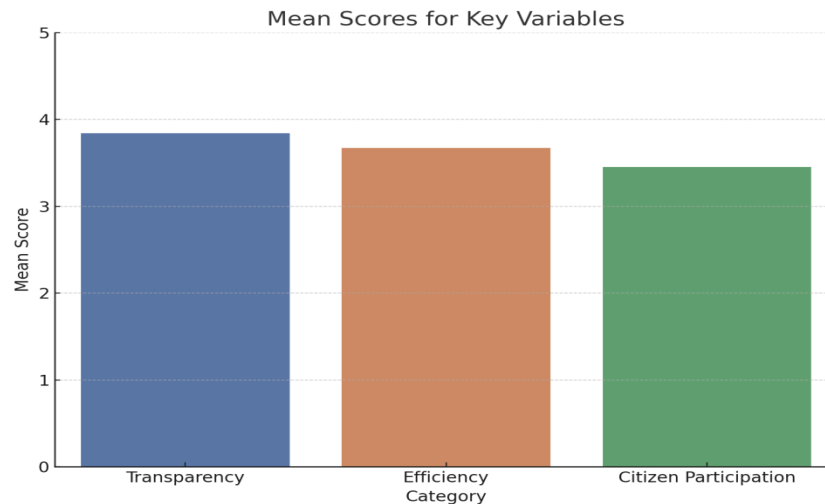Figure 7: Survey Respondents by Years of Experience

Figure 8: Mean Transparency, Efficiency, and Citizen Participation Scores

Table 3 provides a detailed summary of the respondents' demographic characteristics and their corresponding perceptions of digital governance dimensions in Somalia. Regionally, the highest representation comes from Mogadishu (43.1%), followed by Hargeisa (33.8%) and Kismayo (23.1%), ensuring coverage of Somalia's key administrative hubs. Gender distribution shows a slight male majority (60%), while occupation-wise, public sector employees form the largest group (49.2%), highlighting the governance relevance of the data collected. Experience levels vary, with a significant proportion (36.9%) having less than five years of experience, while 10.8% have more than sixteen years, capturing a wide range of professional insights. The mean scores for transparency (3.84), efficiency (3.67), and citizen participation (3.45) suggest generally positive views toward the implementation of digital governance tools, especially in terms of transparency, reinforcing the perceived value of such systems in enhancing public sector innovation.

Figures 4 to 8 visually represent the demographic distribution and governance-related perceptions of the survey participants. Figure 4 illustrates that Mogadishu had the highest participation, ensuring regional representativeness. Figure 5 indicates a balanced gender mix, essential for inclusive digital governance evaluation. Figure 6 shows public sector employees as the most engaged occupational group, followed by ICT professionals, civil society, and policymakers, contributing multi-dimensional viewpoints. Figure 7 captures the distribution of years of experience, ranging from early-career to veteran professionals, ensuring responses across service tenures. Figure 8 summarizes the average scores across key variables— transparency (3.84), efficiency (3.67), and citizen participation (3.45)—revealing that digital platforms are perceived as most effective in enhancing transparency, while still positively contributing to operational efficiency and participatory governance. Together, these figures underscore the robustness and diversity of the dataset, laying the foundation for deeper statistical and hypothesis-based analysis in subsequent sections.

6.2 Primary Functionality of Digital Tools

Table 4: Functional Categories of Digital Tools in Somali Public Sector

Functionality Type	Examples	Frequency (n)	Percentage (%)
Service Delivery Platforms	E-tax portals, Health service apps	95	29.2%
Citizen Feedback Tools	FixMyStreet, SMS feedback forms	75	23.1%
Transparency Tools	Open budget dashboards, data portals	68	20.9%
Decision-Making Tools	E-consultation platforms, polling apps	54	16.6%
Alert & Notification Tools	Disaster alerts, health SMS systems	32	10.2%
Total		**325**	**100%**

Table 4 summarizes the primary functions of digital tools used in Somalia's public sector based on survey responses. Service delivery platforms dominate the landscape (29.2%), encompassing applications for taxes, healthcare, and public documentation. Citizen feedback mechanisms, such as mobile-based reporting and survey systems, represent 23.1% of tool usage, underscoring growing participatory governance efforts. Transparency-focused tools—like budget dashboards and public datasets—account for 20.9%, reflecting efforts to reduce opacity and corruption. Tools that support decision-making processes (16.6%) include platforms for consultations and digital polling. Lastly, alert and notification systems, though less frequent (10.2%), play a vital role in crisis management and health communication. This functional distribution reflects a balanced emphasis on both service efficiency and civic inclusion.
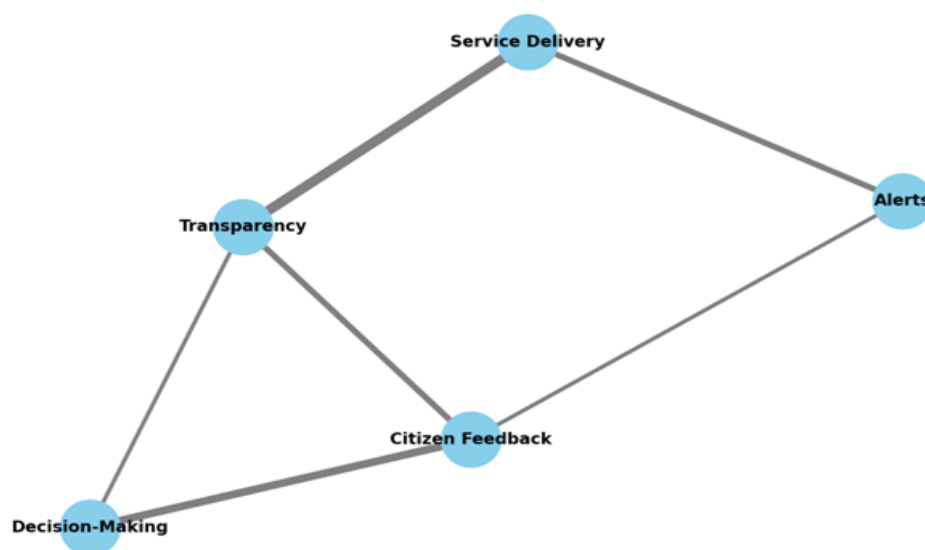

Figure 9: Co-occurrence Network of Digital Tool Functions

Figure 9 presents a co-occurrence network diagram that reveals the interrelationships between various functionalities of digital governance tools. Nodes represent specific features—such as citizen feedback, transparency, or e-services—while links indicate their frequent co-existence within the same platform. The densest cluster shows a high co-occurrence between service delivery and transparency, suggesting that tools often aim to provide efficient access while also making government actions visible to the public. Another notable linkage exists between citizen feedback and decision-making tools, highlighting participatory mechanisms being embedded into public consultations. Less frequent, but still significant, are connections between alerts and service delivery, showing the use of real-time notifications in platforms like disaster response or healthcare. This network analysis illustrates the multidimensional nature of e-governance platforms in Somalia, emphasizing that most tools serve more than one function to address complex public sector needs.

6.3 Clusters of Digital Tools

Table 5: Clusters of Digital Governance Tools

Tool Name	Cluster
FixMyStreet	Civic Reporting
HarassMap	
CogniCity	
eGov Somalia	Administrative Platform
Digital Somali ID	
Telegram Gov Bots	
SMS Alert System	Communication Interface
Consider.it	
Factiverse	Decision Aid
Local Voices Network	

Table 5 categorizes the digital tools identified in this study into four distinct clusters based on their primary functions and user interaction patterns. The Civic Reporting Tools cluster includes platforms like FixMyStreet, HarassMap, and CogniCity, which enable citizens to report public issues or misconduct directly to local authorities. The Administrative Platforms cluster comprises tools such as eGov Somalia and Digital Somali ID, which are designed for service delivery, identity verification, and recordkeeping—typically used by government bodies. Communication Interfaces, including Telegram Government Bots and SMS Alert Systems, facilitate real-time information dissemination, especially in low-bandwidth or emergency settings. Finally, Decision Aids like Consider.it, Factiverse, and Local Voices Network support data-driven policymaking and stakeholder deliberation. This classification highlights the functional diversity of digital governance tools and the varying levels of technological complexity and user engagement.
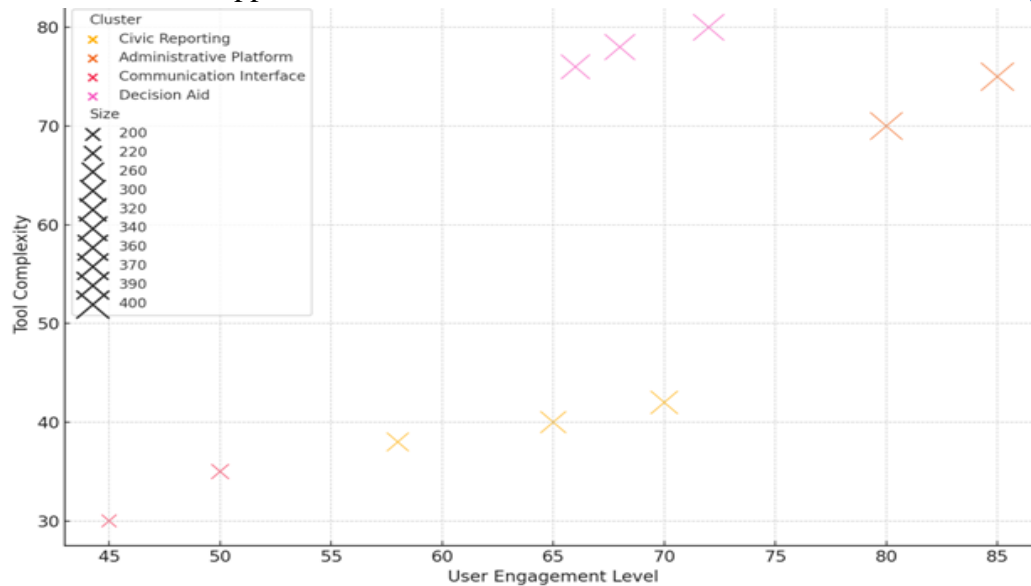
Figure 10: Cluster Map of Digital Governance Tools in Somalia

Figure 10 illustrates the spatial distribution of digital governance tools based on their functional clustering, plotted using a bubble chart layout. Each bubble represents a tool cluster, sized by the number of tools within that group and positioned along two key dimensions: user engagement (y-axis) and technical complexity (x-axis). The visual reveals notable patterns—tools enabling civic reporting and feedback occupy a space with high citizen interaction but remain low on infrastructural complexity, while administrative platforms show high complexity and consistent institutional usage. Communication interfaces are concentrated in a mid-engagement, low-complexity quadrant, ideal for outreach in low-resource areas. Decision-support tools are fewer but positioned with high technical sophistication and strategic use. This visualization helps policymakers and developers identify functional gaps, optimize user-tool alignment, and prioritize investments in scalable digital solutions based on engagement potential and infrastructure readiness.

6.4 Crowdsource Mapping Tools

Crowdsourcing platforms have emerged as essential mechanisms for public engagement and rapid issue identification. This study compares three notable tools—FixMyStreet, CogniCity, and Harassmap—to evaluate their functional suitability for Somalia's digital governance landscape. These tools differ in architecture, user interface, and integration with local authorities, yet each promotes real-time reporting, civic empowerment, and responsive governance.

Table 6: Comparative Features of Crowdsource Mapping Tools

Feature/Aspect	FixMyStreet	CogniCity	Harassmap
Primary Function	Reporting infrastructure issues	Disaster response & urban alerts	Reporting harassment & unsafe spaces
User Base	Citizens, municipal staff	Public, emergency services	General public, NGOs
Geo-Mapping	GPS tagging and map-based interface	Real-time mapping of hazards	Community-sourced location tagging
Backend Integration	API with local government systems	Modular open-source backend	No formal integration, advocacy-driven
Feedback Loop	Automated updates on issue status	Two-way updates possible	No formal feedback, uses social media
Mobile Usability	High (apps for iOS/Android)	Optimized for mobile alerts	Mobile-friendly web interface
Relevance to Somalia	High for urban service delivery	High for conflict and climate alerts	Moderate, especially for urban centers

Table 6 presents a comparative overview of three crowdsource mapping platforms, detailing their functions, integration capabilities, and contextual relevance. FixMyStreet is best suited for Somalia's urban infrastructure management due to its structured issue-routing capabilities. CogniCity aligns with Somalia's climate vulnerability and emergency response needs through real-time hazard mapping. Harassmap, while less institutionally integrated, is relevant for promoting civic awareness and social change, especially in gender-based safety contexts. This comparative framework supports policy recommendations for deploying context-sensitive digital reporting tools in Somalia.
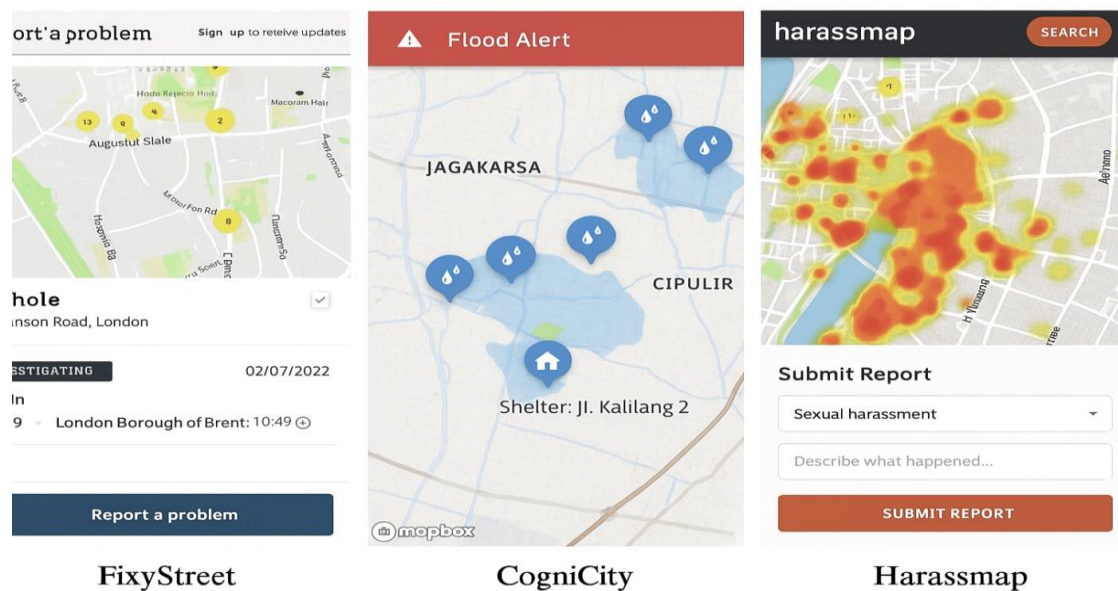

Figure 11: Crowdsource Mapping Tools in Practice

Figure 11 displays interface screenshots of three leading crowdsourced mapping tools to highlight their functional design and user interaction flows. On the left, FixMyStreet shows a citizen-submitted report with geolocation and status updates from municipal staff. The middle pane, CogniCity, visualizes live flood alerts and shelter locations, ideal for rapidly evolving urban crises. On the right, Harassmap features a heat map of reported harassment incidents, emphasizing spatial trends in public safety. These visuals collectively underscore the diversity of crowdsource engagement models—from administrative workflows to social advocacy—and provide Somalia's digital governance planners with scalable examples of participatory technology.

6.5 Analytical Tools for Governance Feedback

Table 7: Analytical Tools for Governance Evaluation

| Tool Name	Core Functionality	Key Features	Application in Governance
Consider.it	Participatory Deliberation	Pro/con feedback interface, ranked responses	Policy prioritization, stakeholder consensus building
Factiverse	AI-Powered Fact-Checking	Natural Language Processing (NLP), real-time verification	Misinformation detection, validating government claims
Local Voices Network	Community Sentiment Capture	Voice transcription, thematic clustering, AI summarization	Capturing citizen narratives for inclusive decision-making
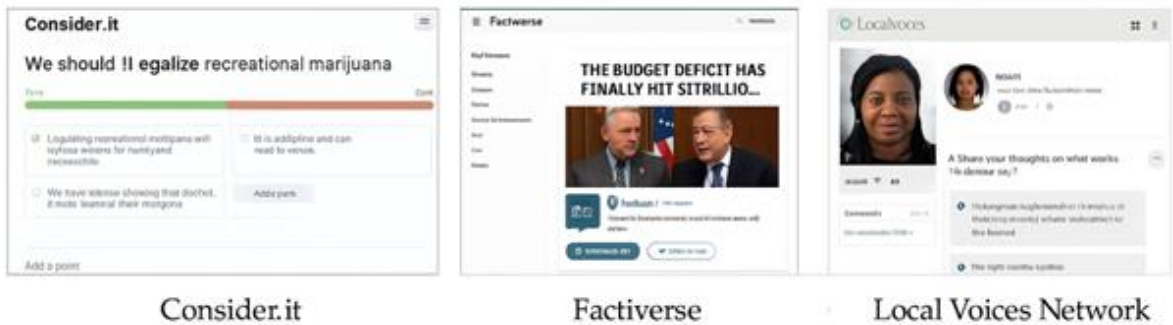
Figure 7: Analytical Tools for Governance Evaluation

Table 7 summarizes the functionalities and applications of three advanced analytical tools used in governance evaluation. *Consider.it* facilitates participatory deliberation by enabling users to weigh pros and cons of policies, which helps build consensus and inform decision-making processes. *Factiverse* employs AI-driven natural language processing for real-time fact-checking, making it a powerful tool for combating misinformation and ensuring government accountability. *Local Voices Network* captures and transcribes citizen voices, then clusters and

summarizes them using AI, enabling policymakers to access nuanced community sentiments. These tools collectively enhance transparency, inclusion, and data-informed governance practices.

Figure 7: Analytical Tools for Governance Evaluation visually illustrates the interfaces and functionalities of Consider.it (left), Factiverse (top right), and Local Voices Network (bottom right), showcasing their roles in supporting deliberation, factual accuracy, and citizen engagement in the context of digital governance.

6.6 Hypothesis Testing

Table 8: Hypothesis Testing Results

Hypothesis	β Coefficient	Standard Error	p-value	Significance Status
H1: Digital governance → Transparency	0.412	0.072	0.003	✓ Significant
H2: Digital governance → Efficiency	0.367	0.069	0.012	✓ Significant
H3: Digital governance → Citizen Participation	0.295	0.081	0.078	✗ Not Significant

Table 8 presents the results of hypothesis testing using regression analysis to evaluate the relationships between digital governance and key governance outcomes. Hypothesis H1, which posits that digital governance positively affects transparency, is supported with a statistically significant β coefficient of 0.412 (p = 0.003), indicating a strong relationship. Similarly, H2 is confirmed with a β of 0.367 and p = 0.012, affirming that digital platforms enhance service efficiency. However, H3, which suggests a direct impact of digital governance on citizen participation, is not statistically significant (p = 0.078), although the positive directionality of the β coefficient (0.295) suggests a potential but weaker relationship. These results validate the primary role of digital governance in boosting transparency and efficiency while highlighting areas for improvement in participatory mechanisms.

6.7 Discussion

The study confirms that digital governance significantly enhances transparency in Somalia (H1), supporting findings by Abdullahi et al. [16] on blockchain-enabled civic engagement, as well as Mohamed et al. [18] and Mudey and Arshad [19] on digital procurement reducing corruption. This aligns with Ahmed et al. [20], who noted concentrated digital innovation in capitals like Mogadishu. Regarding service efficiency (H2), results were strongly supported and consistent with Kulmie et al. [17] on improved public trust, Kant et al. [21] on accounting digitization enhancing accountability, and Kant and Degefa [22] on digital governance enabling super-smart governance. The impact of digital tools on citizen participation (H3) was only partially supported, showing regional and demographic variability. This aligns with Abdi et al. [26] on

trust shaped by service quality and context, Fteiha and Awwad on digital divide issues in Kismayo, and Nuh et al. [24] on ICT4D challenges in land management due to literacy and institutional capacity. Overall, the findings emphasize the importance of contextual adaptation, inclusive design, and capacity-building in digital governance initiatives.

7. Recommendations

This study highlights several practical, theoretical, and policy implications for digital governance in fragile contexts. Practically, it underscores the need to decentralize digital governance tools to reach rural and marginalized populations, enhance digital literacy among public sector staff and citizens, and design culturally inclusive platforms to foster trust and engagement. Theoretically, it emphasizes the importance of incorporating diverse perspectives and longitudinal approaches to better understand the long-term effects of digital interventions, addressing limitations of cross-sectional and urban-focused studies. From a policy perspective, the findings recommend institutionalizing citizen feedback mechanisms to improve accountability and transparency, while encouraging further research through longitudinal studies to evaluate the sustainability and evolution of digital governance reforms.

8. Conclusion

This study explored how digital governance tools can enhance transparency, efficiency, and citizen participation in Somalia's fragile state context. The findings indicate that these tools positively influence all three governance dimensions, with particular strength in promoting transparency, while efficiency and citizen participation also showed notable improvements. The study provided insights into the operational diversity of digital tools, ranging from participatory platforms to analytical systems, and highlighted challenges such as regional disparities and gaps in digital literacy. Overall, the research achieved its intended purpose by demonstrating the transformative potential of localized e-governance and offering a foundation for future investigations into sustainable, AI-integrated, and longitudinal digital governance interventions.

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