The Practice of Smart City Governance in Developing Countries: Comparative Insights from Technology, People, and Institutional Perspectives

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Abstract

This paper explores the governance of smart cities in developing countries through a comparative analysis using technology, people, and institutional perspectives. While smart cities have been promoted globally as engines of innovation, sustainability and improved governance their realization in developing countries context remains challenged by infrastructural gaps, governance limitations, and socio-economic disparities. Drawing on recent scholarly literature (2015–2025), the study examines how technology-driven initiatives, citizen engagement, and institutional arrangements shape the trajectory of smart city projects in different developing regions. Findings reveal that while technology adoption is critical, people-centered inclusivity and institutional robustness remain equally indispensable for effective governance. The paper concludes with policy recommendations aimed at strengthening the integration of these dimensions to promote sustainable, inclusive, and resilient urban governance.

Keywords: *Smart cities, Governance, Technology, Institutions, Developing countries, Comparative analysis*

Introduction

The 21st century has witnessed the rapid urbanization of developing countries, bringing new challenges for governance, sustainability, and service delivery (UN-Habitat, 2020). Smart cities defined broadly as urban areas that leverage digital technologies and data-driven solutions to improve governance and quality of life, have emerged as a strategic response to these challenges (Albino, Berardi, and Dangelico, 2015). However, their governance is complex, requiring not only technological infrastructure but also strong institutional frameworks and citizen engagement (UN-Habitat, 2020). This paper situates smart city governance within developing contexts, where structural inequalities, resource constraints, and governance inefficiencies intersect with opportunities for digital transformation (Satterthwaite and Mitlin, 2020). By adopting a comparative lens, the study analyzes how technology, people, and institutions interact in

shaping smart city governance trajectories across seven selected developing countries.

This study adopts a comparative perspective, examining smart city governance across Rwanda, Kenya, Morocco, Ghana, Nigeria, South Africa and Ethiopia. These countries have adopted varying strategies for smart urban development, yet all face common challenges of translating digital innovations into equitable and sustainable urban outcomes. Using the framework of technology, people, and institutions (Nam and Pardo, 2011), this paper analyzes how different governance models enable smart city development in Africa. Hence, the study aims to answer the following research questions:

- How do technological infrastructures and innovations support smart city initiatives in African countries?
- In what ways are people engaged in and affected by smart city governance?
- How do institutional frameworks shape the design, implementation, and sustainability of smart city projects?

Literature Review

Theoretical and Conceptual Foundations of Smart City

The theoretical foundation of Smart Cities is rooted in the integration of technology, governance, and urban development to enhance the efficiency, sustainability, and livability of urban spaces (Liu, 2023). Drawing on systems theory, urban planning, and ICT, Smart Cities are conceptualized as complex, adaptive systems where data-driven decision-making enables optimized resource management, improved public services, and enhanced citizen engagement (Gorelova, 2024). Key theoretical frameworks emphasize the interaction between physical infrastructure, digital networks, and social systems, highlighting the role of technological innovation in shaping urban processes, facilitating real-time monitoring, and supporting evidence-based governance (Liu, 2023).

Conceptually, Smart Cities represent a shift from traditional urban management toward an inclusive, participatory, and knowledge-driven model of city development (Albino, Berardi and Dangelico, 2015). Central to this concept is the notion that cities can leverage human capital, digital platforms and institutional capacities to promote sustainable growth, social equity, and economic competitiveness (Gorelova, 2024). The concept emphasizes five core dimensions smart governance, smart economy, smart mobility, smart environment, and smart people which collectively support the overarching goal of creating resilient, citizen-centric urban ecosystems (Araral, 2020). By linking technological capabilities with societal needs, the conceptual framework underscores that successful Smart City initiatives require both technological

infrastructure and active citizen participation for long-term sustainability (Nam and Pardo, 2011).

Smart City Governance in Developing Countries

Smart city governance in developing countries represents a multi-dimensional effort to integrate technology, people, and institutional frameworks in order to address rapid urbanization, governance inefficiencies, and socio-economic inequalities (UNESCAP, 2021). The concept of smart cities extends beyond the mere adoption of digital technologies; it emphasizes citizen-centered governance, participatory decision-making, and institutional capacity building (Nam and Pardo, 2011). Recent studies highlight that while technological innovations such as IoT, big data, and AI provide essential tools for enhancing urban services; their effectiveness depends heavily on robust governance structures and inclusive policies that ensure equitable access to resources (Araral, 2020). In contexts like Africa, Asia, and Latin America, smart cities governance remains challenged by limited infrastructure, policy fragmentation, and weak institutional frameworks, yet these regions also exhibit significant opportunities to leapfrog traditional development barriers by adopting scalable digital solutions (Bibri and Krogstie, 2020).

Comparative insights from developing countries reveal that people-centered governance is as critical as technological adoption (Tan and Taeihagh, 2020). Smart city initiatives that fail to prioritize inclusivity, transparency, and citizen participation often reinforce existing inequalities rather than bridging them. Strong institutional frameworks, backed by coherent policies and adaptive governance models, are required to integrate technology effectively into urban management (Anthopoulos, 2017). Evidence from countries such as India, Kenya, and Brazil suggests that when governments foster collaborative ecosystems involving private actors, civil society and local communities, smart cities achieve greater sustainability and resilience (Tan and Taeihagh, 2020).

Smart cities have emerged as a central paradigm in addressing rapid urbanization, climate challenges, and demands for sustainable development (UNESCAP, 2021). While the concept has been interpreted in multiple ways, Nam and Pardo (2011) proposed a foundational framework that conceptualizes smart cities across three interconnected dimensions: technology, people, and institutions. This framework remains influential in understanding how cities can leverage digital innovation, citizen engagement, and governance reforms to transform urban spaces. Hence, successful smart city governance in developing contexts demands balance between technological innovation, citizen empowerment, and institutional reform to build inclusive, adaptive and future-ready urban systems.

Technology Dimension

The technological dimension represents the backbone of smart cities, enabling efficiency, automation, and real-time urban management (Wang et al., 2021). Information and Communication Technologies, Internet of Things (IoT), artificial intelligence and big data analytics are increasingly used to monitor traffic, manage energy consumption, optimize waste management, and improve public safety (UNESCAP, 2021). Recent studies highlight how 5G networks and edge computing are accelerating smart city functions by enhancing data processing and connectivity (Wang et al., 2021). However, technology alone does not make a city smart; its effectiveness depends on integration with human and institutional systems.

People Dimension

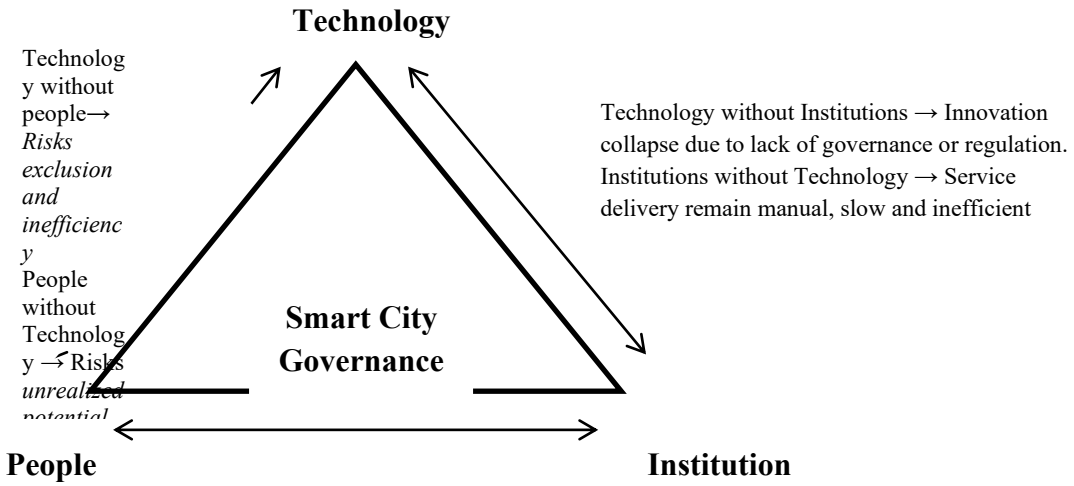
The people dimension emphasizes the role of human capital, creativity, and digital literacy in smart city development (Albino et al., 2015). A city becomes 'smart' not only through technological deployment but also by fostering citizen engagement, social equity, and inclusive access to services (Nam andPardo, 2011). Active citizen participation in co-designing solutions increases public trust and ensures that innovations address real community needs (Albino et al., 2015). Moreover, social innovation and open data platforms empower communities to develop local solutions, bridging gaps in education, mobility, and healthcare (Nam and Pardo, 2011). Hence, without citizen buy-in and digital literacy, smart initiatives risk being ineffective or elitist.

Institutional Dimension

Institutions provide the governance, policies, and organizational capacity necessary to sustain smart city initiatives (Tan, 2020). Transparent governance frameworks, inter-agency coordination, and public-private partnerships are essential for integrating technologies into everyday life (Nam and Pardo, 2011). Recent literature emphasizes the importance of regulatory frameworks that protect data privacy, ensure cyber security, and standardize interoperability across systems (Mora et al., 2017). Strong institutions also ensure that investments are equitable and sustainable, preventing the creation of 'digital divides' between affluent and marginalized communities (Tan, 2020). Thus, governance and institutional arrangements are critical to align technology and people for long-term urban resilience.

Conceptual Framework

The triangular conceptual framework adopted in this study provides a robust analytical model for examining smart city governance in developing countries. It positions Technology, People, and Institutions at the three vertices of a triangle, with effective and sustainable smart city governance located at the intersection. This visualization highlights both the interdependence and the tensions among the three dimensions.



Methodology

This study employ n using secondary data sources to analyze smart city governance across selected developing countries. The comparative approach is particularly suited for capturing variations and commonalities across national contexts, as it allows for the systematic evaluation of smart city initiatives in relation to technology, people, and institutional dimensions. Seven countries (Rwanda, Kenya, Morocco, Ghana, Nigeria, South Africa, and Ethiopia) were selected based on active engagement in smart city projects or digital urban transformation programs between 2015 and 2025, representation of different regions of Africa and diverse governance and economic contexts as well as availability of secondary data (policy documents, scholarly articles, government reports, and project evaluations).

Data for this study were drawn from secondary sources, including peer-reviewed scholarly articles (2015–2025), government policy documents and smart city master plans, reports from international organizations (World Bank, UN-Habitat, ITU, African Development Bank) and reputable news and practitioner sources documenting project progress and challenges. The study used a three-dimensional analytical framework (technology, people, and institutions) adapted from Nam and Pardo (2011) and subsequent refinements in smart city literature. Each dimension was operationalized as Technology Dimension (ICT

infrastructure, interoperability, e-services, smart mobility, and data systems), People Dimension (Digital literacy, citizen engagement, inclusion, equity, and human capital development) and Institutional Dimension (Governance frameworks, PPPs, regulations, financing, and intergovernmental coordination). A structured content analysis was conducted, where all collected materials were coded according to these three dimensions. Patterns of convergence and divergence across cases were identified to enable comparative insights.

Comparative Analysis and Discussions

Technology Dimension

Rwanda has made significant strides in developing technological infrastructure to support smart city initiatives, particularly in Kigali. The country has established a nationwide 4G LTE network, expanded broadband coverage, and developed ICT hubs such as the Kigali Innovation City (KIC). KIC is a master-planned innovation city situated on 60 hectares of land in Kigali, aiming to facilitate the development of pan-African talent and act as a technology innovation hub (Rwanda Ministry of ICT and Innovation, 2022). In Kigali, smart transport solutions include digital bus ticketing, traffic monitoring systems, and intelligent street lighting. Public buses in Kigali are being fitted with free Wi-Fi and contactless payment terminals from a Rwandan company called Tap'n'Go. These initiatives are part of the Smart Kigali initiative, which aims at modernizing the lifestyle of Kigali City dwellers and visitors through the use of ICT for better service delivery (Rwanda Ministry of ICT and Innovation, 2022).

The deployment of drones for medical supply delivery, such as Zipline, demonstrates Rwanda’s innovative use of technology to address public service gaps. Zipline operates distribution centers in Rwanda, delivering medical supplies by drone, including vaccines, blood, and medicines, to hospitals and health centers across the country. This service has significantly improved the efficiency of medical supply distribution, particularly in remote areas (Khanna and Gonzalez, 2024).These developments illustrate how Rwanda leverages ICT and digital platforms to enhance efficiency and connectivity, aligning with the technology dimension of smart cities.

Kenya's approach to technology emphasizes the development of digital public infrastructure (DPI), ICT-enabled service delivery, and the establishment of smart-city hardware (Kenya National Digital Master Plan, 2022). KonzaTechnopolis, the nation's flagship smart-city project, embodies the ambition to create a modern, data-driven urban center featuring integrated operations centers, smart mobility solutions, and digital economies. Simultaneously, nationwide DPI initiatives, such as Huduma digital services, digital ID programs, and interoperable e-government platforms, support service

delivery across urban areas (Kenya Digital Economy Acceleration Project, 2023). These investments highlight Kenya's strengths in mobile-led innovation and public-sector digitalization. However, they also reveal challenges related to interoperability, financing, and ensuring that large-scale projects translate into equitable local services.

In addition to infrastructure and service delivery, Kenya's smart city strategy emphasizes governance, data integration, and stakeholder collaboration. The Konza Technopolis project incorporates advanced urban management systems, including integrated operations centers that enable real-time monitoring of traffic, energy, and public services, reflecting a data-driven approach to city governance (Konza Technopolis Development Authority, 2025). National-scale digital initiatives such as Huduma services and digital ID programs facilitate interoperability across government departments, enabling more efficient and transparent service delivery. Nevertheless, scholars and practitioners have highlighted persistent challenges, including limited financial resources, coordination gaps among public and private actors, and the risk that high-tech urban investments may not fully reach marginalized populations (Kenya Digital Economy Acceleration Project, 2023). Addressing these challenges is critical to ensuring that Kenya's smart-city ambitions translate into equitable, sustainable, and inclusive urban development outcomes.

In Morocco, technological investments have focused on telecommunication upgrades, IoT pilots, and integrated platforms within designated smart-city zones. Zenata Eco-Cite, designed as an eco and smart campus near Casablanca, embeds smart water, energy, and mobility systems alongside GIS-based planning and building-energy management (Anteverti, 2016). Such projects demonstrate technology's enabling role for energy efficiency, traffic management, and e-services. However, Moroccan experience also illustrates common pitfalls: fragmentation of digital systems across agencies, vendor-driven 'tech-first' approaches, and limited system interoperability. Scholars caution that without interoperable standards, robust data governance, and cyber security measures, technological deployments risk under delivering public value and creating maintenance burdens (Munoth, 2022). Moreover, the absence of standardized data protocols and clear governance frameworks can hinder the seamless integration of various technological components, leading to inefficiencies and increased operational costs (SDG Local Action, 2023).

The technology component in Ghanaian cities focuses on expanding digital infrastructure, e-governance, and ICT-enabled service delivery (Boateng, 2022). The government has launched initiatives such as the Ghana Digital Agenda and e-Transform Ghana to digitize public services, while private operators have deployed mobile applications to support urban transport and digital payment

platforms. Projects like the Accra Smart City framework emphasize smart grids, digital waste management, and traffic control systems. Nonetheless, challenges remain in affordability, uneven internet access, and the interoperability of data systems, which limit the full realization of technology-driven urban management (SDG Local Action, 2023).

In recent years, Ghana has made significant strides in advancing its smart city agenda. The government's commitment to digital transformation is evident through initiatives such as the Ghana Digital Acceleration Project, which aims to enhance digital innovation, skills development, and sector-wide digital transformation (Ghana's Digital Agenda, 2018). Furthermore, the Accra Smart SDG Cities Program focuses on leveraging digital tools and spatial data to improve service delivery and urban planning, while actively engaging communities, especially youth, in decision-making processes. These efforts are complemented by the development of the National Artificial Intelligence Strategy, which seeks to position Ghana as a leader in AI applications across various sectors (Ghana's Digital Agenda, 2018). Collectively, these initiatives underscore Ghana's dedication to building sustainable and resilient smart cities through strategic investments in technology and inclusive governance (Ghana's National Artificial Intelligence Strategy, 2023).

Nigeria's technological landscape presents both opportunities and challenges for smart city development (Mosaic51, 2025). Major urban centers like Lagos and Abuja are experiencing rapid growth in information and communication technology ecosystems, characterized by expanding mobile broadband coverage, a burgeoning startup sector, and increasing deployments of Internet of Things (IoT) sensors and digital dashboards (Open Access Metro, 2025). These advancements facilitate the provision of mobile-first citizen services and contribute to the development of smart city infrastructures (Mosaic51, 2025).

However, several infrastructural gaps impede the seamless integration of these technologies. Challenges such as limited backbone fiber connectivity, the absence of standardized interoperability protocols, unreliable power supply, and the lack of comprehensive urban data platforms hinder the scalability of smart city initiatives beyond pilot projects (Open Access Metro, 2025). To maximize public value within constrained budgets, successful technology investments in Nigeria prioritize the deployment of interoperable, low-cost sensors, mobile-enabled services, and robust data governance frameworks (Digital Rights Lawyers, 2021).

South Africa's smart city initiatives aim to leverage Information and Communication Technologies, big data, and digital platforms to enhance urban service delivery and efficiency. Pilot projects have introduced smart meters for electricity and water, e-government portals, and intelligent traffic systems in

cities like Johannesburg (Scholtz, 2022). However, these initiatives face challenges such as high implementation costs, digital divides, and infrastructural backlogs, particularly in historically underserved townships and rural areas. Studies indicate that limited access to technology and quality data are significant barriers to reducing the digital divide and developing digital citizens in South Africa (Department of Cooperative Governance and Traditional Affairs, 2023).

The South African government has recognized these challenges and has been working towards bridging the digital divide through various initiatives. For instance, the Department of Science and Innovation has been investing in ICT infrastructure to promote digital inclusion and support smart city development. Additionally, the Department of Cooperative Governance and Traditional Affairs has developed a Smart Cities Framework to guide municipalities in integrating ICT into urban planning and service delivery (Department of Science and Innovation, 2020). Despite these efforts, the digital divide remains a significant hurdle. Research has shown that students from disadvantaged backgrounds face difficulties in accessing and utilizing ICTs for learning, which can be extrapolated to broader smart city initiatives (Mphahlele, Mokwena and Ilorah, 2021). This underscores the need for targeted policies and investments to ensure equitable access to digital technologies across all communities.

Technology is pivotal to Ethiopia's smart city initiatives. The government has made significant investments in expanding digital infrastructure through the state-owned Ethio Telecom and, more recently, liberalization efforts to attract private telecom operators. Projects such as the digital ID program and e-government platforms represent steps toward digitizing services. However, limited broadband penetration, infrastructural gaps, and high costs of internet access remain key barriers to scaling technology-driven smart city solutions (World Bank, 2020). As of 2025, Ethiopia has over 28 million internet users, with mobile broadband coverage reaching approximately 70.8% of the population. Ethio Telecom has expanded its 4G network to cover about 85% of the population and launched 5G services in 26 cities. Despite these advancements, challenges such as the "usage gap" persist, with only 26% of the population covered by mobile broadband being active users. Barriers include low smartphone penetration, lack of digital skills, and limited access to electricity (Ethio Telecom, 2023).

The government's Digital Ethiopia 2025 strategy aims to digitize 1,000 government services by 2030. Currently, around 325 e-government services are available online, with over 900 public services digitized as of 2025. The Fayda digital ID system, issued to over 20 million citizens, serves as the foundational pillar of this strategy (Biometric-Update, 2025). Despite these efforts, Ethiopia

faces challenges in internet access and affordability. The country has one of the lowest internet penetration rates in Africa, with only 16% of the population having internet access as of 2022. Infrastructure gaps, high costs of internet access, and limited broadband penetration remain significant barriers to scaling technology-driven smart city solutions (Research ICT Africa, 2022).

Table-1: Comparative Technology Dimensions

Country	Key Technology Initiatives	Infrastructure/ Platforms	Notable Projects	Challenges
Rwanda	ICT-enabled public services, smart transport, drone-based medical delivery	Nationwide 4G LTE, broadband coverage, Kigali Innovation City	Smart Kigali initiative, Tap'n'Go digital bus ticketing, Zipline drone deliveries	Limited scale beyond Kigali, integration across services
Kenya	Digital public infrastructure, ICT-enabled service delivery, smart-city hardware	Konza Technopolis, nationwide DPI, Huduma digital services, digital ID programs	Konza Technopolis smart mobility & integrated ops centers	Interoperability, financing, equitable access, coordination gaps
Morocco	IoT pilots, integrated smart-city zones	Telecommunication upgrades, GIS-based planning, smart grids	Zenata Éco-Cité smart water, energy & mobility systems	Fragmented digital systems, limited interoperability, tech-first approaches
Ghana	Digital infrastructure, e-governance, ICT-enabled services	Ghana Digital Agenda, e-Transform Ghana, smart grids, digital waste management	Accra Smart City framework, Ghana Digital Acceleration Project, National AI Strategy	Affordability, uneven internet access, data interoperability
Nigeria	Mobile broadband expansion, IoT deployment, digital dashboards	ICT ecosystems in Lagos & Abuja	Smart city infrastructure, mobile-first citizen services	Limited fiber connectivity, lack of interoperability, unreliable power, limited urban data platforms
South Africa	ICT and big data for service delivery	Smart meters, e-government portals, intelligent traffic systems	Pilot smart city projects in Johannesburg	High costs, digital divide, infrastructural backlogs, limited access to

				technology
Ethiopia	Digital infrastructure, e-government platforms, digital ID program	Ethio Telecom 4G & 5G network, broadband expansion	Digital Ethiopia 2025 strategy, Fayda digital ID, 900+ digitized services	Low broadband penetration, affordability, usage gap, limited digital skills

The comparative analysis highlights the diversity of approaches, achievements, and challenges in implementing the technology dimension of smart cities across African countries. Rwanda and Kenya stand out for their comprehensive ICT infrastructures and flagship smart-city projects (Kigali Innovation City and Konza Technopolis, respectively) that combine digital infrastructure, e-governance platforms, and citizen-focused service delivery. Rwanda's innovative use of drones for medical supply delivery (Zipline) illustrates how technology can directly address critical service gaps, while Kenya's emphasis on integrated operations centers demonstrates the potential of real-time data-driven governance.

Morocco and Ghana illustrate a more mixed landscape. Morocco's Zenata Eco-Cite demonstrates the integration of IoT, GIS, and energy management for sustainability; however, challenges such as fragmented digital systems and lack of interoperability limit the scalability and effectiveness of these initiatives. Ghana's digital agenda shows strong progress in e-governance and AI adoption, yet affordability, uneven internet access, and data integration issues indicate gaps in translating technological potential into equitable urban services.

Nigeria and South Africa present the dual realities of opportunity and constraint. While urban centers like Lagos, Abuja, and Johannesburg are increasingly equipped with ICT ecosystems, smart meters, and digital dashboards, both countries face infrastructure limitations, high costs, and digital divides that hinder broad-based impact. Nigeria's limited fiber connectivity and South Africa's persistent inequities underscore the importance of not only technological investment but also inclusive access and effective governance. Ethiopia illustrates both rapid progress and persistent structural challenges. The Digital Ethiopia 2025 strategy, including the Fayda digital ID and e-government services, provides a framework for large-scale digital transformation. However, limited broadband penetration, affordability issues, and low digital literacy levels highlight the critical need for complementary social and institutional strategies to maximize technological benefits.

Overall, the table and discussion underscore that while the technology dimension is central to smart city development its effectiveness depends on complementary investments in human capital, institutional capacity, and inclusive governance. Countries that integrate ICT infrastructure with citizen-

centric services, interoperability standards, and data-driven urban management such as Rwanda and Kenya are more likely to realize the full potential of smart city initiatives. Conversely, fragmented systems and uneven access, as seen in Morocco, Ghana, Nigeria, South Africa, and Ethiopia, limit technological impact emphasizes that smart city success requires coordinated technological, social, and institutional strategies.

People Dimension

Rwanda's smart city vision is anchored in active citizen participation, digital inclusion, and human capital development. Guided by Vision 2050 and the National Strategy for Transformation, the government has prioritized building a knowledge-based economy powered by ICT innovation and inclusive digital participation (Government of Rwanda, 2017). Through institutions such as the Ministry of ICT and Innovation and the Rwanda Information Society Authority, substantial investments have been made in digital infrastructure and e-governance platforms (RISA, 2020). A flagship initiative, IremboGov, launched in 2015, now offers access to more than 150 online public services, streamlining administrative processes and improving service transparency (IremboGov, 2024). In parallel, nationwide digital literacy and skills programs including the Digital Ambassadors Program and the Rwanda Digital Acceleration Project have equipped thousands of citizens with ICT competencies and expanded broadband access to promote innovation and inclusion (Big Win Philanthropy, 2024).

Despite these advancements, challenges persist in bridging the urban–rural digital divide and ensuring equitable access to smart city benefits. While urban areas such as Kigali enjoy high-speed 4G coverage and robust digital ecosystems, rural communities continue to face barriers in connectivity, affordability, and access to digital devices (ITU, 2022). Gender disparities further complicate inclusion, as women especially in rural regions remain underrepresented in digital engagement (GSMA, 2022). To achieve a fully people-centered smart city, Rwanda must continue investing in inclusive digital infrastructure, localized innovation, and gender-responsive policies. Sustained commitment to expanding digital literacy, promoting youth innovation, and integrating citizen feedback will be essential to maintaining Rwanda's trajectory toward an inclusive and sustainable smart city future (UNDP, 2023).

Kenya's smart city agenda has advanced through the establishment of Huduma Centres and digital service platforms, which have streamlined public service delivery by consolidating multiple transactions into single access points and digitizing routine processes. This initiative, recognized globally for enhancing efficiency and transparency, has improved citizens' access to government services (United Nations Public Service Awards, 2015). However, persistent

digital divides continue to hinder inclusivity. Studies indicate that disparities in internet access, device ownership, and digital literacy between urban and rural areas, as well as across socio-economic groups, limit equitable participation in digital governance and service delivery (World Bank, 2018). Consequently, while Kenya's e-government innovations demonstrate strong institutional progress, their benefits remain unevenly distributed among citizens.

At the same time, flagship projects such as Konza Technopolis exemplify both the potential and challenges of Kenya's smart-city development. Research highlights that top-down planning, land-tenure insecurities, and limited community participation around Konza risk excluding informal-sector workers and local residents from benefiting directly (Centre for Intellectual Property and Information Technology, 2024). Given that the informal economy constitutes a significant share of Kenya's urban livelihoods, sustainable and inclusive smart-city development requires deliberate investment in digital skills, participatory planning, and service models tailored to informal and peri-urban populations (Van and Kloosterboer, 2019). Recent analyses reinforce that effective urban governance must prioritize community engagement and local ownership to ensure that technological innovation supports social equity and inclusive development (Laterite, 2024).

Morocco's smart-city initiatives have led to significant infrastructure improvements but produced uneven outcomes in social inclusion. Large-scale projects such as Zenata and other villesnouvelles have enhanced formal housing and business environments, yet raised concerns about displacement, informal-sector exclusion, and unequal access to digital services (Cote-Roy and Moser, 2022). Studies exploring youth and citizen perspectives reveal cautious optimism about improved services alongside skepticism about whether marginalized groups will benefit (Perceptions of Young Moroccans, 2025). To ensure that smart-city programs are genuinely people-centered, Morocco must invest in digital literacy, participatory planning mechanisms, and affordable connectivity, measures that have improved inclusion and technology adoption in other developing-country contexts (Bajpai and Biberman, 2021). Furthermore, national policy frameworks highlight the need for polycentric urban planning and stronger social safeguards to balance economic modernization with equity objectives (Cote-Roy and Moser, 2022).

Despite the government's emphasis on infrastructure and investment, institutional fragmentation and limited citizen engagement continue to challenge Morocco's smart-city agenda. Overlapping mandates among municipalities, private developers, and national agencies have constrained transparency and accountability, weakening the governance foundations needed for sustainable innovation (OECD, 2024). Flagship projects such as Casablanca Smart City and

Zenata Eco-City exemplify top-down planning approaches that risk neglecting informal settlements and small-scale enterprises (Cote-Roy and Moser, 2022). Research demonstrates that co-design frameworks, participatory mapping, and open data systems can strengthen citizen trust and ensure that smart-city projects respond to local needs (Bajpai and Biberman, 2021). Building inclusive governance structures where citizens act as active co-creators rather than passive users is therefore essential for aligning Morocco's smart-city transition with broader goals of social justice and sustainable urban development.

Ghana's smart-city initiatives emphasize the role of people as both beneficiaries and co-creators of urban innovation. With a mobile penetration rate exceeding 130%, citizens actively engage in digital transactions, e-governance platforms, and online communication networks (ITU, 2023). Despite these gains, digital inequality persists, particularly among low-income, rural, and peri-urban populations who face challenges in connectivity, affordability, and digital literacy. Programs such as the Ghana Innovation Hub and Tech Hubs in Accra and Kumasi aim to promote youth entrepreneurship, digital skills, and community-driven innovation ecosystems (Ministry of Communications and Digitalization, 2021).

While digital adoption is strong, governance and institutional coordination remain key challenges. Fragmented roles among municipal authorities, private technology providers, and national agencies often limit transparency and slow implementation of inclusive solutions (World Bank, 2022). Evidence from Accra and Kumasi indicates that top-down smart-city interventions risk overlooking marginalized communities, including small-scale entrepreneurs and women-led enterprises (Boateng et al., 2021). Research highlights that participatory planning, open-data initiatives, and community-driven innovation hubs can enhance citizen trust, promote co-creation, and ensure equitable access to digital services (GSMA, 2022). Embedding inclusive governance frameworks alongside technological infrastructure is therefore critical to ensure that Ghana's smart-city initiatives advance both urban modernization and social equity.

Smart city initiatives in Nigeria are increasingly prioritizing digital inclusion and community engagement to ensure equitable access to urban services. Recognizing that a significant portion of the Nigerian urban population relies primarily on mobile devices for internet access, and considering the uneven distribution of digital literacy and affordability across socioeconomic groups, it is crucial for smart city projects to integrate inclusive strategies. Recent studies highlight the importance of participatory approaches in the development of smart cities in Nigeria. For instance, a report evaluating national urban policies and smart city strategies in Nigeria underscores the need for inclusive planning

processes that consider the diverse needs of urban populations (UN-Habitat, 2023).

The informal sector plays a pivotal role in Nigeria's economy, encompassing various activities such as informal transport operations and market trading. However, these sectors often face challenges in accessing digital tools and services. Initiatives like Tech Herfrica have been instrumental in bridging this gap by providing digital and financial literacy training, distributing mobile devices, and facilitating access to digital platforms for women and girls in rural and marginalized communities (Tech Herfrica, 2021). Additionally, the development of a national digital trade strategy for Nigeria emphasizes the necessity of aligning digital policies with the African Continental Free Trade Area, focusing on enhancing infrastructure and regulatory frameworks to promote digital inclusion (Overseas Development Institute, 2020). Implementing participatory pilots that incorporate feedback loops and adapt services to meet the specific needs of communities has proven effective in fostering the adoption of smart city initiatives. For example, the Ilorin Innovation Hub serves as a platform for developing digital skills and supporting startups, promoting community-led innovation and addressing local challenges through technology (Ilorin Innovation Hub, 2022).

Smart city initiatives in South Africa, particularly in Cape Town, emphasize citizen participation and empowerment through digital platforms. The city has launched mobile, web, and social media tools that allow residents to engage with local government, participate in decision-making processes, and receive important updates, thereby promoting transparency and inclusive governance (Molobela, 2025). These initiatives also aim to address historical inequalities and enhance urban resilience by fostering more equitable access to city services and infrastructure. However, challenges such as uneven participation across socioeconomic groups, limited digital literacy in marginalized communities, and gaps in infrastructure coverage continue to affect the effectiveness of these platforms (Adedokun and Zulu, 2022).

Digital literacy and inclusion are central to Cape Town's smart city strategy. Programs such as SmartCape provide free internet access and digital skills training through public libraries, benefiting over half a million residents as of 2024 (City of Cape Town, 2024). Despite these efforts, affordability of internet access and digital devices remains a significant barrier, limiting participation for low-income communities, even with community Wi-Fi hotspots and mobile health applications in place (OpenUCT, 2015–2025). Additionally, concerns around data privacy, cyber security, and equitable service delivery are emerging issues that require careful attention to ensure that smart city initiatives do not

inadvertently reinforce existing social and economic divides (Adedokun and Zulu, 2022).

Ethiopia's pursuit of smart city development is strongly linked to citizen engagement, inclusivity, and human capital development, leveraging its youthful population as a demographic advantage. The Digital Ethiopia 2025 strategy emphasizes digital literacy and skills as critical for an inclusive digital economy, aiming to achieve 70% digital literacy by 2025. Initiatives such as the Digital Transformation Centers, launched in collaboration with the International Telecommunication Union and the Ministry of Innovation and Technology, provide hubs for digital education and community engagement (UNCDF, 2022). Despite these efforts, significant gaps remain, including low mobile money usage and limited familiarity with digital financial services, reflecting persistent socioeconomic inequalities and barriers to citizen-driven digital transformation.

Human capital development is a central component of Ethiopia's digital strategy, with the Digital Skills Country Action Plan 2020–2030 targeting higher education institutions and technical vocational education and training centers to build digital competencies (DPG Ethiopia, 2024). Evidence suggests that increasing the supply of skilled and semi-skilled labor could substantially enhance GDP, non-agricultural output, exports, and fixed investments, highlighting the economic impact of strengthening human capital (MDPI, 2025). Nevertheless, challenges persist, including affordability, limited access to technology, and underutilization of digital infrastructure, which constrain the full potential of digital transformation in Ethiopia (World Economic Forum, 2024).

Table-2: Comparative People Dimension

Country	Citizen Engagement & Participation	Digital Inclusion & Literacy	Human Capital Development	Challenges / Gaps	Key Initiatives / Examples
Rwanda	Active citizen participation guided by Vision 2050 and National Strategy for Transformation	Digital literacy programs like Digital Ambassadors Program and Rwanda Digital Acceleration Project; expanded broadband access	Focus on ICT skills for innovation and inclusion	Urban–rural digital divide; gender disparities in rural areas	IremboGov platform offering 150+ online services
Kenya	HudumaCentr	Unequal access	Investment in	Digital divide	KonzaTechno

	es streamline public services; top-down planning around KonzaTechnopolis	to internet and devices; digital literacy gaps	participatory planning and youth digital skills	between urban/rural areas; informal-sector exclusion	polis, e-government platforms
Morocco	Top-down planning with limited citizen engagement; cautious optimism among youth	Uneven access to digital services; need for digital literacy initiatives	Policy frameworks emphasize polycentric planning and skills development	Displacement, informal-sector exclusion, institutional fragmentation	Casablanca Smart City, Zenata Eco-City
Ghana	Citizens engaged as co-creators; high mobile penetration (>130%)	Digital inequality persists in rural/low-income areas; programs promote youth entrepreneurship and skills	Support for community-driven innovation hubs	Fragmented governance; top-down interventions risk marginalizing women and informal workers	Ghana Innovation Hub, tech hubs in Accra and Kumasi
Nigeria	Focus on participatory approaches and community engagement; inclusion of informal sector	Mobile-based internet access; initiatives bridge gaps in digital literacy and device access	Developing digital skills through innovation hubs	Socioeconomic disparities; uneven access for informal workers	Ilorin Innovation Hub; national digital trade strategy aligned with AfCFTA
South Africa	Citizen participation via mobile/web platforms in Cape Town	SmartCape initiative provides free internet and digital skills training	Integration of digital literacy into urban services	Uneven participation across socioeconomic groups; affordability and infrastructure gaps	SmartCape, community Wi-Fi hotspots, mobile health apps
Ethiopia	Youthful population leveraged for	Digital Ethiopia 2025 targets 70% digital	Digital Skills Country Action Plan	Affordability, limited access to technology,	Digital Transformation Centers;

	engagement; Digital Transformation Centers promote community participation	literacy by 2025; gaps remain in mobile money use	2020–2030 builds competencies in TVET and higher education	underutilization of infrastructure	community-focused digital literacy programs

The comparative analysis of the People Dimension across Rwanda, Kenya, Morocco, Ghana, Nigeria, South Africa, and Ethiopia reveals both common patterns and context-specific dynamics in citizen engagement, digital inclusion, and human capital development. Across all seven countries, governments recognize that technology alone cannot drive smart city outcomes; citizen participation and inclusivity are essential for sustainable and equitable urban transformation. Programs such as Rwanda's Irembo Gov, Ghana's Innovation Hub and Ethiopia's Digital Transformation Centers demonstrate that well-structured initiatives can empower citizens, foster digital literacy, and enhance access to public services, thereby promoting more inclusive governance.

Despite these advances, persistent challenges limit the full realization of people-centered smart cities. Urban–rural digital divides, affordability constraints, and gender disparities remain widespread, particularly affecting marginalized and informal-sector populations. Top-down planning approaches as seen in Morocco and Kenya, risk excluding local communities and reinforcing existing social inequalities. Fragmented institutional roles and limited participatory mechanisms, observed in Ghana, Nigeria, and South Africa, further hinder equitable access to digital services. Overall, the evidence suggests that successful smart city strategies in developing countries require a balanced approach, combining technological investments with deliberate policies to enhance digital literacy, expand access for disadvantaged groups, strengthen human capital, and foster participatory urban governance. Countries that integrate these elements are more likely to achieve inclusive, socially equitable, and sustainable smart city outcomes.

Institutional Dimension

Rwanda's institutional and regulatory framework has been instrumental in advancing its smart city agenda. Law was enacted to protect personal data and digital governance by setting standards for data handling and appointing the national cyber security authority as the enforcement body (Rwanda Ministry of ICT and Innovation, 2021). The Rwanda information society authority, established in 2017, coordinates ICT policy and collaborates with the Rwanda utilities regulatory authority to digitize public services (RISA, 2020). PPPs

further drive innovation most notably the Kigali Innovation City, collaboration between Africa50 and the Rwanda Development Board, which promotes job creation, ICT exports, and knowledge development. The government's partnership with Zipline, initiated in 2016, also exemplifies technology-driven service delivery and economic diversification (RDB, 2024).

Despite these achievements, Rwanda faces emerging challenges related to data governance and inclusivity. Although the data protection and privacy law became enforceable after a two-year transition period in 2023, institutional capacity and public awareness remain limited, particularly in data compliance and enforcement (MINICT, 2023). Reports emphasize the need to strengthen transparency, ensure accountability in PPPs, and safeguard citizen rights through effective governance mechanisms (allAfrica, 2025). Additionally, achieving long-term sustainability in Rwanda's smart city initiatives requires expanding digital literacy, promoting participatory decision-making, and ensuring equitable access to digital opportunities across all segments of society (GSMA, 2024).

Kenya's smart-city governance is shaped by formal institutional arrangements that allocate roles for planning, procurement, and data stewardship. KonzaTechnopolis is managed by the KonzaTechnopolis Development Authority, a statutory body tasked with delivering the master-planned smart city through public-private partnerships and international cooperation (KonzaTechnopolis Development Authority, 2024). Konza is embedded in the country's broader policy scaffolding including Kenya Vision 2030 and the Kenya National Digital Master Plan which together align national economic objectives with sectoral digital strategies and the establishment of smart city facilities such as a national data center and integrated operations center (KoTDA, 2023).

However, institutional constraints limit scalability and equity: implementation requires stronger coordination between national ministries, county governments, and private partners, clearer financing and procurement transparency, and robust data governance to protect citizens and enable trustworthy data sharing. Several official strategies and progress reports recognize these gaps and call for capacity building, clarified governance roles, and accountability mechanisms to de-risk private investment and foster inclusive outcomes (Open Government Partnership-Kenya, 2023). Kenya's Data Protection Act provides an important legal foundation for data stewardship in smart cities, but effective operational rules and oversight remain critical to ensure safe, transparent use of urban data as Konza and other projects scale (ICT Authority, 2022).

Morocco's trajectory toward smart city development reflects a governance model underpinned by strong central steering and institutional coherence. The

national government's strategic coordination has facilitated the mobilization of financial and technical resources for large-scale urban infrastructure and digital transformation. Policy measures such as mandating the publication of procurement data, requiring digital tendering platforms, and digitizing bank guarantees have advanced public sector efficiency and transparency (World Bank, 2023). Within the framework of the New Development Model, Morocco has institutionalized mechanisms like the Procurement Observatory and Open Data Contracting Standards, reinforcing state-led accountability and harmonizing governance practices across municipalities (OECD, 2019). These developments underscore state's pivotal role in orchestrating smart urban transformations through centralized oversight and policy driven reforms.

Simultaneously, the pursuit of accountability, data governance, and municipal capacity building reveals both progress and systemic challenges. Morocco's data protection framework, formalized under Law and enhanced through regulatory provisions on biometric data, has laid the groundwork for responsible digital governance (Digital Policy Alert, 2025). Despite advancements such as the establishment of the national open data portal, limited dataset interoperability and inconsistent adoption across ministries continue to constrain open-data effectiveness (OECD, 2019). Recent legal instruments prioritize local content and SME participation in procurement, promoting inclusive economic growth but simultaneously exposing municipal weaknesses in contract management and ICT governance (DTI-EUI, 2024).

Institutional capacity is a critical factor in implementing smart city initiatives in Ghana. The Ministry of Communications and Digitalization, together with local assemblies such as the Accra Metropolitan Assembly, leads the development of digital governance policies. PPPs have further enhanced e-service delivery through collaborations between government agencies and telecom companies. Strengthening institutional frameworks and building municipal capacity are necessary to support coordinated urban development and ensure effective service provision (Owusu-Ansah et al., 2024). The Ghana Digital Acceleration Project exemplifies such efforts, focusing on expanding broadband access, enhancing digital public services, and fostering a robust digital innovation ecosystem (World Bank, 2025).

Despite progress, challenges such as fragmented planning, regulatory gaps in data governance and limited municipal financing constrain the full realization of smart city goals. Reports highlight the need for harmonized urban policies and robust institutional mandates to facilitate sustainable development and successful digital transitions in urban planning (National Development Planning Commission, 2025). Addressing these institutional capacity issues is essential for Ghana to advance its smart city agenda and achieve sustainable urban

development outcomes. Report on Public-Private Partnership Projects emphasizes the importance of capacity-building initiatives for public officials to bolster institutional oversight and integrate sustainability and climate resilience into PPP project planning and execution (Ministry of Finance and Economic Planning, 2024).

Institutional readiness is widely recognized as a critical factor influencing the successful implementation of smart city initiatives (United Nations, 2023). In Nigeria, the development of smart cities is constrained by several interrelated institutional challenges, including fragmented urban governance, unclear procurement regulations, limited municipal technical capacity, and insufficient financing mechanisms (Federal Ministry of Communications and Digital Economy, 2023). Addressing these challenges requires comprehensive policy reforms, such as the establishment of data stewardship standards, the creation of PPP frameworks, and the development of multi-level governance platforms. Moreover, the federal structure of Nigeria necessitates coordination and harmonization among national ICT agencies, state governments, and local authorities to ensure consistent standards, aligned funding streams, and effective city-scale implementation (OECD, 2025).

Fragmented governance and limited technical capacity represent significant bottlenecks in Nigeria's smart city landscape. Overlapping mandates among federal, state, and local authorities reduce efficiency and complicate the coordination of smart city projects, often resulting in inconsistent implementation and delayed decision-making (UN-Habitat, 2023). These challenges are compounded by insufficient technical expertise at the municipal level, which undermines the deployment, management, and maintenance of smart city technologies. Additionally, the absence of clear procurement rules and robust financing mechanisms further hinders progress, increasing costs, causing delays, and deterring investment (OECD, 2025). To overcome these institutional constraints, Nigeria must adopt transparent procurement processes, strengthen municipal capacity, and implement multi-source financing strategies, including PPPs and dedicated urban innovation funds, thereby creating an enabling environment for sustainable smart city development (ITU, 2025).

Institutional capacity is a pivotal determinant in the successful implementation and sustainability of smart city initiatives in South Africa. National frameworks such as the National Development Plan 2030 and the Smart City Blueprint underscore the necessity for governance innovation, intergovernmental coordination, and public–private partnerships to foster urban transformation (Mphahlele, 2021). Municipalities like Tshwane and Johannesburg have undertaken pilot projects involving digital governance systems, open data

platforms, and smart public safety programs. However, these endeavors are often impeded by entrenched institutional weaknesses, including inadequate governance structures, insufficient technical expertise, and pervasive corruption, which hinder the scaling of such initiatives. Furthermore, challenges such as data security concerns, the digital divide, and limited access to essential infrastructure exacerbate the difficulties faced by municipalities, particularly in small and rural areas (Mashau, 2023).

Despite these challenges, strategic enablers exist to bolster institutional capacity and facilitate the advancement of smart cities. PPPs are instrumental in mobilizing resources and expertise, thereby enhancing the scalability and sustainability of smart city projects. The South African Smart Cities Framework provides a comprehensive approach that integrates governance innovation with technological advancement, emphasizing the importance of context-specific solutions. Additionally, the adoption of robust digital governance practices is essential to ensure transparency, accountability, and equitable service delivery. Case studies from Tshwane and Johannesburg illustrate the potential of smart city initiatives to address urban challenges; however, their success is contingent upon addressing underlying institutional deficiencies and fostering a collaborative approach among stakeholders (Lamidi, 2025).

Institutional leadership is central to the governance, regulation, and sustainability of smart cities. In Ethiopia, the Ministry of Innovation and Technology drives the national digital agenda through the Digital Ethiopia 2025 Strategy, aiming to digitalize over 900 government services, enhance technological innovation, and improve service delivery efficiency (ENA English, 2025). At the municipal level, the Addis Ababa City Administration Innovation and Technology Development Bureau implements smart city initiatives by modernizing local processes, integrating digital technologies into urban services, and fostering PPPs to strengthen innovation capacity (AAITDB, 2025). These institutions exemplify the alignment of national strategies with local implementation, forming the backbone of Ethiopia's smart city framework.

Ethiopia has made notable strides in digital governance, urban mobility, and infrastructure development. The digitalization of public services has improved transparency and accessibility across sectors, while initiatives such as the Cross-Country Public Transport Service System and the National Traffic Point-Based Penalty Management System optimize traffic management and safety through data-driven solutions (Ethiopian Business Review, 2025). Infrastructure projects like the Addis Ababa City Corridor Project enhance urban mobility via bicycle lanes, pedestrian pathways, and upgraded road networks (ibid). Nonetheless, challenges persist, including institutional fragmentation, regulatory gaps in data governance, and limited metropolitan capacity,

particularly in Addis Ababa, which constrains the scaling and sustainability of smart city initiatives (Science Direct, 2025).

Table-3: Comparative Institutional Dimensions

Country	Institutional Framework	Key Achievements	Challenges/Gaps
Rwanda	Ministry of ICT and Innovation; Rwanda Information Society Authority); PPPs (e.g., Kigali Innovation City, Zipline).	Data protection law; digitization of public services; ICT-driven economic diversification; job creation.	Limited institutional capacity for enforcement; low public awareness; gaps in inclusivity and transparency.
Kenya	KonzaTechnopolis Development Authority; aligned with Kenya Vision 2030 & National Digital Master Plan.	Development of master-planned smart city; national data center; integrated operations center; PPPs with international cooperation.	Weak coordination between ministries and county governments; limited financing transparency; data governance challenges.
Morocco	Centralized national coordination; New Development Model; Procurement Observatory; Open Data Contracting Standards.	Large-scale urban infrastructure; digital tendering and procurement; open data portal; SME participation in procurement.	Limited dataset interoperability; inconsistent adoption across ministries; municipal weaknesses in contract and ICT governance.
Ghana	Ministry of Communications and Digitalization; local assemblies (e.g., Accra Metropolitan Assembly); PPPs.	Ghana Digital Acceleration Project: broadband expansion, digital public services, innovation ecosystem development.	Fragmented planning; regulatory gaps in data governance; limited municipal financing; need for capacity building in PPP oversight.
Nigeria	Federal Ministry of Communications & Digital Economy; multi-level governance required across federal, state, and local authorities.	Establishment of legal frameworks for data protection; initial PPP frameworks; federal ICT initiatives.	Fragmented governance; unclear procurement regulations; limited municipal technical capacity; insufficient financing mechanisms.
South Africa	National frameworks: National Development Plan 2030, Smart City Blueprint; municipalities (e.g.,	Pilot projects: digital governance, open data platforms, smart public safety; governance	Institutional weaknesses: inadequate governance structures, limited technical

	Tshwane, Johannesburg); PPPs.	innovation through PPPs.	expertise, corruption; digital divide; uneven infrastructure access.
Ethiopia	Ministry of Innovation and Technology; Addis Ababa City Administration Innovation and Technology Development Bureau; PPPs.	Digitalization of 900+ public services; data-driven transport systems; Addis Ababa City Corridor Project.	Institutional fragmentation; regulatory gaps in data governance; limited metropolitan governance capacity.

The comparative analysis of institutional dimensions across these African countries highlights that effective smart city governance relies heavily on coordinated institutional frameworks, legal and regulatory instruments, and the capacity to implement policies at multiple levels of government. Rwanda and Kenya illustrate strong policy alignment and structured national-to-local implementation, whereas Morocco emphasizes centralized oversight with strategic policy enforcement. Ghana and South Africa show the importance of municipal capacity building and PPPs, though gaps in coordination and technical expertise persist. Nigeria exemplifies the challenges of fragmented governance and insufficient financing mechanisms, which limit scalability and equitable service delivery. Ethiopia demonstrates significant progress in digital service delivery and urban mobility but faces challenges in institutional fragmentation and governance coordination. Across all countries, the evidence underscores that institutional readiness, clear legal frameworks and effective intergovernmental coordination are crucial enablers for sustainable and inclusive smart city development.

Conclusion and Recommendations

Technology is a transformative dimension of smart city governance in Africa, but its effectiveness depends on how it is embedded within broader governance frameworks. For sustainable impact, governments should: (1) strengthen interoperability standards and data governance; (2) invest in affordable, inclusive digital infrastructure; (3) foster public-private partnerships that align with citizen needs; and (4) integrate technological innovations into long-term institutional reforms. Doing so will maximize the value of technology while ensuring that smart city governance advances equity, resilience, and sustainability.

The People dimension is pivotal in the success of smart city governance, particularly in developing countries where challenges like digital exclusion, limited public participation, and trust deficits prevail. Addressing these issues is essential for creating inclusive, equitable, and sustainable urban environments.

Hence, it is recommended that African government to enhancedigital literacy and access:implement nationwide programs to improve digital skills and provide affordable internet access, ensuring all citizens can participate in smart city initiatives; promote inclusive governance:establish platforms for meaningful citizen engagement, ensuring diverse community representation in decision-making processes; invest in capacity building:develop educational curricula and training programs focused on smart city technologies to build a skilled workforce; build trust through transparency:adopt transparent governance practices, including open data initiatives and regular public consultations, to foster trust and accountability; and foster public-private partnerships:encourage collaborations between governments, private sector, and civil society to leverage resources and expertise in smart city development.

Institutional dimensions remain central to determining the trajectory of smart cities in developing countries. Across cases, the ability to harmonize national strategies with local implementation, ensure transparent procurement, strengthen data governance, and sustain PPPs determines success. Policy recommendations include: (1) enhancing institutional accountability through procurement reforms and independent oversight; (2) strengthening municipal capacity and financing to embed smart city practices; (3) adopting clear data governance frameworks that protect citizen rights; and (4) fostering intergovernmental platforms to improve coordination. By embedding these reforms, developing countries can leverage technology not only for efficiency but for inclusive, transparent, and sustainable urban futures.

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