

**Comparative Analysis of Smart City Initiatives in Nigeria and South Africa: Lessons for
Public Administrators**

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Abstract

Nigeria and South Africa are facing the consequences of rapid urbanisation, including thriving urban slums, inadequate social services, and increasing environmental degradation. Smart cities have been documented to possess features such as resource conservation, climate resilience, and an engaging atmosphere for citizen-government engagement. While Nigeria and South Africa have demonstrated significant interest and progress in developing smart cities, a comparative analysis of their guiding initiatives has yet to be sufficiently conducted. In doing this comparison, this paper conducted a systematic review of the literature on smart city implementation in the two countries. Indicators adopted to enable systematic comparison were operational efficiency, potential cost savings, environmental impact, scalability, and security. Key findings revealed critical institutional roles for Nigeria's Town Planning Authority and South Africa's Department of Cooperative Governance (DCoG) in the implementation of smart city initiatives. Furthermore, the findings identified common challenges to effective smart city initiative implementation in the two countries, including social infrastructure deficiency, financial mismanagement, ineffective regulations, and rapid and unregulated urban growth. Despite these challenges, notable progress was observed in specific sectors, with Nigeria advancing in transportation and South Africa in urban infrastructure development. Among the recommendations of this paper are incremental infrastructure investment, financial discipline, adequate regulations, and rural infrastructure development to reduce rural-urban migration. Other recommendations include integrating smart city development with national plans, investments in AI-capable service infrastructure, upskilling public administrators in ICT and AI capabilities, and enhancing citizen participation. The comparison ultimately reveals more similarities than differences in smart city initiatives between the two countries, suggesting a potential for a unified African smart city framework on the continent. Lastly, the paper provides insights for public administrators and policymakers on the relevance of cross-national peer-learning for effective smart city development in Africa.

Keywords: Comparative Analysis; Information Technology (IT); Nigeria; Public Administrators; Smart City; South Africa

1. Introduction

“Smart city initiatives could be enhanced by learning from peers.” DCoG (2021)

The new mantra about knowledge accumulation is now centred around *learning, unlearning, and relearning*. Rather than pioneering initiatives, people, groups, societies, and even countries now leverage mentoring and peer-learning for policy development and implementation, especially on non-peculiar challenges. The advantages of these include reduced chances of error, prudent resource use, and idea exchange.

Across developing countries, particularly on the African continent, rural-urban migration is leading to overcrowding of urban centres. Consequently, service infrastructure is fast becoming inadequate and ineffective. Governments, through their specialised workforce, often referred to as public administrators, have been striving to enhance public service delivery (Adejuwon, 2018) using information technologies (da Silva Tomadon et al., 2024). Public administrators are the public servants who implement government policies and programmes. They work, day in and day out, to manage public resources for enhanced social outcomes.

As service demand pressure increases, public administrators need to transform service delivery infrastructure and channels to balance service supply with demand. Such transformation, particularly using technology, refers to smart city development (da Silva Tomadon et al., 2024). Smart cities enable citizens to live in cities that are effective and efficient in addressing urban challenges, and most importantly, cities that do this smartly (González-Zamar et al., 2020; Mansur, 2019). Simply, smart cities enhance the quality of life of urban dwellers (Ishaq & Farooq, 2023; Jacks et al., 2024; Okewale & Atobatele, 2022; Zaman et al., 2024).

While smart cities enhance citizens' wellbeing, it is principally driven by necessities (Adejuwon, 2018; Jacks et al., 2024), such as the growing public service and environmental crises (Chetty, 2022; da Silva Tomadon et al., 2024). These crises result from the growing recognition of urban centres as economic opportunity hubs, which attract people from far and near (Kadiri et al., 2020; Patrão et al., 2020; Sharifi, 2019). As people enter these centres, so does service demand increase, waste generation soars (Tripathi, 2024; Zaman et al., 2024) with over 2 billion metric tons of annual waste (Cárdenas-León et al., 2024; DCoG, 2021), while urban slums develop (Abbasnia et al., 2023; Brglez et al., 2024; Ebekozién et al., 2024; Hashemi-Amiri et al., 2023).

Whether based on necessity or the emerging needs of digital citizens, considerable pressure is now on governments and urban administrators (Toit & Stimie, 2023), especially on the African continent, to adopt smart city initiatives. Evidence from literature indicates that city administrators in developed economies (Hasija et al., 2020), such as China (da Silva Tomadon et al., 2024), Vancouver, and Singapore (Ogunseye et al., 2022; Toit & Stimie, 2023) now leverage digital technologies to create intelligent living environments that address most, if not all, the emerging urban management challenges and pressures. The integration of digital technologies in enhancing city management is enhancing governance effectiveness.

While Nigeria and South Africa have demonstrated significant progress in the implementation of smart city initiatives for enhancing urban services and governance, there is a need for a comparative analysis between these countries for enhanced governance outcomes through administrative peer-learning. This paper attempts to enrich the competencies of public administrators in the two countries through knowledge and experience exchange for the successful smart city initiatives.

2. Literature Review

2.1. Defining Smart City

Cities, by their nature, are focal points of economic activity (Ogunseye et al., 2022), as they draw people from far and near (Chetty, 2022). In consequence, these cities, such as Lagos (Ogunseye et al., 2022), Abuja, Johannesburg, and Cape Town, became centres for waste accumulation, rapid environmental degradation, and points for sporadic climate change (Kadiri et al., 2020). Furthermore, these cities experience dwindling resources and widening social inequality (Michalec et al., 2019), resulting from increasing city population (Ansari & Banubakode, 2024; Jacks et al., 2024; Tripathi, 2024). And more strategically, they become points of contamination as evidenced in the COVID-19 case (Costa & Peixoto, 2020). All these issues necessitated the transformation of traditional cities, using technologies to make them smart (Sharifi, 2019).

A city, as defined by Kadiri et al. (2020), is an expansive human settlement with organized housing, transportation, communication, and commercial systems. However, when 'smart' is integrated, it becomes something more: a technology-driven, efficient, and sustainable living and working environment (González-Zamar et al., 2020; Lombardi, 2011; Sengupta & Sengupta, 2022). In specifying the actual technology required to make a city smart, Mansur (2019) defines a smart city

as an urban centre that can blend linking sensors with information systems to enhance decision-making in solving daily problems. This submission, although specific, presents a smart city as a sophisticated project that is difficult for developing economies to achieve anytime soon. This is because sensing technologies are just gaining prominence worldwide in solving transportation problems, and developing economies are far behind in embracing this innovation.

It is from this specific perspective that many scholars define smart cities. According to Patrão et al. (2020), for instance, a smart city represents an approach to addressing emerging urban issues while enhancing public service delivery. In this submission, the role of public administrators is reflected as they are the human component that combines resources to achieve targeted improvements in public service delivery. As furthered by Ejjami (2024) and Michalec et al. (2019), emerging AI technologies have created transformative platforms for data-driven public administrators to improve their public service delivery prowess. Ejjami further described data and technology-driven administrators as Public Administration 5.0 or green public service, as captured by Ansari and Banubakode (2024), especially given their potential role in implementing smart city initiatives.

The smart city initiative, as posited by Irawan et al. (2024) and Zaman et al. (2024), refers to the engagement of citizens and technology in the sustainable management of cities. This submission highlights that several key elements are necessary to implement a smart city initiative, including citizen engagement (Ogunseye et al., 2022), effective governance, economic viability, environmental sustainability, and the integration of technology (Hasija et al., 2020; Jacks et al., 2024). The focus is not just on making cities technologically smart, but also on ensuring that they are humanly smart and conducive (Mansur, 2019). Zaman et al. (2024) further argued that in a smart city, technology serves as a facilitating platform, rather than an end in itself. With this narrative, da Silva Tomadon et al. (2024) and Tripathi (2024) identified inclusive city planning, bridging the digital divide, ensuring data security, ethical innovation, and stakeholder collaboration (Kadiri et al., 2020) as key components of a regulatory framework for achieving humane smart cities.

In another perspective that downplays technology, at least a little bit, Zaman et al. (2024) described a smart city as a comprehensive approach to urban development that transcends mere adoption of technologies; rather, it extends to the incorporation of technology with people, institutions (Kadiri

et al., 2020), and the environment. This perspective presents the smart city as a means to an end, rather than an end in itself. In harmonizing all these perspectives, Chetty (2022) and DCoG (2021) proposed that a smart city should refer to a settlement where human and social capital are well invested in, to fuel sustainable economic, social, and environmental development.

Pointers from each of the proposed definitions of a smart city, as presented above, are that a smart city is an approach towards improving the status quo. One submission that merged these perspectives is that of Ogunseye et al. (2022), who opined that a smart city is the integration of multiple systems, such as communication, technology, water, power, transportation, emergency response, and others, to enhance the management of the city and its people (DCoG, 2021).

Consequently, this paper considers a city to be smart when it is concise in resource use, relies on smart infrastructure, and conserves the environment (Ansari & Banubakode, 2024; González-Zamar et al., 2020; Ishaq & Farooq, 2023; Irawan et al., 2024) for sustainable living. Since its introduction in the 1990s (DCoG, 2021; Okewale & Atobatele, 2022), the concept of a smart city has assumed a unifying role among stakeholders of sustainable development (Patrão et al., 2020). Among these stakeholders are governments, public administrators, industries, and civil society organisations that are striving to turn existing traditional cities into a data-driven one in a bid to improve the quality of life of people (Hasija et al., 2020; Tripathi, 2024) while ensuring the preservation of the environment for subsequent generations.

Despite the significant contributions from scholars in defining smart cities, some scholars argue that an appropriate definition for the concept remains elusive. For instance, DCoG (2021), Kadiri et al. (2020), Patrão et al. (2020), and Toit and Stimie (2023) posited that a concise definition of a smart city has yet to emerge. To complicate matters, DCoG noted that several alternative terms exist for 'smart city,' each connoting slightly different things. For instance, digital cities, intelligent cities, green cities, and future cities are a few of the alternative concepts for smart cities. This is due to the argument among smart city scholars on whether the idea of smart city should be concerned with technological or social innovation. In this study, however, borrowing from diverse perspectives and integrating the technological and social innovation polarities, a smart city refers to an ecosystem where governance, technology, and community interact in a complex manner to enhance the quality of life of people while engendering socio-economic progress and environmental sustainability.

2.2. Transforming to Smart Cities: Opportunities and Threats

Smart cities offer several opportunities for city administrators, citizens, and the environment. As opined by Ansari and Banubakode (2024), González-Zamar et al. (2020), Hasija et al. (2020), Jacks et al. (2024), Lombardi (2011), Mansur (2019), Tripathi (2024), and Zaman et al. (2024), the integration of technologies in the administration of cities enhances transportation management through traffic control and decreasing parking congestion, healthcare service delivery through remote patient screening, and overall public service delivery (Toit & Stimie, 2023). According to Sengupta and Sengupta (2022), the benefits accrued to smart cities could be economic (DCoG, 2021), through increased job opportunities (Tripathi, 2024) and public revenue, accompanied by corresponding cost reductions. This is to ensure that cities are resource-prudent and self-sustaining, as Hasija et al. (2020) argue, smart city initiatives would lose their potential to consistently improve city administration without being economically self-sustainable.

Despite the benefits of making cities smart, it still comes with costs (Sengupta & Sengupta, 2022; Zaman et al., 2024). The leading costs of smart city adoption are the risks associated with privacy violations, cybercrimes (Ansari & Banubakode, 2024; Tripathi, 2024; Zaman et al., 2024), ethical issues (DCoG, 2021), and resistance to changes from the citizens and stakeholders (Sengupta & Sengupta, 2022) with strong cultural attachment to traditional societal settings. These costs are not just about smart cities, but about technological adoption generally (Abdulkareem et al., 2024).

More specifically, Tripathi emphasized that transforming to a smart city deliberately and systematically overlooks digitally non-compliant people. This may be the exact reason for the ineffectiveness of many smart city initiatives, which fail to incorporate inclusiveness in their planning and implementation phases (Sengupta & Sengupta, 2022). In essence, as a smart city is developed to solve certain problems, other issues emerge, and the onus thus lies on public administrators to balance technological use with social inclusion.

Therefore, the integration of technology in the planning and management of urban centres is not new (Irawan et al., 2024). What is new, however, is the need to make cities intelligent, self-sustaining, data-driven (Ansari & Banubakode, 2024) and socially inclusive (Sengupta & Sengupta, 2022). As a smart city offers city administrators a way out of emerging social, economic, and environmental issues, it also poses new challenges to public administration. As noted by Hasija et al. (2020), city administrators are now faced with the challenges of planning and funding smart

city projects, especially at a time when government revenue is dwindling (Ansari & Banubakode, 2024). These challenges before public administrators are contributing to the slow pace of smart city initiative implementation in resource-constrained contexts.

Sequel, there is a need for public administrations across countries to exchange ideas and share lessons (Patrão et al., 2020) on how to effectively and efficiently implement smart city initiatives. In this context, this paper conducts a comparative analysis of smart city initiatives in Nigeria and South Africa, aiming to extract valuable lessons for public administration in both countries.

2.3. Empirical Review

There is an emerging perspective on smart cities, which suggests that transforming a city into a smart one does not necessarily translate to building new cities; rather, it entails upgrading and integrating automated technologies with existing traditional city infrastructure (Patrão et al., 2020). With digitalized infrastructure, Tripathi (2024) held that efficient service delivery and citizen engagement could be facilitated. This infrastructural upgrading, as furthered by Costa and Peixoto (2020), involved the application of data science and deep learning algorithms in city operations. Besides the fact that this approach is resource-prudent compared to building a new city from scratch (Jacks et al., 2024), it reduces government expenditure through decreased labour-intensive public service delivery systems (Abdulkadir, 2025, Ejjami, 2024).

Several studies have explored smart city initiatives across countries, with many focusing on the impact of smart cities on communities (Sengupta & Sengupta, 2022). For instance, Ansari and Banubakode (2024) examined the benefits associated with integrating the Internet of Things (IoT) in urban management and how this enhances the quality of life for citizens. Relying on existing literature, surveys, case studies, simulations, and modelling, the study established that with IoT, cities become smarter in public infrastructure management by reducing resource consumption while enhancing citizens' quality of life. One critical factor not considered in this study is the concept of social justice. This concept emphasises the need to ensure equitable social and economic outcomes for all sections of society. Without adequate provisions to eliminate existing inequalities, smart city initiatives may lose their humane outcomes (DCoG, 2021; Jacks et al., 2024). Groups such as women, senior citizens, people with disabilities, and those who are digitally illiterate must be incorporated into the smart city project.

The gap in the study by Ansari and Banubakode (2024) was bridged by Sengupta and Sengupta (2022) in their paper, which investigated why government-supported smart city initiatives fail. Their analysis identified community risk and benefit agreements as the missing link to accountability for equity-seeking groups. This finding draws from related case studies of failed smart city initiatives across countries. Sharing this perspective is Hasija et al. (2020), who noted that interest balancing among groups is critical to the success of city transformation through technology. Consequently, Jacks et al. (2024), Kadiri et al. (2020), Tripathi (2024), and Zaman et al. (2024) concluded that collaboration among various interest groups, especially those previously disadvantaged, is key to the successful implementation of smart city initiatives.

In another study conducted by Kadiri et al. (2020), it was observed that Nigerian cities are characterized by challenges ranging from infrastructural deficits to weak regulatory frameworks. By implication, these have curtailed the smooth implementation of smart city initiatives in the country. Using a systematic literature review, the study examined the literature on the successful implementation of smart city initiatives across countries. It concluded that for smart city projects to succeed in Nigeria, there is a need for adequate investment in infrastructural development and proper adjustment to existing land-use regulations. In addition, Ogunseye et al. (2022) explored smart city initiatives in the city of Lagos with the intent to extract lessons for city administrators from leading smart cities like Vancouver and Singapore. Relying on qualitative secondary data, the study concluded that three key components of citizens' engagement, stakeholder partnership, and strong political will are necessary for transforming Lagos into an effective smart city.

Equally, in South Africa, Toit and Stimie (2023) examined the move towards smart city development in the country. The study pursued three objectives: investigate the evolution of cities, the future of smart cities, and the opportunities/challenges confronting the nation in implementing its smart city initiatives. In its findings, the paper established that the earliest cities are traced to Mesopotamia around 7500 BCE, while subsequent towns emerged in Egypt, China, and Rome, owing to the expansion of slave and trade networks. The study also noted that several challenges hindered the implementation of smart city initiatives in South Africa, following President Ramaphosa's 2019 declaration. These challenges revolve around corruption, inadequate basic infrastructure, weak institutional regulations, uncontrolled population growth, and the rise of

informal settlements. The study concluded that a successful smart city initiative rests on several critical social infrastructure elements and buy-in from relevant stakeholders.

Smart city initiatives have thus assumed a central position in the transformation of urban centres (Kadiri et al., 2020) among governments (Patrão et al., 2020) and their respective public administration. According to Tripathi (2024), this has the potential to reshape the very fabric of urban life and management. In a comparative analysis of development strategies in Africa and US metropolitan areas, Jacks et al. (2024) leveraged available studies that individually analysed each domain to provide the information needed for comparison. Their study found that ICT adoption aims to achieve innovativeness, improved service delivery, and enhanced urban management in the two case studies. Regarding areas of divergence, the study found disparities in the stage of urban development among the case studies; also, it documented differences in financial capacity and strategic priorities. The study concluded that public administration and policymakers must ensure that, in the implementation of smart city initiatives, benefits must flow to all groups within the state without fear or favour.

While previous studies have examined smart city initiatives in Nigeria (Adejuwon, 2018; Kadiri et al., 2020; Ogunseye et al., 2022; Okewale & Atobatele, 2022; Mansur, 2019) and South Africa (Chetty, 2022; DCoG, 2021; Toit & Stimie, 2023) separately, there is a notable gap in the literature concerning the comparison of smart city initiatives in the two countries. This comparison could provide an impact evaluation of the smart city implementation across countries (Patrão et al., 2020). The conclusion of such a comparison could guide public administrators on the strengths and weaknesses of adopted initiatives, as well as provide valuable insights crucial for the planning of cities for further development and upgrades.

Since this area is yet to be sufficiently explored and the benefits yet to be realized, this paper bridges this gap by conducting a comparative analysis of smart city initiatives in Nigeria and South Africa, with a view to extracting valuable lessons for public administrators in the two countries.

3. Methodology

3.1. Research Design

This paper adopted a systematic review approach to examine smart city initiatives in Nigeria and South Africa. A systematic review was selected as it provides a rigorous and transparent method for identifying, evaluating, and synthesizing existing scholarly literature on a specific topic (Kitchenham & Charters, 2007). This approach is particularly appropriate for understanding the current state of smart city implementation in Africa, as evidenced by its increasing adoption in similar studies (Ansari & Banubakode, 2024; Jacks et al., 2024; Kadiri et al., 2020; Ogunseye et al., 2022).

3.2. Search Strategy

To gather relevant and sufficient literature for the review, the Google Scholar database was adopted, in addition to newspaper articles, given that the focus of the review is an issue of public concern. This database allows an elaborate search of literature from multiple sources, given that most reputable publication outlets are indexed in the database. Furthermore, the database offers access to literature across disciplines, which enables literature diversity.

In conducting the literature search, two categories of search terms were developed. The primary search term was framed to incorporate alternative vocabularies that could replace smart city. In this regard, the primary search term was "smart city" OR "smart cities" OR "intelligent city" OR "digital city" AND "Nigeria" OR "South Africa," a geographical search term to capture the countries of focus. No definite year was specified in the search, and this was to enable access to as much literature as possible. However, the literature search was conducted in December 2024.

3.3. Selection Criteria

After the search, a set of parameters was used to sort the literature for analysis. These parameters include the inclusion and exclusion criteria, as shown in Table 1.

Table 1. Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
Literature focused on the use of technology for urban governance	Literature connecting technology to other issues besides urban governance
Diverse literature such as journal articles, conference papers, workshop reports,	Duplicated publications of the same study were excluded

newspaper articles, books, book chapter and others was included.	
Literature mainly prepared in the English language was included.	Literature written in other languages aside from English was excluded
Literature that addressed at least one of the evaluation metrics: operational efficiency, cost savings, environmental impact, scalability, or security	Literature not having bearing with any of the evaluation metrics was excluded

Using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, this paper adopted a four-phase process for literature selection. In the first phase, Identification, the literature search on the Google Scholar platform yielded 117 publications with an additional 12 from newspaper sources. In the second phase, Screening, 23 duplicated and 14 non-English written publications were removed manually, with 92 publications remaining. In the third phase, Eligibility assessment, the 92 documents were assessed for relevance. In this regard, 43 publications considered irrelevant were excluded after review by two research assistants. Finally, only 49 publications were included in the analysis. The breakdown of these phases is presented in Figure 1.

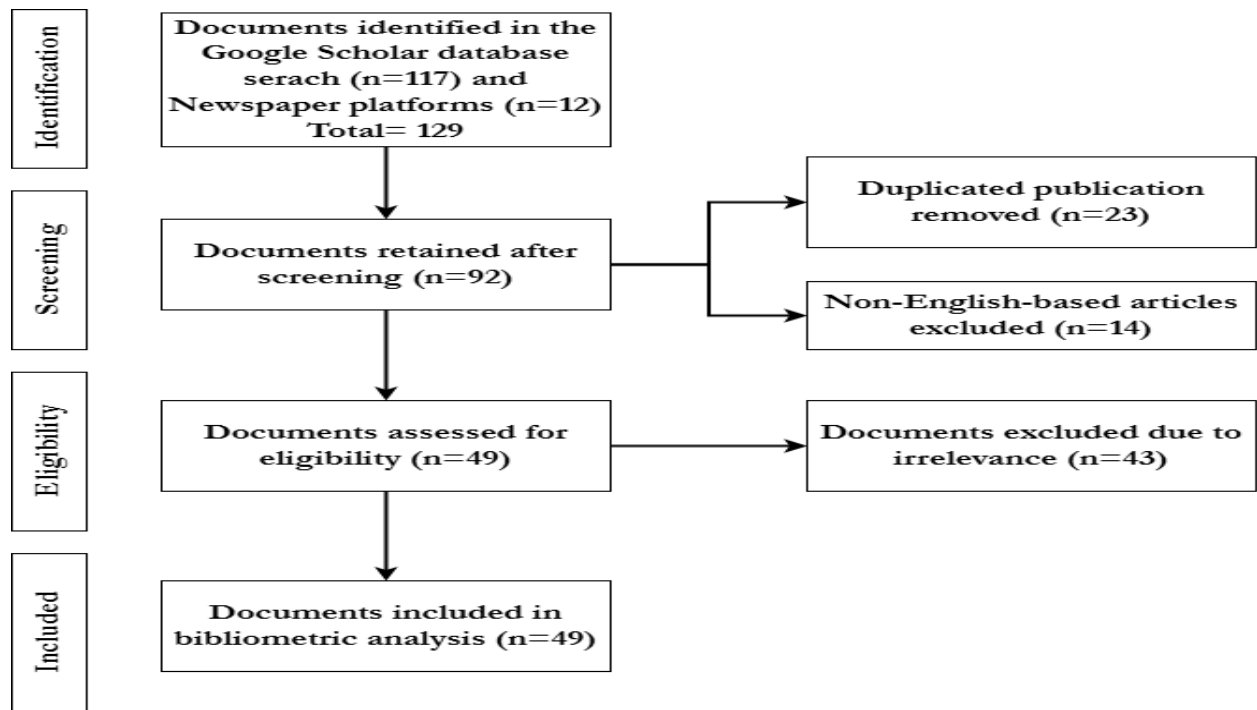


Figure 1. Data collection process

The quality of the publications included for analysis was confirmed by ensuring their clarity of objectives, analysis depth and relevance to the focus of the current study. Using these indicators, all 49 publications were rated as high in quality. In extracting the needed data from the adopted publications, two research assistants were engaged.

3.4. Analytical Framework

This study adopted operational efficiency measures, cost savings, environmental effect, scalability, and security as the primary metrics for evaluating smart city initiatives in Nigeria and South Africa. These metrics were selected based on their prominence in smart city evaluation literature (Patrão et al., 2020; Zaman et al., 2024) and their applicability across different contexts.

While acknowledging the challenges associated with adopting country-specific indicators for comparative analysis (Jacks et al., 2024), these metrics provided an opportunity for general assessments devoid of country-specific indicators such as prevailing socio-economic, cultural, and technological landscapes. This approach enabled meaningful cross-country comparison while maintaining analytical rigor.

Data synthesis employed thematic analysis to identify patterns, commonalities, and divergences across studies. The process involved:

- i. Initial coding: Extracted data was coded according to the five-evaluation metrics
- ii. Pattern identification: Common themes and recurring findings were identified within each metric category
- iii. Cross-case analysis: Comparative analysis between Nigerian and South African initiatives
- iv. Framework analysis: Examination of adopted frameworks and their effectiveness
- v. Synthesis of lessons: Integration of findings to derive lessons for public administrators

3.5.Limitations

This systematic review has several limitations:

- i. The search was limited to English-language publications, potentially excluding relevant studies in other languages.
- ii. Grey literature (technical reports, government documents, newspaper articles, etc.) was included, which may affect review quality.
- iii. The selected metrics, while broadly applicable, may not capture all dimensions of smart city success in these contexts.
- iv. The dynamic nature of smart city implementation means recent developments may not yet be reflected in published literature.

3.6.Ethical Considerations

As a review of published literature, this study did not require ethical approval. All included studies were properly cited, and their findings were reported accurately and in context.

4. Findings and Discussion

Cities in Nigeria and South Africa are usually congested and lack basic social infrastructure, given the vast landmass and population (Okewale & Atobatele, 2022; Toit & Stimie, 2023). And cities by their nature are emergency-prone environments (Costa & Peixoto, 2020), in addition to being sources of waste generation and excessive resource use (Kadiri et al., 2020). In cities like Lagos, Oyo, and Kano, in Nigeria, where commercial activities are at peak (Ogunseye et al., 2022; Okewale & Atobatele), fire incidence, once initiated, can spread rapidly, heavy downpour can cause erosion, and gas leakage can be catastrophic.

All these necessitated the need for the digital management of cities. These technologies provide viable platforms for data collection and analysis to inform policy decisions, optimise resource use, and improve public service delivery. Even though achieving this is becoming challenging on the African continent, given the limited upgradable infrastructure and funds, other economies such as Vancouver, Singapore (Ogunseye et al., 2022), Spain (Tripathi, 2024), Korea (Adejuwon, 2018), Canada, Japan, and Denmark (Okewale & Atobatele, 2022) are doing well in this regard.

Even though the idea of smart city initiatives is not new, there are conflicting reports on when it commenced in Nigeria. According to Okonji (2016), it began in February 2016 through the actions of the Permanent Secretary, Federal Ministry of Communication, Sonny Echono. In another submission, a practical step towards it started in 2017 (Ogunseye et al., 2022; Okewale & Atobatele, 2022; Mansur, 2019), when the Nigerian government, through the Ministry of Communication, organised a summit with the private sector on how to mainstream smart city initiatives into urban development and management in the country (SCSN, 2017).

Despite this contradiction, there is the understanding that it started with a summit, which identified the potential challenges and opportunities in pursuing the initiative. At the summit, it was concluded that the move towards smart cities in Nigeria could enhance the economic and social lives of urban people, using ICT (Okewale & Atobatele, 2022). To achieve this, stakeholders' buy-in is critical to the success of the initiative. This buy-in as pointed out in the summit tallies with the submission of Jacks et al. (2024); Kadiri et al. (2020) that for a complex policy initiative such as that of smart city to succeed, the need for collaboration which is usually built on the Public Private Partnership (PPP) framework (Adejuwon, 2018; Mansur, 2019) cannot be overemphasised.

In addition, the summit argued that an adequate legal framework is necessary to regulate smart city implementation in the country. Such a framework in Nigeria is regulated by the Town Planning Authority (Kadiri et al., 2020). This body relies on the Urban and Regional Planning Law No. 88 of 1992 to ensure orderly planning of cities and towns by stipulating permissible standards for all aspects of planning activities. The combination of these efforts is expected to create the needed foundation for the smart city initiative to thrive in the country.

Despite the potential of the smart city initiatives as portrayed in the SCSN summit, the pace towards making cities smart in Nigeria is rather slow, given several obstacles (Kadiri et al.). As noted by Adejuwon (2018), Okewale and Atobatele (2022), for instance, basic social and communication infrastructure required to drive the transition are inadequate. This is further aggravated by the growth of slums and informal settlements around cities (Okewale & Atobatele, 2022; Toit & Stimie, 2023). Regardless of these challenges, slow but steady progress is still visible in many cities in Nigeria.

In transportation management, for instance, both the government and stakeholders have shown significant commitment. In 2017, Google Maps was deployed with a street view of about 10,000

kilometres in Nigeria (Okewale & Atobatele, 2022). Also, a smart rail system was inaugurated in Abuja and Lagos, with other cities to follow (Adejuwon, 2018). In Lagos, the Bus Rapid Transit (BRT) is equipped with Wi-Fi connectivity (Okewale & Atobatele, 2022) to enable commuters to link up with the world even while on the move. More particularly, the Jalingo Smart City Tracking and Monitoring Project, an initiative of the National Information Technology Development Agency (NITDA), has been globally recognized (Okonji, 2016) as an epic step on the part of the country towards championing smart city initiatives on the African continent.

Here and there, smart cities, such as in Ibeju Lekki, Eko Atlantic, the Lekki-Epe Expressway (Adejuwon, 2018; Ogunseye et al., 2022; Okewale & Atobatele, 2022), Abuja Integrated Transportation Project, the Ibadan Smart Waste Collection and Mapping System, the Awka Smart Internally Generated Revenue Collection Project, the Port Harcourt Traffic Flow Control System, and the Smart Education Management Hubs in Sokoto and Kaduna cities (Okonji) are springing up in Nigeria.

In South Africa, the idea of a smart city started much later in 2019, during a national address by President Cyril Ramaphosa (Chetty, 2022; DCoG, 2021; Toit & Stimie, 2023). By 2020 and 2021, the 2019 – 2024 Medium Term Strategic Framework (MTSF) was launched. In this framework, the three cities' development projects: Lanseria, Durban Aerotropolis, and Mooikloof Mega-City were activated. Primarily in South Africa, the Department of Cooperative Governance (DCoG) provides leadership in the development of cities and towns (Chetty), and this body is expected to champion these pioneering projects. However, these projects suffer from implementation challenges from the government. Despite the establishment of the DCoG, smart city policies are uncoordinated in the country, even though Toit and Stimie (2023) reported slow progress as evidenced in the Waterfall City project in Gauteng.

Many challenges have continued to mitigate the extent to which South Africa could pursue its smart city initiative. Some of these challenges, as noted by Toit and Stimie (2023), were poor infrastructure, ineffective regulations, corruption, and the prevalence of informal settlements. In describing the South African reality, DCoG (2021) characterised the country as having overwhelming socio-economic challenges. These issues have continued to limit the effort of public administration in the country in the implementation of smart city initiatives.

5. Lessons for Public Administrators

In Africa and most especially in the focused countries, smart cities respond to emerging urban issues that resulted from high population, inadequate city infrastructure, improper waste management, and rapid environmental degradation (Abbasnia et al., 2023; Brglez et al., 2024; DCoG, 2021; Ebekoziem et al., 2024; Hashemi-Amiri et al., 2023). All these curtailed the extent to which the government can coordinate city life and deliver public services to the citizens, effectively and efficiently. The responsibility of saving the situation mostly lies with public administrators. Even though they are specialists in city administration, public administrators must be strategic and guided by lessons from other climes. It is on this note that this paper explored smart city initiative implementation in Nigeria and South Africa with a view to investigating possible areas of peer learning between public administrators in the two countries.

Comparatively, the idea of smart city commenced in Nigeria and South Africa less than a decade ago (Chetty, 2022; Ogunseye et al., 2022; Okewale & Atobatele, 2022; Okonji, 2016; Mansur, 2019; Toit & Stimie, 2023). This showed a striking similarity in the period of smart city initiative adoption in the two countries. Actually, in this period, there was a rising population in major urban centres of the two countries (Kadiri et al., 2020; Okewale & Atobatele, 2022; Toit & Stimie, 2023), while the pressure on government and city administrators was at its peak (Adejuwon, 2018; Chetty). Similarly, the two countries began with ambitious projects without a commensurate implementation follow-up (Okonji, 2019; Toit & Stimie, 2023). The lesson here for public administrators is on the need to scale smart city initiatives into manageable phases with realistic timeframes. This could inform faster initiative implementation and better outcomes. The DCoG (2021) equally recommended that smart city policies be integrated with national plans rather than being isolated as a stand-alone initiative.

In the implementation of smart city initiatives in the countries were Town Planning Authority (Kadiri et al., 2020) in Nigeria and DCoG (DCoG, 2021) in South Africa. These bodies championed the initiatives but ended up recording few results owing to several challenges. These challenges centred on inadequate social infrastructure in cities, corruption, ineffective regulations, and overpopulation (Okewale & Atobatele, 2022; Toit & Stimie, 2023). More particularly in South Africa, just as it is in Nigeria, DCoG (2021) posited that the regular supply of electricity, which is a critical component of the smart city initiative, is lacking in the country.

From the comparative analysis of Nigeria and South Africa in terms of smart city initiatives, public administrators in the two countries have many lessons to learn. At first, there is a need for urgent investment in city infrastructure. These should not be regular infrastructure but state-of-the-art infrastructure that can withstand integration with AI. Smart cities have gone beyond just integrating ICT into the administration of cities; instead, AI and IoT offer self-guiding and thinking technologies that reduce human involvement in the administration of cities. As noted by Adejuwon (2018), with AI, public administrators are able to deliver public services more efficiently and effectively. In support of this, Ejjami (2024) argued that using AI and IoT in public administration enhances risks, disruptions, and danger mitigation. There is, therefore, a need for public administrators in Nigeria and South Africa to buy into this revolution.

It is one thing to adopt ICT, AI, and IoT in the management of cities; it is another to be skilled in using them. It is therefore important that public administrators become ICT- and AI-compliant (Adejuwon, 2018) to manage the ever-increasing service demand pressure. Also, public administrators in Nigeria and South Africa must be willing to tackle the growing urban slums, as sprouting slums and informal settlements (Toit & Stimie, 2023) are recurring features of urban centres anywhere in the world. These settlements constitute both security and social concerns for the governments in Nigeria (Adejuwon, 2018; Kadiri et al., 2020; Okewale & Atobatele, 2022) and South Africa (DCoG, 2021). Addressing this issue is critical to the successful implementation of smart city initiatives in the study areas.

Infrastructure funding cannot be overemphasised, and this is why it features in several sections of this paper. In Nigeria (Kadiri et al., 2020) and South Africa (Toit & Stimie, 2023), investment in social infrastructure is poor, and this is further worsened by endemic corruption and a poor public infrastructure maintenance culture. Significant improvement in infrastructural funding must be pursued by the public administration in the two countries. Partners from domestic and international organisations, such as Surveyors and Town planners (Mansur, 2019), multinational companies, private businesses, NGOs, etc., can be helpful in this regard (Ogunseye et al., 2022). Funding on the part of the home government is based on the extent of willingness displayed by the political class. Thus, the role of the political class is also sacrosanct.

Cities, as noted by DCoG (2021), are considered smart when they increase the chances of social, economic, and environmental sustainability outcomes. These outcomes are not automatic; rather,

they result from deliberate actions of public administrators guided by the directives of the political class. These directives need to be backed by a strong political will on the part of politicians in Nigeria and South Africa (Ogunseye et al., 2022). It is through such a strong political will that a significant commitment to funding smart city initiatives can emerge. Also, public administrators in each country must study, understand, and exploit their peculiarities in the implementation of smart city initiatives. With these peculiarities, they can identify the perfect merging points of technology and societal needs to provide better service that can positively impact the lives of the people. To achieve this, people's participation cannot be overlooked, as smart city initiatives have the primary aim of improving the quality of life of the urban dwellers (Chetty, 2022). For this to be efficiently and effectively achieved, there is a need to integrate citizens into the implementation of smart city initiatives (Ogunseye et al., 2022). Inclusiveness in smart city implementation is, therefore, an important driver for a successful smart city development in Nigeria and South Africa.

6. Conclusion

The innate potential of ICT in leapfrogging development, especially among African cities, is assuming popularity (Jacks et al., 2024; Mansur, 2019). Thus, governments on the continent are exerting much pressure on their public administrators to facilitate the transformation of their hitherto traditional cities to data-driven ones. Leading in this regard are Nigeria and South Africa. In this paper, challenges and opportunities prevalent in each of the countries are discussed. These challenges include inadequate service infrastructure, issues of inclusion, emerging slums, and inadequate funding. The comparative analysis of smart city initiatives in the two countries showed more commonalities than divergencies. This illustrates the potential of a single smart cities' implementation framework on the African continent. Designing such a framework could be the focus of subsequent studies.

7. References

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