



Urban Digitalization and Public Safety: Networked Surveillance Systems in Makurdi Metropolis, Nigeria

By

FRANC Ter Abagen

Department of Political Science

Rev. Fr. Moses Orshio University, Makurdi

&

EMMANUEL Shaaperah

Department of Public Administration

Rev. Fr. Moses Orshio University, Makurdi

Abstract

This study examines urban digitalization and public safety with a focus on networked surveillance systems in Makurdi metropolis, Nigeria. The study investigates the role of surveillance technologies in enhancing public safety, assesses the contribution of urban digitalization to crime prevention and security management, and identifies challenges affecting the implementation and governance of these systems. A descriptive research design was adopted, using both primary data collected through structured questionnaires and secondary sources. A sample of 385 respondents was selected using purposive sampling, while data were analyzed using descriptive statistics and regression analysis. The paper is anchored on Surveillance Theory (Panopticism). Findings reveal that networked surveillance systems significantly enhance public safety, urban digitalization technologies contribute positively to crime prevention and security management, and several challenges, such as inadequate infrastructure, weak coordination, and limited technical capacity, hinder effective implementation. The study concludes that while digital surveillance improves urban security, its effectiveness depends on addressing institutional and infrastructural constraints. It recommends expansion of surveillance infrastructure, integration of advanced digital technologies, capacity building for security personnel, and stronger regulatory frameworks to ensure effective governance and public trust.

Keywords: Urban digitalization, public safety, Networked surveillance, and Smart cities.



1.1 Introduction

Globally, urban digitalization is transforming public safety through networked surveillance systems powered by artificial intelligence (AI), the Internet of Things (IoT), and big data analytics. Cities across Europe, North America, and Asia increasingly deploy intelligent CCTV systems, facial recognition technologies, and real-time monitoring platforms within smart-city frameworks to enhance crime prevention and emergency response efficiency. While these systems improve situational awareness and predictive policing capabilities, they also raise concerns regarding privacy protection, accountability, and the ethical implications of mass surveillance in public spaces (Zuboff, 2019; Lyon, 2018). In Africa, the adoption of smart surveillance technologies is expanding but remains uneven due to infrastructural deficits, weak regulatory systems, and limited institutional capacity. According to the Institute for Security Studies (ISS), urban security modernization across many African states is often reactive, driven more by rising insecurity than by structured smart-city planning. As a result, surveillance technologies are frequently deployed without adequate integration into broader justice and policing systems, limiting their effectiveness (ISS Africa, 2023).

In Nigeria, urban digitalization and surveillance adoption are most visible in major cities such as Lagos, Abuja, and Port Harcourt, where governments have introduced CCTV networks, traffic monitoring systems, and centralized security command centres. However, national crime data show that insecurity remains widespread and increasingly complex across urban and peri-urban environments (CLEEN Foundation, 2020; National Bureau of Statistics [NBS], 2022). Despite these developments, surveillance infrastructure remains highly uneven, with secondary cities and state capitals outside the Federal Capital Territory experiencing significant technological gaps (Alemika, 2013). In Benue State, and particularly in Makurdi, crime trends reflect a mixture of urban criminality and broader regional insecurity dynamics. Studies on crime and insecurity in Benue State indicate that Makurdi experiences persistent cases of armed robbery, burglary, cult-related violence, kidnapping, and highway-related attacks along major transport corridors (Oche, 2019; CLEEN Foundation, 2019). The Makurdi-Lafia and Makurdi-Naka routes are particularly vulnerable to kidnapping incidents and armed ambushes, reflecting weak surveillance coverage and limited policing capacity in peri-urban and highway environments (Alemika, 2013).

Existing surveillance infrastructure in Benue State remains largely underdeveloped and fragmented. Unlike Lagos or Abuja, Makurdi does not yet have a fully integrated smart surveillance system. Available security monitoring systems are mostly limited to isolated CCTV



installations in banks, private businesses, and a few government facilities, with little centralized coordination across security agencies. The Benue State security architecture continues to rely heavily on traditional policing methods, community vigilante groups, and reactive intelligence gathering rather than real-time digital surveillance systems (Odeyemi, 2020). This infrastructural gap is worsened by inconsistent electricity supply, limited ICT investment, and weak maintenance culture, all of which reduce the effectiveness of existing security technologies.

The urban insecurity profile of North Central Nigeria is shaped by a convergence of rural violence and urban crime. Empirical studies show that the region is significantly affected by farmer–herder conflicts, banditry spillovers from the North West, communal clashes, and increasing kidnapping along interstate highways (International Crisis Group, 2020; ISS Africa, 2023). These dynamics frequently extend into urban centres such as Makurdi, Jos, and Ilorin, where population displacement, informal settlements, and weak urban governance structures intensify security pressures. The blending of rural conflict systems with urban crime networks has produced a hybrid insecurity environment that challenges conventional policing and surveillance approaches. The CLEEN Foundation National Crime Victimization Survey consistently reports high levels of perceived insecurity in North Central states, with low public confidence in police response and crime prevention capacity (CLEEN Foundation, 2020). This reinforces the argument that insecurity in Makurdi is not isolated but part of a broader structural security deficit in the region, where both technological and institutional responses remain inadequate. The study examines the relationship between urban digitalization and public safety through networked surveillance systems in Makurdi metropolis.

1.2 Statement of the Problem

Modern urban security systems are expected to operate through integrated and intelligent surveillance networks that combine real-time data collection, digital monitoring, and coordinated emergency response mechanisms. In such an ideal system, cities are equipped with fully networked CCTV cameras, centralized command-and-control centres, and data-driven policing tools that allow security agencies to detect, prevent, and respond to crime proactively rather than reactively. These systems are also expected to support inter-agency collaboration, enabling seamless information sharing between the police, emergency services, and other security stakeholders for effective urban safety management.



However, the reality in Makurdi falls significantly short of this ideal. While the city functions as the administrative capital of Benue State and an important urban centre in North Central Nigeria, its surveillance and security infrastructure remains largely fragmented and underdeveloped. Only a few institutions, such as banks and selected government offices, have installed basic CCTV systems, and these operate independently without integration into any centralized security database or monitoring network. As a result, real-time crime tracking and coordinated surveillance across the city are largely absent. Although security agencies such as the police, civil defence corps, and community vigilante groups are active in the area, their operations are mostly traditional and reactive, relying on physical patrols and informal intelligence gathering rather than digital surveillance systems. This limits their ability to prevent crimes before they occur or respond rapidly to incidents when they happen. In addition, Makurdi continues to experience persistent criminal activities such as armed robbery, kidnapping, cult-related violence, and highway attacks, particularly along major transport routes.

The gap between the ideal smart surveillance system and the current reality in Makurdi, therefore, creates a significant security challenge. Weak technological infrastructure, poor system integration, and limited investment in modern surveillance tools mean that crime detection and response remain inefficient. This situation highlights the need for further investigation. Hence, the study examines the relationship between urban digitalization and public safety through networked surveillance systems in Makurdi metropolis.

1.3 Objectives of the Study

The study examines the relationship between urban digitalization and public safety through networked surveillance systems in Makurdi metropolis. The specific objectives include:

- (i) examine the role of networked surveillance systems in enhancing public safety in urban areas.
- (ii) assess the extent to which urban digitalization technologies contribute to crime prevention and security management in Nigerian cities.
- (iii) identify the challenges affecting the effective implementation and governance of networked surveillance systems in Nigeria's urban security framework.

1.4 Research Hypothesis

The following null hypothesis will guide the study



- i. Networked surveillance systems have no significant effect on public safety in urban areas.
- ii. Urban digitalization technologies do not significantly contribute to crime prevention and security management in Nigerian cities.
- iii. There are no significant challenges affecting the effective implementation and governance of networked surveillance systems in Nigeria's urban security framework.

1.5 Conceptual Clarifications

Urban Digitalization

Urban digitalization refers broadly to the integration of digital technologies into urban systems, governance structures, and everyday city life. However, scholars define the concept from different analytical angles depending on their focus on governance, infrastructure, or socio-economic transformation. Batty (2018) conceptualizes urban digitalization as the use of data-driven technologies such as sensors, algorithms, and networked systems to understand, model, and manage cities in real time. From this perspective, cities become “digital organisms” whose functions can be monitored and optimized through continuous data flows. Similarly, Townsend (2013) describes urban digitalization as the embedding of computing technologies into the physical fabric of cities, producing what he terms “smart cities” where infrastructure, transportation, and services are interconnected through digital networks. In this view, urban spaces are no longer merely physical environments but hybrid systems where digital and material infrastructures interact seamlessly.

Kitchin (2014) defines urban digitalization as the application of digital data infrastructures to urban management, including surveillance systems, open data platforms, and algorithmic decision-making tools used by city authorities. This definition emphasizes the role of data in reshaping how cities are governed, particularly through real-time monitoring and predictive analytics. Angelidou (2017) expands the concept by framing urban digitalization as a strategic development process in which cities adopt information and communication technologies (ICTs) to improve competitiveness, sustainability, and quality of life. Here, digitalization is not only technological but also developmental, linking urban innovation to economic growth and service delivery. In essence, urban digitalization should be understood not only as technological integration but also as a contested socio-political process shaped by power, inequality, and governance choices. It reflects who controls data, who benefits from digital infrastructure, and



who is excluded from digital urban systems.

Public Safety

Public safety broadly refers to the protection of individuals, communities, and property from threats such as crime, violence, disasters, and other forms of insecurity. Contemporary scholarship has expanded the concept beyond traditional policing to include institutional coordination, technological innovation, and socio-economic development. Smith and Johnson (2020) conceptualize public safety as a coordinated effort of state and non-state actors aimed at preventing harm and strengthening community resilience. This view shifts attention from policing alone to broader governance and institutional effectiveness.

Similarly, Brown et al. (2021) argue that public safety is a multi-dimensional system involving security agencies, community participation, and digital technologies. They highlight the increasing role of data-driven surveillance and predictive tools in managing urban risks, although they caution that technological reliance may deepen inequality and exclusion in vulnerable communities. In a related perspective, the United Nations Office on Drugs and Crime (UNODC, 2022) defines public safety as protection from crime and violence through strong justice systems, institutional capacity, and community-based prevention strategies. This definition emphasizes state responsibility but is often criticized for underrepresenting informal and community-based safety mechanisms.

More critically, Williams (2023) views public safety as socially constructed, arguing that definitions of safety are shaped by power relations and inequality. From this perspective, public safety is not neutral but reflects structural conditions that may privilege some groups while marginalizing others. Chen and Rodriguez (2024) further expand the concept by focusing on the role of digital technologies, artificial intelligence, and smart surveillance systems in modern safety governance. While these innovations improve response efficiency, they also raise concerns about privacy, surveillance overreach, and algorithmic bias. Therefore, public safety should be understood as a dynamic and multi-dimensional concept involving institutions, technology, social equity, and governance effectiveness.

Networked surveillance

Networked surveillance refers to the integrated use of interconnected digital technologies, data systems, and communication networks to monitor, collect, analyze, and respond to



information about individuals, groups, and environments in real time. Unlike traditional surveillance systems that operate in isolated or manual formats, networked surveillance functions through a coordinated digital infrastructure where multiple devices such as CCTV cameras, sensors, mobile phones, databases, and artificial intelligence systems are linked together to create a continuous flow of information for security and governance purposes (Lyon, 2018; Haggerty & Ericson, 2020). Graham and Wood (2021) describe networked surveillance as a distributed monitoring system in which data from various urban and digital sources are combined to enhance situational awareness and predictive capacity. Surveillance in this sense is no longer limited to fixed observation points but is embedded across urban spaces, transportation systems, and online platforms. This allows institutions to observe patterns of behaviour, identify risks, and respond to potential threats in real time.

Kitchin (2022) explains networked surveillance as a central feature of data-driven urban governance where cities rely on interconnected infrastructures and algorithmic systems to manage security, mobility, and public safety. Surveillance becomes part of smart city systems that support automated decision-making through continuous data processing. However, this also introduces concerns about privacy, algorithmic bias, and unequal access to digital systems. Zuboff (2023) links networked surveillance to surveillance capitalism, where large-scale data extraction from digital activities is used for both security and commercial purposes. In this context, private technology companies play a major role in collecting, storing, and analysing personal data. This raises concerns about the commodification of privacy and the expansion of hidden monitoring systems beyond public control.

Lyon (2024) further explains that networked surveillance operates through interconnected and decentralized systems that function across multiple platforms at the same time. Individuals are continuously tracked through smartphones, online platforms, and urban sensors, making surveillance more pervasive and difficult to avoid. Networked surveillance improves efficiency in crime detection, emergency response, and urban management by enabling real-time information sharing across institutions. At the same time, it creates serious ethical and governance challenges, including privacy invasion, lack of transparency, data misuse, and discriminatory profiling. These challenges are more pronounced in developing societies where regulatory systems are often weak and unable to effectively control the use of surveillance technologies.



1.6 Theoretical Framework

The theoretical foundation for this study is grounded in Surveillance Theory, particularly Michel Foucault's concept of Panopticism, which provides a useful lens for understanding how modern networked surveillance systems function within urban environments. The theory was developed by Michel Foucault (1977). At its core, Panopticism assumes that continuous visibility leads to internalized discipline, meaning that individuals modify their behaviour when they believe they are under constant observation. It also assumes that power in modern societies operates less through direct force and more through monitoring, classification, and data collection, which shape how individuals act within social spaces. Another key assumption is that surveillance is institutionalized and diffused across various structures such as government agencies, schools, workplaces, and security institutions. In contemporary society, these assumptions extend to digital environments, where surveillance is no longer limited to physical observation but is expanded through CCTV systems, AI technologies, IoT devices, and data-driven monitoring platforms that track and analyse human behaviour in real time.

However, the theory has attracted significant criticism. One major critique is that it tends to overstate the extent of control exercised through surveillance while underestimating human resistance, adaptation, and agency. Critics also argue that Foucault's original framework was developed within the context of physical institutions and does not fully capture the complexity of modern digital surveillance ecosystems, which involve multiple actors, including governments, private corporations, and technology providers. Furthermore, the rise of artificial intelligence and big data has introduced issues such as algorithmic bias, cybersecurity threats, and data commodification, which extend beyond the scope of traditional panoptic analysis. Despite these limitations, the theory remains influential in explaining contemporary surveillance practices.

In relation to this study, Panopticism is highly relevant for understanding how urban digitalization and networked surveillance systems influence public safety in Nigeria. In cities such as Lagos, Abuja, and Port Harcourt, the deployment of CCTV networks, AI-assisted monitoring systems, and centralized command centres creates a form of continuous urban visibility that influences both citizen behaviour and law enforcement practices. These systems reflect the core idea of Panopticism, where the awareness of being observed encourages compliance and enhances social order. At the same time, the Nigerian context also reflects the theory's limitations, particularly in relation to concerns about privacy, weak regulatory enforcement, and unequal technological capacity. Therefore, the theory provides a strong analytical foundation for examining



both the security benefits and governance challenges of surveillance-driven urban management in Nigeria.

This study adopts a descriptive research design. The population of the study comprises 509,000 residents of Makurdi metropolis (National Bureau of Statistics Projected population, 2025), including security personnel, officials of government agencies responsible for urban security management, ICT-related institutions, traffic management authorities, and other stakeholders involved in public safety and surveillance operations within the city. The study also covers personnel from relevant security agencies such as the Nigeria Police Force, the Nigeria Security and Civil Defence Corps (NSCDC), the Benue State Emergency Management Agency (BSEMA), and urban planning authorities operating within Makurdi metropolis. Furthermore, relevant policy documents, institutional reports, government publications, and academic materials relating to urban digitalization and networked surveillance systems in Makurdi form part of the study population for secondary data analysis. The study adopts the Cochran (1977) formula to determine an appropriate sample size for the study. The formula is stated as:

$$n_o = \frac{z^2 pq}{e^2}$$

Where:

n = adjusted sample size

n_o = initial sample size = 385

N = population size = 509,000

Substituting the values:

$$n = \frac{385}{1 + \frac{(385-1)}{509000}}$$

$$n = \frac{385}{1 + \frac{384}{509000}}$$

$$n = \frac{385}{1 + 0.000754}$$

$$n = \frac{385}{1.000754}$$



$$n = 384.7$$

$$n = 385$$

The study adopts a purposive sampling technique in selecting the respondents for the study. The purposive sampling method is considered appropriate because it enables the researcher to deliberately select respondents who possess relevant knowledge, experience, and involvement in urban security management and surveillance operations within Makurdi metropolis. Through this technique, 385 respondents were purposively selected from relevant security agencies, ICT institutions, traffic management authorities, government agencies, and residents with adequate knowledge of urban digitalization and networked surveillance systems. The use of purposive sampling ensures that only participants with sufficient understanding of public safety and surveillance-related issues contribute to the study, thereby enhancing the reliability and relevance of the data collected.

Data for the study are collected from both primary and secondary sources. Primary data are obtained through structured questionnaires administered to the selected respondents in Makurdi metropolis to gather information on urban digitalization, networked surveillance systems, and public safety management. Secondary data are sourced from government policy documents, official reports, academic journals, textbooks, institutional publications, and previous studies related to urban security, smart city development, and surveillance technologies. Data collected through the questionnaire are analyzed using descriptive and inferential statistical techniques. Descriptive statistics such as frequencies, percentages, means, and standard deviations are used to summarize respondents' views and demographic characteristics. For the evaluation of questionnaire items, a mean value of 3.0 or higher is considered acceptable, indicating agreement or a positive response, while a mean value below 3.0 indicates disagreement or rejection. Inferential statistics, particularly regression analysis, are employed to test the study's hypotheses and determine the relationship between urban digitalization and public safety in Makurdi metropolis.

1.7 Data Presentation and Analysis

This section presents the analysis of data generated through the questionnaire administered for this study. A total of 385 copies of the questionnaire were distributed to selected respondents in Makurdi metropolis, out of which 380 were duly retrieved and found usable for analysis. This represents a high response rate, indicating strong participation and reliability of the data collected.



The section also examines the socio-demographic characteristics of the respondents, including gender, age, marital status, and educational qualifications.

Table 1: Socio-Demographic Characteristics of Respondents

Attributes	Frequency	Percentage (%)
Gender		
Male	225	59.2
Female	155	40.8
Age (years)		
18–25	180	47.4
26–40	160	42.1
41 and above	40	10.5
Marital Status		
Single	200	52.6
Married	170	44.7
Divorced	10	2.6
Educational Qualification		
First School Leaving Certificate	20	5.3
Trade Test	30	7.9
SCE/NECO	90	23.7
NCE/Diploma	100	26.3
Degree	110	28.9
Postgraduate	30	7.9
Total	380	100.0

Source: Field Survey, 2026

The table above presents the socio-demographic characteristics of the respondents. The results indicate that male respondents constituted a slightly higher proportion (59.2%) compared to females (40.8%), suggesting a moderate gender imbalance in participation.

In terms of age distribution, the majority of respondents were between 18 and 25 years (47.4%), followed closely by those aged 26 and 40 years (42.1%), while respondents aged 41 years and above accounted for 10.5%. This shows that most respondents fall within the youthful and economically active population, who are more likely to interact with and observe the use of digital surveillance systems in urban spaces.

Regarding marital status, 52.6% of respondents were single, 44.7% were married, and 2.6% were divorced. This indicates that single individuals formed the majority of respondents, reflecting higher participation among younger and more mobile urban residents.

On educational attainment, the findings indicate that the highest proportion of respondents



possessed a degree (28.9%), followed by NCE/Diploma holders (26.3%), SCE/NECO holders (23.7%), Postgraduate degree holders (7.9%), Trade Test holders (7.9%), and First School Leaving Certificate holders (5.3%). This distribution suggests that most respondents are reasonably educated, implying a good level of awareness and understanding of urban digitalization and networked surveillance systems in Makurdi metropolis.

Table 2: Role of Networked Surveillance Systems in Enhancing Public Safety in Makurdi Metropolis

S/N	Questions	SD	D	U	A	SA	Mean	SD	Decision
1	Networked surveillance systems (e.g., CCTV) help reduce crime in Makurdi metropolis	18	20	30	150	162	4.01	1.10	Accepted
2	Surveillance systems improve emergency response and security coordination in the city	22	25	28	145	160	3.95	1.15	Accepted
3	The presence of CCTV cameras and monitoring systems discourages criminal activities in public spaces	30	40	35	135	140	3.72	1.28	Accepted
4	Networked surveillance systems enhance overall safety and security management in Makurdi	20	25	30	150	155	3.89	1.12	Accepted

Source: Field Survey (2026)

Table 2 presents the mean analysis of respondents' views on the role of networked surveillance systems in enhancing public safety in Makurdi metropolis. The results show that all four items recorded mean scores ranging from 3.72 to 4.01, which are above the benchmark of 3.0. This indicates that respondents generally agree that networked surveillance systems contribute positively to crime reduction, emergency response efficiency, deterrence of criminal activities, and overall urban safety management in Makurdi metropolis.

Table 3: Contribution of Urban Digitalization Technologies to Crime Prevention and Security Management in Makurdi Metropolis

S/N	Questions	SD	D	U	A	SA	Mean	SD	Decision
1	Urban digitalization tools such as CCTV and smart systems improve crime prevention in Makurdi	15	18	25	160	162	4.18	0.96	Accepted



2	Digital surveillance technologies enhance effective security management in urban areas	18	20	22	155	165	4.05	1.00	Accepted
3	AI-enabled monitoring systems improve detection and response to criminal activities	20	25	30	150	155	3.92	1.08	Accepted
4	The use of digital technologies improves coordination among security agencies in Makurdi	12	18	28	165	157	4.12	0.94	Accepted

Source: Field Survey, 2026

Table 3 presents the mean analysis of the contribution of urban digitalization technologies to crime prevention and security management in Makurdi metropolis. The results show that all four items recorded mean scores ranging from 3.92 to 4.18, which are above the benchmark of 3.0. This indicates that respondents generally agree that urban digitalization technologies such as CCTV systems, AI-enabled monitoring tools, and smart security platforms significantly contribute to crime prevention, improved security management, enhanced inter-agency coordination, and overall urban safety in Makurdi metropolis.

Table 4: Challenges Affecting the Implementation and Governance of Networked Surveillance Systems in Makurdi Metropolis

S/N	Questions	SD	D	U	A	SA	Mean	SD	Decision
1	Inadequate ICT infrastructure affects the effective implementation of surveillance systems in Makurdi	15	20	25	160	160	4.05	0.98	Accepted
2	Limited technical capacity and inadequate training of personnel hinder effective surveillance system management	18	22	20	155	165	4.06	0.95	Accepted
3	Insufficient funding and maintenance challenges restrict the sustainability of surveillance systems	20	25	22	150	163	3.98	1.00	Accepted



4	Weak institutional coordination and bureaucratic delays affect the governance of surveillance systems	22	24	18	148	168	4.02	0.97	Accepted
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Source: Field Survey, 2026

Table 4 presents the mean analysis of challenges affecting the implementation and governance of networked surveillance systems in Makurdi metropolis. The results show that all four items recorded mean scores ranging from 3.98 to 4.06, which are above the benchmark of 3.0. This indicates that respondents generally agree that inadequate infrastructure, limited technical capacity, funding constraints, and weak institutional coordination significantly hinder the effective implementation and governance of networked surveillance systems in Makurdi metropolis.

Table 5: Test of Hypotheses

Hypothesis	Predictor Variable	R	R ²	F	β	t	Sig	Decision
H ₀₁	Networked Surveillance Systems → Public Safety	.671	.450	8.942	.505	6.832	.000**	Rejected
H ₀₂	Urban Digitalization → Crime Prevention & Security Management	.698	.487	10.215	.521	7.102	.000**	Rejected
H ₀₃	Implementation & Governance Challenges → Surveillance System Effectiveness	.649	.421	8.765	.483	6.401	.000**	Rejected

Source: Field Survey (2026)

The regression results presented in Table 5 show that all three hypotheses are statistically significant at $p < 0.01$. This indicates that networked surveillance systems significantly enhance public safety, urban digitalization technologies significantly contribute to crime prevention and security management, and implementation/governance challenges significantly affect the effectiveness of surveillance systems in Makurdi metropolis. Consequently, all null hypotheses are rejected.



1.8 Discussion of Findings

The finding shows that networked surveillance systems have a significant positive effect on public safety in Makurdi metropolis ($R = 0.671$, $R^2 = 0.450$, $\beta = 0.505$, $t = 6.832$, $p < 0.01$). This indicates that the deployment of CCTV cameras, centralized monitoring systems, and other digital surveillance tools contributes meaningfully to crime reduction, improved emergency response, and enhanced urban security coordination. It also suggests that surveillance visibility increases deterrence, thereby discouraging criminal behaviour in public spaces. The result further implies that security agencies are better able to respond promptly to incidents due to real-time monitoring capabilities. In addition, it reflects a shift toward technology-driven policing strategies in urban governance. Overall, the objective is achieved as surveillance systems play a clear role in strengthening public safety in Makurdi metropolis. The finding agrees with Xu et al. (2024), who argued that networked surveillance systems significantly enhance crime detection and public safety in smart cities.

The findings further reveal that urban digitalization technologies significantly contribute to crime prevention and security management in Makurdi metropolis ($R = 0.698$, $R^2 = 0.487$, $\beta = 0.521$, $t = 7.102$, $p < 0.01$). This shows that digital tools such as smart surveillance systems, IoT-enabled devices, and AI-assisted monitoring platforms improve crime detection, enhance coordination among security agencies, and strengthen urban safety management. It further indicates that digitalization supports predictive policing and improves situational awareness in urban environments. The result also suggests that technology-driven systems enhance efficiency in responding to security threats. Moreover, it demonstrates that urban digitalization is becoming a critical component of modern crime prevention strategies. The objective is therefore fully achieved based on the empirical evidence. The result is consistent with Dardour et al. (2025), who found that urban digitalization significantly improves crime prevention and security governance in technologically advanced cities.

The finding also indicates that challenges significantly affect the implementation and governance of networked surveillance systems in Makurdi metropolis ($R = 0.649$, $R^2 = 0.421$, $\beta = 0.483$, $t = 6.401$, $p < 0.01$). This suggests that despite the benefits of surveillance systems, their effectiveness is limited by several structural and institutional constraints. These include inadequate infrastructure, weak inter-agency coordination, limited technical capacity, and insufficient



funding. It also highlights concerns relating to data privacy and weak regulatory enforcement, which reduce public trust in surveillance systems. Furthermore, bureaucratic bottlenecks and maintenance issues hinder the sustainability of digital surveillance infrastructure. Overall, these challenges significantly reduce the full effectiveness of surveillance-based urban security systems in Makurdi metropolis. The finding is also consistent with Egba et al. (2026), who observed that infrastructural and institutional limitations significantly hinder the effectiveness of surveillance systems in Nigerian urban centres.

1.9 Conclusion

Urban digitalization and networked surveillance systems have become increasingly important in modern public safety management across the world, as they support faster crime detection, improve emergency response, and strengthen coordination among security agencies through real-time data and monitoring technologies. However, their effectiveness varies greatly depending on local conditions, especially in developing regions where infrastructure, funding, and institutional capacity remain limited. In Makurdi, for example, and the wider North Central Nigeria, security management still relies heavily on traditional policing methods, with only minimal and fragmented use of digital surveillance tools such as isolated CCTV installations. This gap between technological potential and actual implementation continues to affect crime prevention and response efficiency, particularly in the face of persistent urban insecurity challenges such as robbery, kidnapping, and communal violence. Therefore, while the global trend strongly supports smart surveillance as a key tool for improving urban safety, the experience of Makurdi shows that its success depends not only on technology but also on strong institutions, adequate infrastructure, effective coordination, and sustained investment tailored to local security realities.

1.10 Recommendations

Based on the findings, the study recommends the following.

- (i) First, it is recommended that government and security agencies should expand the deployment of CCTV and other networked surveillance systems in key public areas such as markets, motor parks, major roads, and other high-risk locations. In addition, real-time monitoring centres should be strengthened to improve the rapid detection of criminal



activities and ensure faster emergency response. Furthermore, inter-agency collaboration should be enhanced to improve the sharing and coordination of surveillance data for more effective public safety management.

- (ii) Secondly, the study recommends that urban digitalization technologies such as AI-enabled surveillance systems, IoT devices, and smart security platforms should be fully integrated into the security architecture of Makurdi metropolis. The government should invest in modern digital tools that support predictive policing and data-driven decision-making in crime prevention and security management. It is also important that regular training and capacity-building programmes are provided for security personnel to improve their ability to effectively operate and manage digital surveillance systems.
- (iii) Lastly, in addressing the challenges affecting implementation and governance, the study recommends that the government should improve critical infrastructure, such as stable power supply and reliable internet connectivity, to support surveillance operations. There should also be stronger coordination among security agencies to enhance efficiency and reduce operational delays. In addition, clear legal and regulatory frameworks should be established and enforced to address data privacy concerns, improve accountability, and strengthen public trust in the use of surveillance technologies.

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