

ROLE OF SMART CITY IN SUSTAINABLE URBAN DEVELOPMENT IN NIGERIA

Akujobi, C.T.^{*1}, Nwakanma, U.E.² and Ekeocha, O.E.¹

¹ Department of Sociology and Anthropology, University of Port Harcourt, Choba, Rivers State, Nigeria. Mobile: +2348064317522, Email: prof.akjizzle@gmail.com

² Department of Sociology, Abia State University, Ituru, Nigeria. Mobile: +2348034390731, Email: e.nwakanma@yahoo.com

¹ Mobile: +2348067638555, Email: estherekeocha1@gmail.com

* Author for correspondence.

Abstract

Although the spate of urban growth is increasing around the globe, urban decay ensures the cities cannot support the ever rising urban population and constitutes several environmental and social risks to urban dwellers in developing countries. To help develop strategies to curb the challenges of urban decay, this study examined the role smart cities initiatives can play in ensuring sustainable urban development in Nigeria. The paper adopts the library research method and relies on extant review of theoretical and empirical literature, from which inferences were drawn. Findings recommendations and implications would provide empirical approaches to curbing the problem of urban decay and guide policy makers to integrate smart city initiatives in sustainable urban development policies in Nigeria.

Keywords: *Smart cities, Urban decay, Sustainable urban development, Nigeria*

1.0 Introduction

In recent years, countries around the world have witnessed unprecedented increase in urban population and this has increasingly stretched the capacity of most cities to support the ever rising urban population amidst dwindling natural and economic resources. Most cities are confronted with the quagmire of managing the attendant socioeconomic and ecological problems emanating from the social relations of its teeming population. The world population has been projected to increase by more than one billion people amounting to about 8.5 billion by 2030. It is expected to increase further to 9.7 billion by 2050 and 11.2 billion by 2100 (UN 2015). The contemporary global population distribution indicates that approximately 60 % of the global population lives in Asia (4.4 billion), 16 % in Africa (1.2 billion), 10 % in Europe (738 million), 9 % in Latin America and the Caribbean (634 million), and the remaining 5 % in Northern America (358 million) and Oceania (39 million).

The spate of urban growth in Africa is fast becoming a concern for governments on the continents. Although a late starter in the global urbanization process, Africa is currently urbanizing at an alarming rate with predictions suggesting that Africa will enter the urban age around 2030 when half of Africans will live in urban areas Celik, 2005, UN-Habitat (2004). This process is suggested to be driven by Nigeria which is notably the most populous African -nation United Nations (2012). It is estimated that at current growth rate, Lagos will be the third largest city in the world with a population of over 24 million people by 2020 Dung-Gwom, J. Y., Hirse, S. O. and Pwat, S. P. (2008). A

crucial aspect of this is that city growth and expansion in Nigeria has been largely uncontrolled Egunjobi, L. (2000), Oyesiku, O.O. (2002), and Olanrewaju, D.O. (2004) thus compounding problems in the country. Some of these problems include inadequate and poor housing, slum-squatter settlements, inadequate water supply, waste disposal management, vehicular traffic and human congestion, high rates of unemployment, poverty, crime and other social problems Rotimi M. A. (2003, and Dung-Gwom, Hirse, and Pwat, (2008). Specifically, studies have shown that urban housing problems are universal; however, Olanrewaju, (2004) Aina, (1990) Lawanson, T. O. (2005), Olotuah,. and Bobadoye, (2009) opine that this problem is more critical in developing countries like Nigeria because of its magnitude and limited capacity to surmounting it. It is estimated that about 60-70% of Nigerian urban dwellers live in slums Dung-Gwom.& Oladosu, (2004),. Furthermore, Nigerian cities are known for poor waste management practices, ranging from poor waste collection system to ineffective disposal, which contribute adversely to crisis of air, water and soil pollution confronting sustainable urban development in the country. Also open and unsanitary landfills contribute to contamination of drinking water and increase infection and transmit diseases. Likewise, solid waste management has become a challenge for most cities across the world (UN-Habitat 2010). Most water bodies are been polluted with plastic wastes generated from the cities and as Jambeck et al. (2015) reported, 275 million metric tons of plastic waste was generated in 192 coastal countries in 2010 alone with approximately 1.7–4.6 % of these plastic wastes entering the oceans . Plastic wastes do not readily biodegrade but degrades

into smaller pieces that affect marine ecosystems (Derraik 2002). The plastics form 'soups' in five major ocean gyres: two in the Pacific, one in the Indian and two in the Atlantic and affect many marine biodiversity by ways of ingestion (Zarfl et al. 2011; McFedries 2012). Also consumer products contribute to the emission of micro-plastics to surface water such as cosmetics and personal care products, cleaning agents, paint and coatings (Van Wezel et al. 2015). The problem of urbanization induced environmental degradation evidently has engendered crises of underdevelopment in the country. Hence the need to investigate and provide new ways of managing the urbanization induced development crises and ensuring sustainable urban development in the country has increasingly become a concern for the government, scholars and development agencies. It is in the light of this that this study seeks to examine the role of smart city initiatives in promoting sustainable urban development in Nigeria.

2.0 Conceptual clarification

In the course of writing this paper, some key concepts were utilized and it becomes pertinent for these concepts to be operationalized as used in the context of this work.

2.1 Smart cities: There are many different ways of defining and understanding the idea of a smart city, complicated by overlapping terms such as the knowledge city (Yitcanlar et al., 2008), ubiquitous city (Leem and Kim, 2012), the digital city (Shin and Kim, 2012) and the intelligent city (Komninos, 2008), all of which have slightly different emphases. This study operationalized smart city to depict a city with smart Information and communication technology been central to its overall livelihood processes.

Ensuring sustainable development and quality of life in complex social relations of cities' environment and its inhabitant are imperative concerns to contemporary environmental concerns. Cities are increasingly aware of the concept of "smart city" and are actively developing strategies towards the goal of becoming "smart" and manage city resources more efficiently while addressing development and inclusion challenges. The genesis of the concept lie in Dutton's wired city, which promised to use emerging telecommunications technology to provide unprecedented amounts of data and information to households and businesses through "information highways" that, would create a communications-centric society. Another precursor to the smart city is the digital city, a technologically-defined city that uses widespread broadband infrastructure to support e-Governance and "a global environment for public transactions" (Mitchell, 2000).The notion of smart city is established from the combination of the knowledge society and digital city. It is defined as a "multi-layer territorial system of innovation" made up of digital networks, individual intellectual capital, and the social capital of the city, which together constitute collective intelligence (Komninos, 2008). Economic competitiveness and innovation achieved through the knowledge-based economy marks a city as intelligent, allowing it to generate a "spatial competitive advantage" through industrial districts, regions, and learning clusters that produce sophisticated R&D and are supported by digital networks and artificial intelligence (Komninos 2008).

2.2 Sustainability:

Sustainability can be defined as the way of economic and social development without disrupting the environment. If we consider the Brundtland commission report (The United Nations Report 1987), it defines sustainable development with two concepts: development focusing on the world's poor and

although development is limitless from the technology purview, it still has many limitations considering the environment's ability to satisfy our present as well as future needs. The sustainable development can be broadly classified into Social, Economic, and Environmental sustainability. These would encompass the major requirements of city environments comprising of sustaining water, energy, and food supplies, managing water and reducing greenhouse gas emission. 70% of the world's population is expected to reside in the cities in less than 40 years (Charbel Aoun 2013). Cities are the foundation for providing economic stability to its citizens by attracting business and capital. Cities need to become more efficient, more livable and provide better quality of life, business opportunities and security to achieve social inclusiveness and social sustainability. Cities consume 75% of our energy resources, and emit 80% of the carbon that is harming our environment (Charbel Aoun 2013) A smart city leads its community to become more competitive for capacity, opportunity and investment by providing an enhanced quality of life as well as decreases the environmental consequences of urban life by decreasing its carbon footprint through sustainable and integrative governance.

2.3 Urban

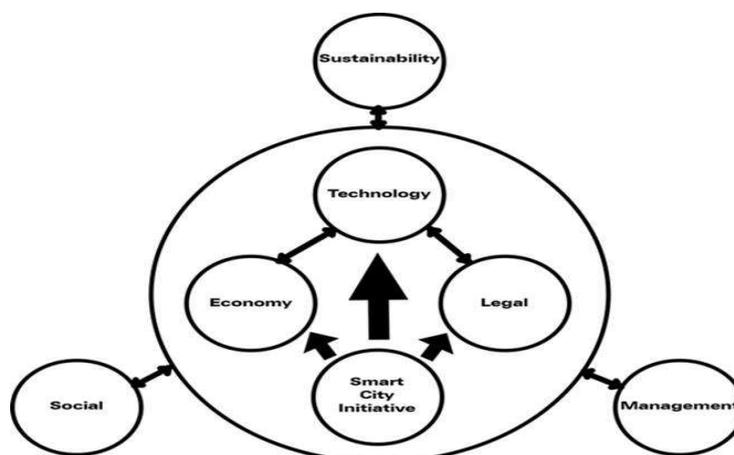
Development in Nigeria: To understand the inherent problems of smart cities and sustainable urban development it would suffice one to take a historical review of urban development plans in Nigeria; 1960-1966: focused its development plan in the country on sectoral and economic planning rather than conscious efforts aimed at resolving physical planning challenges. The second National Development Plan 1970-1974, was formulated as the first after the Nigeria civil war, designed to reconstruct the Eastern parts of the country most affected by the civil war. The 1975-1980 plan that brought a great relief to physical planning activities by including certain policies that

relate to environment and rural development, the establishment of Federal Ministry of Housing, Urban Development and Environment. The greatest contribution of the Federal Government to Urban and Regional Planning during post-independence period and through the third National Development Plan (1975 – 1980) was institutionalization of the concept of new towns which led to the emergence of Abuja, Onne, Satellite town and Festac town. A critical look at the sustainable positions of these towns would argue sternly that outside the present Abuja City and the then celebrated FESTAC towns that is evidently deteriorating as a result of ineptitude of our unsustainable policy thrust with only Abuja seemingly at the forefront of looking smart as a result of bias and political economy of national development in Nigeria. In addition to this, the World Bank started making in-roads into the states for urban development programmes with site and services projects in Bauchi and Imo states which are currently at a laughable stage of development as result of their current socioeconomic and political inability to sustain overtime and adapt to smart ICT utilization in urban governance. Besides, the Federal Government initiated studies on twenty major urban centres. In the Second Republic: 1979-1983, the Military Government handed over power to the civilian administration and the fourth National Development Plan was already in However, the Plan specified clearly the objective of Urban and Regional Planning by defining the role of physical planning as a tool for achieving national development objectives as well as putting forward some policy measures that were of planning interest (Adebayo, 1999). From 1999 to date Nigeria has made efforts and adopted a number of strategies for national development and management.

The National Economic Empowerment and Development Strategy (NEEDS1)-(2003-2007) in 2003 that was translated to State and Local Government versions, State Economic Empowerment and Development Strategy (SEEDS) and Local Economic Empowerment and Development Strategy (LEEDS) – adopted in 2005 and 2007, respectively. The above gave fillip to the National Urban Development Policy (Nudp) (2009); charged with the goal to develop a dynamic system of urban settlements which will foster sustainable economic growth, promote efficient urban and regional development and ensure improved standard of living and wellbeing of all Nigerians by

- (i) Restructuring all existing public institutions involved in urban management at the three tiers of Government and where necessary create new ones with a view to ensuring effective responses to the challenges of urbanization in Nigeria.
- (ii) Prepared regional, master plans, and development plans for all designated urban centers and growth centers within the context of National Physical Development Plan
- (iii) Integrate the urban development policy into the national economic policies of government.

3.0 Theoretical model:



Adapted from: Joshi , Saxena , Godbole,& Shreya (2016)

Based on the exploration of a wide and extensive array of literature from various disciplinary areas, the identified factors– Social, Management, Economy, Legal, Technology, Sustainability, (SMELTS) forms the basis of an integrative framework. This comprehensiveness is the distinguishing factor of the smart city, which integrates a number of physical, institutional, and digital components to create a holistic definition of what smart planning would *be*.

i) Social

The ability for all citizens to communicate with one another and agencies and groups that represent them provides a new sense of possibility to the idea that smart cities are based on smart communities whose citizens can play an active part in their design. Presently there are many initiatives where citizens can first access information about what is happening in their communities and cities but also explore ways in which many different groups can become actively involved in the design and planning process, both in face-to-face and remote situations using data, scenarios and models all informed by the contemporary ICT (IFF. 2020 Forecast). **Joshi , Saxena ,**

Godbole,& Shreya (2016) argued that cities that are smart only with respect to their economy are not smart at all if they disregard the social conditions of their citizenry. Smart cities initiatives should be sensitive in balancing the need of various communities. Projects of smart cities have an impact on the quality of life of citizens and aim to foster more aware, educated and informed citizens. Also, smart cities initiatives allow the citizens to participate in the governance and management of the city and become active users. If they are key players they may have the opportunity to engage with the initiative to the extent that they can influence the effort to be a success or a failure. The smart city is invisible to many citizens, which makes it difficult to get them engaged. But the smart city is about all citizens, not just a group of enthusiasts. It is about daily chores and everyday life. Social Media also plays an important role in smart city initiatives. As the smart city is about altering attitude, communication is a critical factor in engaging people by showing them the enormous value of data. In addition to the traditional role of a watchdog on behalf of the people – the media now needs to work on being the – Disseminator of information; Educator – on a variety of aspects of modern urban living and Simplifier of policy and how it impacts individual lives. Reaching a large audience is hard in a time where the media landscape is changing rapidly.

ii .Urban city Management:

Governance is a major execution challenge for smart cities. Limited transparency, fragmented accountability, unequal city divisions and leakage of resources are some of integral characteristics of regular governance. A move from this type of governance to digital or e-governance is essential for an effective and efficient administration of the smart cities. Smart Governance includes political and active participation, citizen services and the smart use of e-Government. (Gil-Garcia & Pardo 2005) suggested a list of success factors and challenges

for e-government initiatives which can be extended to the smart city governance as most smart city initiatives are also driven by governments and leveraged by the exhaustive use of technology to better serve citizens. E-government can be explained as an initiative to improve the decision making process, improve public policy-making and improve public governance – all with ICT at its foundation. E-governance helps the citizens to involve comprehensively in all these aspects. Internet is the most widely used channel of communication for many people and thus cities can incorporate it to identify the needs and wishes of the different target groups and address them in the most effective manner. ICT can enhance democratic processes and increase opportunities for individuals and communities to interact with the government. Internet enables greater participation, as it incapacitates the restrictions imposed by geography, disabilities or other factors. It also enables access to information by individuals and groups that had not been included previously. Smart governance is an important characteristic of a smart city that is based on citizen participation (Giffinger, Fertner, Kramar, Kalasek, Pichler-Milanovic & Meijers, 2007) and private/public partnerships. Smart governance relies on the implementation of smart governance infrastructure that facilitates service integration, collaboration, communication and data exchange (Odendaal, 2003). *Legal* Evolution of smart cities cannot be successful without legitimate legal compliances. Also councils, governments and other political bodies influence the operation of these initiatives. So both political and legal components are crucial for smart city development (Mauher & Smokvina, 2006). Governments and the organizing entities must write down policies that support the development of smart cities (Eger & Maggipinto, 2010). Legal and regulatory issues should be tackled accordingly by the government for frictionless development of a city. City governments must boost pro-active

steps for implementing and managing smart city drive by framing laws and policies that become the fulcrum for growth and development. Technological innovations are necessary but innovations in policy making are even more essential and are obscure (Hartley, 2005). The policies must conform to both technical as well as non-technical requirements that are imperative for urban growth (Yigitcanlar & Velibeyoglu, 2008).

Smart cities face various challenges with respect to legal compliances, environmental and regulatory issues that dominate the policy context (Gil-García & Pardo, 2005) . Before taking any kind of decisions, rules and regulations must be kept in mind (Mahler & Regan, 2002). Knowledge of policies, law and restrictions is critical in understanding and using Information and Communication Technology in a proper manner. Smart cities must be governed on the grounds of well-laid principles and guidelines. Therefore, principles and policies are important for efficient and smooth working between administration and local public bodies.

iii. Technology

For an ordinary city to transform into a “smart” city, technology (notably ICT technologies) plays major role. Modern cities are getting smarter because of rapid evolution of technology. Problems can be avoided, anticipated and mitigated by analyzing huge data available. This is where Big Data comes into picture. Various devices and components must be connected with each other to facilitate real-time decision making. Smart cities must exploit information and communication technology to increase sustainability and improve quality of life for the citizens (Bakici, Almirall & Wareham, 2013). Information and Communication Technology is one of the most essential drivers of the smart city initiative (Hollands, 2008). The amalgamation of these drivers along with others such as sustainability and quality of living can

completely transform the prospect of urban life and can boost the proper functioning and management of the cities (Odendaal, 2003; Vasseur, 2010).

Despite taking center-stage in the development of a smart city, technology has some hurdles. Use of ICT can certainly raise the standards of living but it also faces fierce challenges (Odendaal, 2003). Technologically sound human resource with practical skills is limited in urban cities of Africa due to access to quality education and ICT resources. Moreover, educating and training these employees with IT skills can be a major challenge. Politics, cultural differences and lack of inter-departmental cooperation are some of the organizational barriers that lie ahead of smart city development (Ebrahim & Irani, 2005).

4.0 Implications for Policy

The Nigeria state and smart city initiative: an assessment of smart urban development policies.

A critical assessment of infrastructures in major cities in Nigeria significantly challenge the actualization of smart city initiatives as a result of the social, economic and physical threat associated with urban sustainability of its basic infrastructures in its cities. There is inadequate capacity of the Nigerian state to provide sustainable energy; portable water and infrastructural development as a result of the endemic political economy of underdevelopment and leadership in Nigeria thus contribute to the mirage of actualizing smart cities initiatives. This is in concordance with Fadare & Oduwaye (2009) who noted that the situation of smart infrastructure in Lagos metropolis accordingly shows that smart infrastructure in Lagos metropolis is a mirage and the condition of infrastructures such as road, drainage, electricity and other infrastructure is described as appalling with ugly environmental sights, slum

areas, poor electricity, poor sanitation, inadequate and inappropriate use of open spaces, informal settlement, unorganized commercial areas and disjointed transportation system. Fadare & Oduwaye, (2009) advocates a rebranding of Lagos metropolis through regeneration of the city with heavy investment in modern infrastructural facilities, especially electricity supply, roads, bus rapid transit (BRT) and railways. Against the backdrops of above, this study argued that a critical analysis of the definitive components of smart city initiatives in Nigerian should suffice the integration of smartness in cities initiatives as a policy concept and thrust to depict the integration of smart ICT apparatus in overall urban development. we argued that at present there is virtually absence of smart city policy document though it can be adduced that there are some element of smartness in governance of urban cities in Nigeria looking at the policy thrust of efficient transportation network and traffic management in Lagos, Abuja and Enugu states just to mention, despite the non applicability of smart phones to enhance social relations of overall urban ecological management. This situation is responsible for the communication divide between government and the grass root population who have to struggle their way out of the technological divide and access to internet facilities. In addition, it would suffice that growing model of smart urban housing patterns and street linkages, ability of security institutions to receive information on crime and enforce rapid response and smart intelligence gathering, revamping of old metering system to smart metering of electricity, water and other social services been provided by the Nigerian government remains a huge clog to actualization of smart city initiative.

This study thus noted that a comprehensive need to integrate information and communication technology in overall urban

management should be a matter of necessity to trigger the development and boost the Knowledge, Attitudes and Perception of urban dwellers of the need to adopt eco-friendly attitudes towards urbanization in Nigeria. It suggests that institutional framework on redesigning our cities in such a manner that access to information and development of smart social relationship of city dwellers towards their immediate environment especially on contemporary urban challenges should be integral to actualizing the imperative of its sustainability. Consequently, the study argued that the role of smart cities initiatives though faintly observable are virtually inadequate and poorly instituted in the policy implementation process of urban and sustainable development initiative in Nigerian, owing to plethora of institutional and cultural pitfalls on urban residents' whose level of knowledge, attitude and perception of smart city's theoretical assumptions is still at infancy. To achieve urban sustainability therefore, the study suggests sectoral synergies and review of overall city development policies in Nigeria and the incisive infusion of sustainable smartness that would be culturally complementary to our sentiments and values.

6.0 Conclusion

This study established the policy need for the Nigeria state to adopt smart city initiatives in ensuring sustainable urban development that is capable of achieving the sustainable development goal no 11 target in due course. Following this submissions, it concludes that the Nigerian State must address the institutional impediments challenging good governance, policy implementation process of urban development, information technology knowledge/awareness, availability and

affordability of smart information and communication technologies for average urban city population.

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