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AN OVERVIEW OF INSTITUTIONAL BEST PRACTICES IN THE ASSESSMENT OF RESILIENT CITIES AND COMMUNITIES

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Abstract

This paper discusses methods adopted by institutions to fortify and examine the preparedness of cities and communities to respond and adapt to crises and other disruptive events through the use of indicators. It analyses different types of indicators that measure resilience along economic, social, environmental & institutional aspects and discusses the context in which they can be used to ameliorate existing conventional strategies and waning indigenous practices in sustaining cities in Nigeria. It provides recommendations on how local authorities can choose and customize these indicators to their policy priorities and develop guidelines for the effective use and achievement of resilient cities and communities.

Key Words: Resilience, Indicators, Cities

Introduction

Cities around the globe are multi faceted, merging thousands of economic, social, political, institutional and environmental links that strongly affects individuals and the society. With finite land mass and resources, cities population continues to grow with resultant scale and impact of shocks and stresses upon the cities and their population. These stresses include economic crises, insecurity, flood, food shortage, power outage, land degradation, communal clashes and disease outbreak amongst others. Yet the world's cities population is expected to grow from 4 billion in 2018 to roughly 7 billion in 2050 (United Nations, 2018). This justifies the need for more sustainable urban planning to make cities resilient worldwide.

Incontrovertible, urbanization has been seen as a potential driver of economic development, industrialization, human welfare, and structural transformation as it makes cities become engine of growth and spur sustainable development (Aliyu and Ahmed, 2017; Centre for Strategic and International Studies, CSIS, 2018). In Nigerian cities, rapid population growth without improved infrastructure and services has caused negative repercussions in the country. Urbanization has

grown astonishingly with ill equipped services and inadequate planning of urban land uses to parallel the impending risks associated with urbanization. Up till now, Nigerian cities continue to be plagued by negative per capita income growth, weak investment, and decline in productivity. Though the country have tried to make public investments in these areas but with consequentially increased federal debt (CSIS, 2018) and significant economic, social, environmental and institutional impact. This escalating debt profile imposes a critical bottleneck on the path to economic growth and development of Nigerian cities (Ogunjimi, 2019).

To illustrate, the fall in oil prices coupled with Corona Virus Disease 2019 (COVID -19) pandemic plunged the Nigerian economy into a severe economic recession. According to World Bank (2020), the pandemic has led to a fall in private investment due to greater uncertainty, and is expected to reduce remittances to Nigerian households. Since 2011, insecurity has led to 70,000 deaths, 2.5 million displacement, 244,000 refugees and payment of about $18.34 million as ransom (Adeyeye, 2020). In September 2020, torrential rainfall, river floods and flash floods cumulatively impacted 192,594 people across 22 states in Nigeria (Floodlist, 2021). The current waste generated in Nigerian cities is calculated as 66,828 tonnes per day (TPD) at the total urban population of 106 million, while the projected value for 2040 will be 125,473 TPD (Ezeudu, Agunwamba, Ugochukwu and Ezeudu, 2020). Recent statistics from the National Bureau of Statistics revealed that about 44,664 contract staff on the payroll of commercial banks have been reduced by over 5,000 as well as over 2,000 junior staff losing their jobs in the first nine months of 2020 (The Guardian, 2021).

In contrast to these present day predicament in Nigerian cities, ethnographic, historical, oral traditional and archaeological evidence demonstrates that pre colonial Nigerian cities that stood for centuries were derived from truly Indigenous Knowledge Systems (IKS) resulting from such factors as ecology, centralized or quasi-centralized authority and inter-regional trade interacting with one another in various ways and degrees (Okpoko, 1998). It was only with increased food production (resulting in food surplus) and improved distributive network that ancient Nigerian cities began to concentrate on either technological or socio-political activities (Andah, 1976). Accumulated valuable knowledge that stretch over many generations through series of observations and understanding of their environment engendered paradigms and the evolution of techniques, socio-political systems, aesthetics, religious norms as well as modes of organization that can collectively be described as their culture and ascribed to the resilience of ancient Nigerian cities. This implies that culture is a factor of urban phenomenon and hence, cannot be overemphasized in context of achieving resilient cities in Nigeria.

In addition, the World Urban Forum 10 held in Abu Dhabi in 2020 officially declared in section 3 that culture is an integral part of the solution to the challenges of urbanization and to achieve the New Urban Agenda. This is in tune with the African Union (AU) Agenda 2063 - accelerating the implementation of African indigenous knowledge systems in science, technology and innovation for liberation of the African continent. These agenda accentuates the necessity of culture in achieving sustainable and resilient cities and communities.

The central question of this paper is: how can the national, regional, state, local governments and non-governmental organizations promote resilient cities in Nigeria? This question reveals the need for policy makers in Nigeria to understand the conceptual framework of resilient cities,

the background and resilience structure of ancient Nigerian settlements, the indicators inherent in our culture for measuring cities' resilience, and how they can measure and develop a local resilience strategy for present day Nigerian cities.

2. Conceptual Framework of Resilient Cities

According to Hollings (1973), resilience is a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables". In conventional urban planning, myriad of definitions have been propagated by institutions and academicians (see Table 1). From their definitions, three basic attributes are conspicuous; two of these attributes have been earlier postulated by Figueiredo, Honiden & Schumann (2018) as thus – the Authors perceive resilience as a positive characteristic that can be fabricated or acquired by regions, cities and communities. This positive characteristic comprise of the ability to absorb, adapt, transform, recover and resist in relation to the event of shocks, stresses, hazards and disaster. Secondly, they deduced from their definitions that resilience is the product of an outcome. This implies that resilience of a city can only be known after a major shock or stress (Figueiredo *et al*, 2018).

The third attribute in the definitions of resilience cities is the quantification of the interface of systems – human interaction network and their connection with the built and natural environment. This will define the pattern in which settlements are spread across space thereby providing visibility on the lives of the people in the entire social systems and the magnitude of association. It is important to note that the density of the population is the basic variable for understanding the constraints and possibilities of the human social network.

Table 1: Comparative Table of Definitions of Urban Resilience

Institution/ Scholar	**Definition**
United Nations Office for Disaster Risk Reduction (UNISDR) (2013)	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management.
Resilientcity.Org	A resilient city is one that has developed capacities to help absorb future shocks and stresses to its social, economic and technical systems and infrastructures so as to still be able to maintain essentially the same functions, structures, systems and identity.
World Bank (2013)	Resilience is characterized by the ability of people, societies and countries to recover from negative shocks, while retaining their ability to function.
USAID	Resilience is the ability of people, households, communities, countries and systems to mitigate, adapt to and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth.
100 Resilient Cities (2013)	Urban resilience is the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt and grow regardless of what kinds of chronic stresses and acute shocks they experience
Global Alliance for Resilience (AGIR) (2013)	The capacity of vulnerable households, families, communities and systems to face uncertainty and the risk of shocks, to withstand and respond effectively to shocks, as well as to recover and adapt in a sustainable manner.
Frankenberger et al.	The capacity that enables households and communities to maintain a

(2014)	minimum threshold condition when exposed to shocks and stresses
Sjöstedt (2015)	A multidimensional concept that focuses on a city's ability to strategically and spatially adjust to meet the challenges of the future
International Council for Local Environmental Initiatives (ICLEI) (2015)	City that is prepared to absorb and recover from any shock or stress while maintaining its essential functions, structures and identity as well as adapting and thriving in the face of continual change. Building resilience require identifying and assessing hazard risks, reducing vulnerability and exposure, and lastly, increasing resistance, adaptive capacity and emergency preparedness.
Resilient Europe (2016)	Urban resilience is the capacity of urban systems, communities, individuals, organizations and businesses to recover, maintain their function and thrive in the aftermath of a shock or a stress, regardless its impact, frequency or magnitude.
Bosh (2017)	To improve a city's capability to deal with hazards; external problem in general varying from climate change and environmental degradation to poverty and traffic congestion.
Arup (2016)	The capacity of cities to function, so that the people living and working in cities – particularly the poor and vulnerable – survive and thrive no matter what stresses or shocks they encounter
Kruper & Ching (2016)	The capacity of urban or regional systems to respond to the variety of challenges they face.
Rockefeller Foundation (2016)	Resilience is the capacity of individuals, communities and systems to survive, adapt and grow in the face of stress and shocks, and even transform when conditions require it.
Bosh (2017)	
UN-Habitat (2017)	The ability of any urban system to withstand and to recover quickly from multiple shocks and stresses and maintain continuity of service.
United Nations (2017)	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions
Gasu (2018)	The capacity of a city to mitigate, prepares for, respond to and recover from impact.
Figueiredo, Honiden & Schumann (2018)	The ongoing capacity of cities to absorb, adapt, transform and prepare for shocks and stresses along the economic, social, institutional and environmental dimensions, with the aim of maintaining the functions of a city and improving response to future shocks.

Source: Adapted from Figueiredo, Honiden & Schumann (2018)
https://dx.doi.org/10.1787/6f1f6065-en

In making Cities resilient, scholars (Schipper and Langston, 2015; World Bank, 2015; and Figueiredo, Honiden & Schumann, 2018) stated three main complementary approaches to resilience – socio ecological, disaster risk reduction and Sustainable livelihoods. They asserted that the approach is dependent on the scale of analysis which may be National, Regional, Urban /city, communities or households. According to the authors, approach to urban resilience at city scale is emphasized by the socio-ecological approach. Meerow, Newell and Stults (2016) *and* Figeiredo *et. al.* (2018) asserts further that this approach shifted from stability to adaptation and change with the emergence of three cumulative pathways –

i. Persistence/Absorptive Coping - Resist disturbance and maintain the status quo;
ii. Transition/ Adaptive - Incremental adaptation;
iii. Transformation / Transformative (change).

Regardless of the pathway or approach to urban resilience, scholars have stated several qualities of a resilient city as shown in Table 2. The common components identified are foresight, dynamism, flexibility, recovery and integration. This implies for city resilience-building to be comprehensive, it should be precautious to visualize and innovate strategies, to withstand shocks & stress. In addition, the governance of the city should be opened to participation by integrating different sectors in the policy making process. In all, the different qualities are not successive stages but parallel tracks of action which are mutually reinforcing and co-constitutive of overall greater resilience (Figeiredo *et. al.*, 2018).

Table 2: Qualities of Resilient Cities by scholars

Authors	**Qualities**
Carpenter, Walker, Anderies, and Abel (2001)	Ability to 'self-(re)organizing
Wardekker, Jong, Knoop, and Sluijs (2010)	Foresight , flexibility, Robustness
Ahern, Qin, and Liu (2011)	Diversity, allowing for variability, modularity, innovation, tight feedbacks, overlap in governance, social capital and ecosystem services
International Federation of the Red Cross and Crescent Societies (IFRC) (2011)	Ability to assess, manage and monitor its risks; have the capacity to identify problems; have a relationship with external actors; strong infrastructure and services and ability to renovate them; diverse range of economic opportunities; flexible; resourceful; manage their natural assets.
Arup (2015), City Resilience Index (2016), Figeiredo *et. al.* (2018)	Robust, Redundant, flexible, resourceful, reflective, inclusive and integrated.
Meerow, Newell, and Stults (2016)	Ability to recover
Gasu, 2018).	Capacity to mitigate, prepare for, respond to and recover from impacts

Source: Authors' compilation

According to the Organization for Economic Cooperation and Development (OECD) (2016), resilience drivers are in four aspects – economic, social, environmental and institutional. The *economic aspect refers to* the economic conditions of a city or community. The dimensions include: employment levels, the diversification of the economic base, the number of businesses, the disposable household income, exposure in global economic value chains, diversified industries and potential for innovation, reliable infrastructure and skilled labour force (OECD, 2014; Figeiredo *et. al.*,2018). The economic dimension calls for diversification and innovation of industries.

The social aspect denotes the well-being of a society and its members. The dimensions include: the demographic profile of a city or community (age, gender, poverty, etc.), the health conditions, the levels of social capital, civic engagement and effective social ties, social inclusion, access to jobs and education (OECD, 2014). This dimension ensures that society is inclusive and cohesive, citizen networks are active and people have access to opportunities (Figeiredo *et. al.* 2018).

The environmental aspect refers to matters of the environment. The dimensions include: environmental degradation, the overuse of resources, the potential costs of climate change and natural disasters (OECD, 2014), built-up environments, structures that provide critical services for disaster response and recovery, such as communication, transportation, water and sanitation (Figeiredo *et. al.* 2018). The institutional aspect refers to the institutions, organizations and

decision-making processes that administer a city or community. The factors include: knowledge sharing, capacity development, learning processes and participatory channels (Figeiredo *et. al.* 2018). According to the OECD (2014), institutional capacity is necessary to respond and rebound to shocks. They stressed that capacity building in local governments and development in human resources are indispensable.

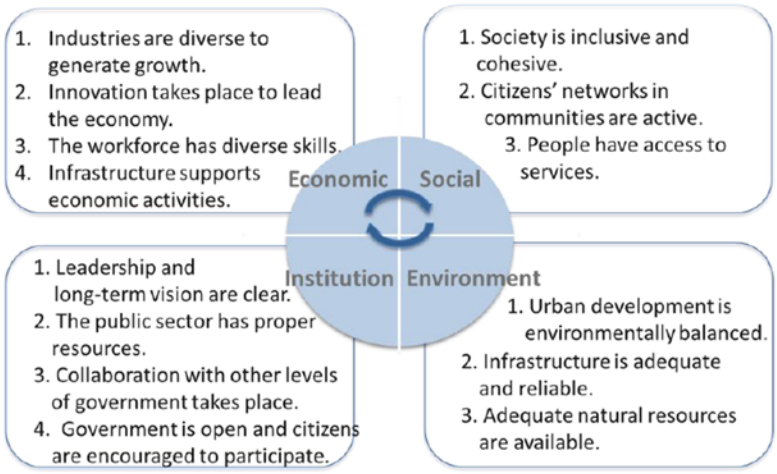

Figure 1: The Resilience framework
Source: OECD (2016) and Figeiredo et. al. (2018)

The inter-relationship of the four dimensions cannot be over-emphasized in achieving sustainable cites and communities. To illustrate, in the event of Covid-19 that necessitated the imposed lockdown measures in Nigeria last year, millions of Nigerians that are self-employed, unemployed and even the employed in private establishments were impoverished (socio-economic). Some lost their jobs as well as their livelihoods thus, complicating the hardship of the citizens. To alleviate the effect of the lockdown, the Federal Government rolled out palliative measures which her citizens decry that the process of distribution have been politicized (Institutional). The hunger led to aggravated violence, insecurity and consequent looting of warehouses and departmental stores (built environment). However, the lockdown significantly improved air quality in cities, reduced green house gasses (GHGs) emission, lessened water pollution and noise, which may have assisted with the restoration of the ecological system (Environment).

Another example is the incidence of flood using Lokoja (the Confluence City) as a case study. The Poor and mid-income earners who live in the suburb at the bank of the River Niger are more affected (social and economic). Also, the roads are obstructed; preventing traffic flow and interaction between the north and the south (built environment, social and economic). The situation is aggravated by poor sanitation and waste management, consequently overstretching the capacity of the National Emergency Management Agency, NEMA (Institutional) to salvage lives and properties.

3. Socio - ecological Influence in the Evolution of Ancient Nigerian Cities

Preceding the era of colonialism, traditional Nigerian settlement were articulate and structured according to the local custom and practice, the traditional land tenure system, the agrarian Nature of the economy, defence, transportation, trade, topography, religion, sacred sites and the existing mode of transportation (Ola, 2011; Onyejekwe, Awonisi and Abdul, 2019). According to Okpoko (1998), the bulk of early urban centres in Nigeria were not directly derived from external influences but were truly indigenous resulting from such factors as ecology, centralized

or quasi-centralized authority and inter-regional trade interacting with one another in various ways and degrees. In affirmation, Akanmu, Daramola, Ogunsesan and Adejare (2018), aforementioned those ancient Nigerian settlements were organic as they were predicted on culture of the society and instincts of their leaders. Their physical development and growth were coordinated and regulated by considering the relationship of any proposed development to the existing structures and making adequate provision for circulation and other conveniences according to customary law (Aduwo, 1999). As a consequence, understanding of the contrasting environmental and social conditions within Nigeria is useful for understanding of the relative impressive level of urban development and resilience in Nigerian cities.

To decipher the physical development, growth and sustainability of ancient Nigerian cities, it is imperative to perpetuate the ecological zones in Nigeria and their connection to the cities and settlement structures. According to Federal Department of Forestry (2018), the ecological zones in Nigeria are defined from South to North (see figure 2) as follows: mangrove swamp and coastal vegetation, freshwater swamp forest, lowland rain forest, derived Savanna, guinea savanna, sudan savanna, and sahel savanna. A few mountainous areas are found in the Jos Plateau, Adamawa, Taraba and Northern part of Cross River State. Nigeria also has three distinct drainage systems namely: short swift-flowing coastal rivers, the inland drainage system of the Chad basin and the long plateau rivers. They are also Forest and savanna of various types that constitute the two broad types of vegetations in Nigeria – The Forest types include coastal forest and mangroves; deltaic swamp forest; moist lowland forest; forest-savannah mosaic (Areola, 1982). The savannah communities comprise the guinea savannah; the montane vegetation; the sahel savannah; and the flood plain complexes (Areola, 1982).

These major ecological zones can be correlated with land use systems in Nigeria (Areola, 1982) but however, they vary in relation to difference in soil, topography and population distribution patterns. It is possible that the land use systems and the various relief and drainage systems and vegetation types containing different kinds of resources influenced in different ways and degrees various human activities and the history of human settlements and their patterns. These settlement and activity patterns in all likelihood could also have influenced the processes of evolution of urbanism and their sustenance for centuries prior to the coming of the Europeans.

To illustrate the above statement, Sukur Cultural landscape, a United Nations Educational Scientific and Cultural Organization, (UNESCO) World Heritage Site in Madagali, Adamawa State, represents a remarkable social, economic, political and spiritual values (National Commission for Museums and Monuments, NCMM, 2014) which continue to define the existence and relationship of the community with their ecological zone. The site display ingenious use of local resources (stones & vegetation) and adaptations to environment for subsistence and economic gains. Stone structures in form of houses, fences, farm terraces, Silos, Iron smelting furnace and walkways are the most distinct future of the sukur landscape (Picture 1 - 4). This did not only demonstrate craftsmanship, but their excellence in harmonizing the stone structures with vegetation (trees, gardens, thatch and raffias). Sukur's eloquent testimony to a strong and continuing cultural tradition that has endured for many centuries and its survival (unchanged) at a time when this form of human settlement is under threat compelled UNESCO's declaration of the site as a World Heritage. These criteria attributed to Sukur cultural landscape can thus encapsulate resilience.

Furthermore, in other parts of Northern Nigeria, cities grew through trade, agriculture and warefare. According to Okpoko (1998), Njimi, the first capital of Kanem-Bornu Empire developed into an urban centre as a result of the incursions of Magumi nomads into the northeast of present Lake Chad. These nomads united and brought under one political control the Zagawa and Kanuri peoples. With robust agriculture specialization and trade, they expanded territories through warfare. Later, in the 14th century, Birnin Ngazargamu, became the capital of Kanem-Bornu empire which reached its apogee in the 16th century. In Kano, they embarked on military

expansion from about 11th century A.D., built the Kano City walls (an endangered National Monument) between the 11th and 12th centuries and began to be absorbed into the trans-Saharan trade system.

Again, in the south, the emergence of Benin however, resulted basically from a highly successful exploitation of their environment by an iron-using people and by the 15th century, Oba Ewuare constructed a true urban unit with a formal urban defence (,Connah, 1972; 1975a) popularly known as the Benin Mounds, an endangered National Monument. In the Igbo speaking areas of Nigeria, a large portion of the land was already the scene of highly artistic culture which derived its sustenance from an economy based partly on food production and partly on wide-ranging commercial contacts (Shaw,1970 ; Afigbo, 1971). In the West, trade based on agriculture and craft production was thus a major element in the (rise and) survival of Yoruba towns (Mabogunje, 1968).

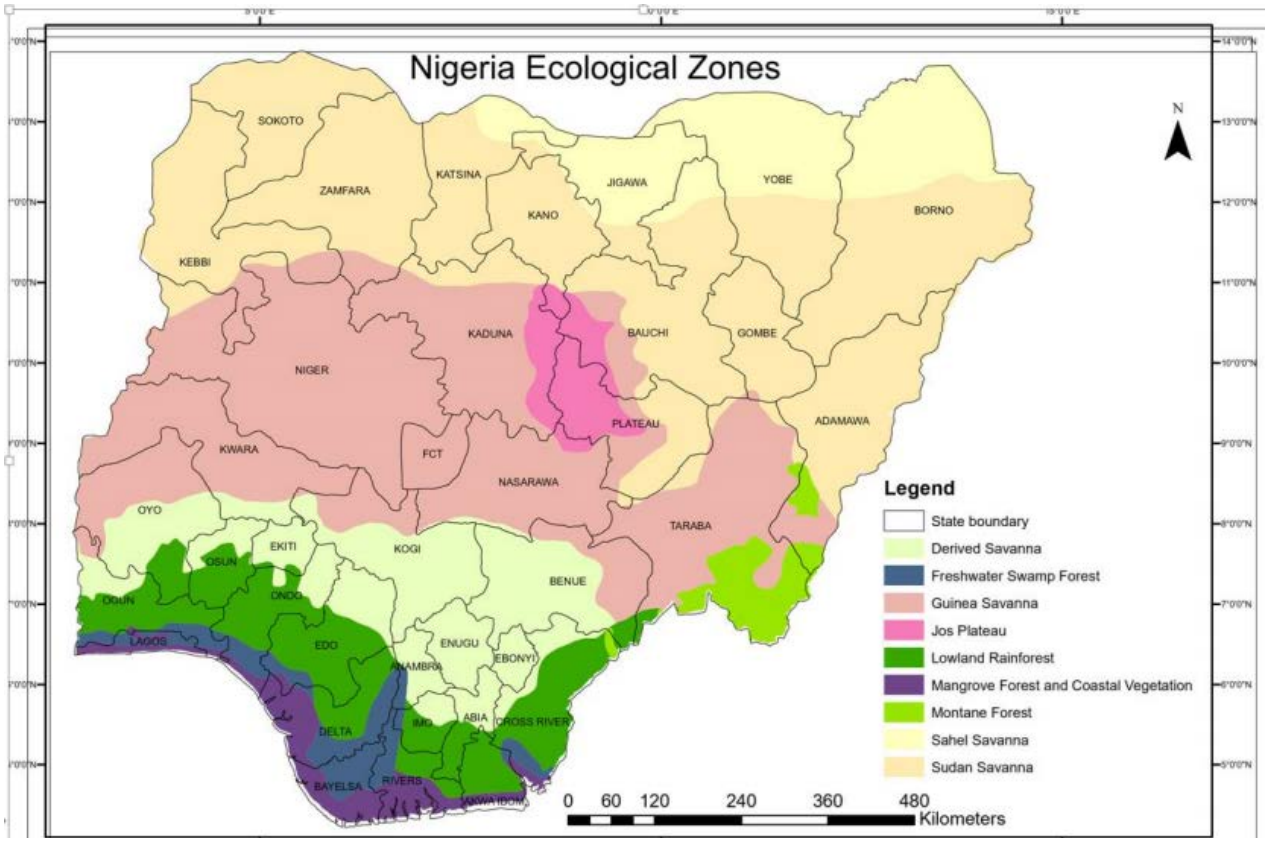

Figure 2: Ecological Map of Nigeria showing the ecological zones
Source: Federal Department of Forestry, 2018
https://redd.unfccc.int/files/nigeria_national_frel_modified_revised__for_posting.pdf

Picture 1: Sukur Cultural Landscape (aerial view),
Source: National Commission for Museums and Monuments, 2014

Picture 2: Stone Walkway
Source: Sham Anthony (Site Manager), 2021

Picture 3: Stone Dwarf Wall with green vegetation
Source: Sham Anthony (Site Manager), 2021

Picture 4: Protective Fencing of the HIdi's Palace
Source: Sham Anthony (Site Manager), 2021

From the above illustrations, it is evident that ancient Nigerian cities grew with increased food production (resulting in food surplus), ingenious technological base and trade. Hence, the Central place theory by Christaller (1933) and Losch (1954) used in describing the nature and function of urban hierarchies strongly conflicts the characterization of ancient Nigerian cities and settlements. As Mabogunje (1968) asserts, '"existence of a homogenous area of uniform population and purchasing power" does not hold for Nigeria where such homogeneity never existed. In support of this view, Andah (1982) commented that 'what constitute central places for the distinct cultural phases discerned archaeologically and/or also for the different specialist activities such as food production, iron working and subsequent manifestations of metal working since such would serve as the basis for characterizing the different kinds of settlements, as well as determining what "leap" or "leaps" in the record, should constitute town and then urban formations. It is also important to note that these ancient cities differ in their total way of life, reaching the pinnacle of their achievement in the sphere of their influence. The implication of these conclusions by Andah, justifies the customization of indicators that characterizes the resilience of ancient Nigerian cities to measure the progress of post – colonial Nigerian cities to their policy priorities and develop guidelines for the effective use and achievement of resilient cities and communities.

Therefore, in Nigerian context, some additional baseline indicators and policy indicators for measurement of Nigerian cities can be deduced – Percentage of skilled population; percentage of household gardens; percentage of household income spent on food; percentage of ethnic/regional representation in policy resolutions; percentage of food storage facilities per household; percentage of household enclosure. These indicators can be used to assess the efficiency and effectiveness and open government of Nigerian policies.

4. Post Colonial Cities and Risks in Nigeria

In the colonial era, the colonial masters developed a hierarchy of administrative centers on existing political centers under the policy of indirect rule. They established an export-oriented cash economy over the entire area. They intensified urban development in the development of waterways and railway systems. According to Ukwu (1980) this created islands of political authority, intensified economic activity, and concentrated investment and income where urban growth was stimulated. Rodney (1976) asserted that these islands of political authority were essentially a centre of administration rather than industry. The author stressed that the towns created by the colonial masters did attract large number of Africans but only to offer them a very unstable life based on unskilled and irregular employment.

Again, with increased urbanization in contemporary time, these colonial centers has been overwhelmed and become congested, slum-driven and inadequate centers, while the urban frontier has also spread out to engulf neighboring villages and minor towns and new unplanned shanty Towns have developed (Ukwu, 1980). Today these towns are not functioning effectively in the economy. According to Mabogunje's verdict several years ago, these unproductive cities have become parasitic and represent a substantial drag on the rate of economic development of the city. Thus, the inability of these colonial towns to play the role of expanding the productive bases is consequential to both the squalor of Nigerian cities and the questionable capacity of colonial impacted cites to withstand risks. This is contrary to ancient Nigerian settlements where most of the populace was technically skilled; having comparative advantage in their cultural artifacts and exploitation of their ecological niche.

According to Onyejekwe et al, (2019), the enactment of planning legislations by the colonial administrators which were based principally on European preferences and ideologies and, its

consequent influence in the contemporary Urban and Regional Planning law in Nigeria has created a discontinuity in the in the development of expressive indigenous settlements. The authors further expressed that Colonial and post-colonial Planning laws and administration gave discriminating guidelines for physical planning which was visible in the habitation areas of the natives and the Europeans.

After the Colonialist gave the Country independence in 1960, the 1946 Town and country planning ordinance, the chapter 123 of the Town and Country planning Law of Western Nigeria of 1959, chapter 130 of the law of Northern Nigeria and Chapter155 of the Law of Eastern Nigeria were retained with its associated discriminatory legislations (Onyejekwe et al. 2019). Hence, exceptional characteristics of Nigerians creative genius developed over many generations through series of observations and understanding of their environment that made their ancient Nigerian resilient are constrained. For Planners to effectively initiate objective judgment and employ practical solutions to defeatist post colonial Nigerian cities, background narratives of her ancient cities cannot be overemphasized.

5. Indicators and Measurement Methods of Resilient Cities

5.1 Indicators in the Resilience building Process of Cities

According to Compass (2007), indicators are tools used to assess the state of a program by defining its characteristics or variables, and then tracking changes in those characteristics over time or between groups. Indicators are specific, observable and measurable characteristic that can be used to show changes or progress a programme is making toward achieving a specific outcome (United Nations Women, 2010). An indicator can also be a quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect changes connected to an intervention or to help assess the performance of a development actor (Falola and Olatunde, 2018).

In planning practice, indicators are essential in guiding physical planning practice with respect to specified targets and to provide evidence of the success or failure of schemes, policies, units and personnel, with the performance being used to discipline underperformance, reward those meeting and exceeding targets, and to guide new strategies policy and budgeting (Falola and Olatunde, 2018).

Scholars asserts that Indicators can be descriptive or diagnostic (Kitchin, Lauriault and McArdle, 2015; Falola and Olatunde, 2018). They stressed that descriptive indicators provide key insights in numbers or quantity into particular phenomena within and between places. In this case, they a viewed as vital sources of evidence for democratic debate and policy formulation with respect to specific issues such as planning environmental and social issues, economic performance, to assess needs and redistribute resources. In addition, descriptive indicators can be referred as baseline indicators. Good examples of baseline indicators are measurements of demographic characteristics such as: percentage of employed and unemployed population, percentage of the elderly percentage of physically challenged, income level (Figeiredo *et. al.* 2018).

In contrast, diagnostic indicators assess performance of a policy programme, organizations, sectors and individuals (Falola and Olatunde, 2018). Diagnostic indicators require an act of scientific imagination and an understanding of social and political networks, relationship and oppourtunities in order to venture toward effect (Falola and Olatunde, 2018). Diagnostic indicators can also be denoted as policy indicators since they measure the performance of policies along different dimensions to assess the effort, efficiency and effectiveness with which a policy is pursued as well as the process through which it is pursued (Figeiredo *et. al.* 2018). This indicator can be further classified into four general categories according to what is measured. These include input indicators, output indicators, outcome indicators and process indicators

(Figeiredo *et. al.* 2018). Input indicator is the amount of funds spent on a certain policy or the number of people working on a project (Cutter, Ash and Emrich, 2014); Output indicators measure quantities that are produced by a policy in order to achieve its objectives (number of people trained to fulfill a task or the area for which environmental protection plans have been developed, number of physicians per 100 000 people etc) (Cutter, Ash and Emrich, 2014); Outcome indicators are used to monitor the effectiveness of policies in achieving their objectives. Typical example is population perception on heath, government, product, Percentage of household income spent on housing by the poorest 20 per cent of the population (City Resilience Index, 2016). Process indicators refer to the institutional dimension of resilience, and to the sub driver of popular participation and open government. Typical example of process indicators are percentage of unemployed population that have benefited from You Win Grant; Percentage of school children that have been educated on insecurity and security measures to keep safe.

In applying indicators to assess the resilience of Nigerian cities and communities, it is imperative to first investigate the historical background of its growth, taking cognizance of the factors that necessitated its evolution (trade, craft, agriculture, warfare, industry etc.). This will inform the planner the dynamics of the socio – ecological and adaptive systems of the city under study. The deduced factors that characterized the growth of the city is compared with the contemporary operational factors. This can reveal the difference and similarities in per capita productivity and efficiency, wealth, security as well as strong compelling parallels between ancient Nigerian cities and post colonial cities. The predictive or diagnostic value can help resolve or augment the current urban planning policy for building of sustainable cities.

3.2 Methods of Measurement of Resilient Cities

To measure and assess resilience using the resilience building indicators, Cole (2013) asserts three methods **–** Descriptive, Assessment –based and Proxy-based**.**

i. Descriptive: This method aims to provide descriptive analysis of factors that lead to resilient communities or organizations. The most basic form of these models is to identify and define (without measurement) factors that influence resilience. Descriptive frameworks can be very useful as a method to identify possible mitigation strategies and develop a high-level understanding of resilience within a community, but the approach is less able to objectively measure resilience or optimize mitigation strategies given limited resources. Also, due to the lack of actual resilience measurement inherent in these models, it can be difficult to use such frameworks to compare different communities or to assess improvements over time.

ii. Assessment-based: This concept of measurement is important as it will allow emergency entities the ability to gauge improvements to resilience within their own organisation over time or even between like entities. These assessment frameworks are typically completed through a reflexive process and use of primarily subjective assessments. Questions typically take the form of either the presence/ absence of factors or the subjective degree to which the organization adheres to the relevant resilience factor (using descriptive ordinal indicators such as low, medium or high).

iii. Proxy-based: This method describes a model of resilience that is measured using secondary sources of data. The primary difference between assessment and proxy frameworks is that the data typically used to measure underlying resilience factors are already gathered (usually across a number of time periods) and as such do not require in-house assessment from the community or organization. This vastly improves the speed at which the assessment can be completed and lowers the amount of additional resources that must be spent by emergency managers in gathering data. A second result of using proxy data is that the data are typically gathered systematically and as

such is commonly objective in nature. This greatly allow for a high level of generalization of results between different communities and over time.

A common technique used in proxy variable assessment is factor analysis, which attempts to divide a set of variables into different categories based on correlation between those variables. This will identify common factors from a set of variables but will be unable to state what difference a change in that factor would have on the aggregate score.

In summary, the capacity of cities to absorb, adapt, recover, transform and prepare for shocks and stresses is built along economic, social, institutional and environmental aspects. The approach in building resilience along these aspects is dependent on the scale of analysis which may be National, Regional, Urban /city, communities or households. At city scale, the socio – ecological approach is considered ideal. This is centered on the fact that socio – ecological systems shape changes and are a central nexus for long - term functioning of societies and ecosystems (Groove, 2009) able to create challenges and offer opportunities' for human kind current and future resilience and sustainability. Thus, a city ought to measure its resilience by comparing itself in the past with the present rather than comparing itself with other cities because the social –ecological characteristics in their formation are peculiar.

6. Developing indicators for measurement of Resilience in Nigerian Cities

From a compendium of scholars and institutions **(**UNISDR, 2012; UNISDR, 2015; Peyroux, 2015; Winderl, 2014; City Resilience Index, 2016; UN, 2017; Gregorowski, Dorgan and Hutchings, 2017; Figueiredo et al. 2018, Falola and Olatunde, 2018), the following considerations are imperative in the development of indicators for Nigerian Cities:

1. Development of indicators should be participatory with local stakeholders in the design and choice.
2. It must have a clear value of what direction is good and which is bad based on consonance between the planner and stakeholders.
3. It must be easily understandable with units that are meaningful.
4. Indicators should follow standards which are internationally recognized to synergize with the global agenda for resilience and facilitate tracking progress in meeting the Sustainable Development Goals (SDGs), Africa Agenda 2063, World Urban Forum etc.
5. It should be measurable
6. Measures should be complemented by context-specific (exogenous factors in the sense of necessary conditions), locally tailored measures. A combination of standard and contextual measurements yields the most complete picture.
7. Each city in Nigeria should compose their own set of indicators because a single documented record does not suit cities of different sizes, demography and contexts.
8. Each city should track progress from its past to its present rather than comparing cities against each other because of the difference in their ecological zones, contexts and uncertainty of risks.
9. Indicators should be set in the beginning of the process of building a resilience strategy, after risk assessment analysis and before policy-making. Indicators should be able to provide information on how resilient a city is in a very detailed manner.
10. Indicators should be disaggregated where relevant by income, sex, age, ethnicity, occupation, migratory status, disability and geographical location, or other characteristics, in accordance with the Principles of official Statistics of the United Nations.

11. Indicators should be consistent by maintaining the same measurement methodology over time, whenever possible. If the measurement methodology changes, the metric data should be kept consistent.
12. Use data sources that are routinely collected by statistical agencies or other public organizations such as Nigeria Bureau of Statistic (NBS), National Population Commission (NPC) etc.
13. Indicators should be accompanied by background information that describes how the input, output, outcome or process that is measured by the indicator contributes to the objective of achieving improved resilience.

These statements aforementioned by the scholars and institutions are not an end to themselves. Instead they should serve as guidelines of other possible issues to be considered in the development of indicators for measurement of resilience cities in Nigeria. Hence, Town Planners and other related disciplines can come up with other underling issues that reflects the above assertions they think is more specific in developing indicators for measurement of the resilience of Nigerian cities.

7. Discussion and Conclusion

From the above review it is evident that post colonial Nigerian cities played the role of expanding their productive bases through exploitation of their ecological niche. Historians such as Cohen, 1978; Andah, 1982 Dike & Ekejiuba, 1990; and Okpoko, 1989, argue that ecology, trade, surplus food production, centralized or quasi-centralized authority amongst others gave rise to cities in Nigeria. They believed that the stability of these ecological, economic and political developments facilitated the rise of urban centres such as Benin, Kano, Njimi, Old Oyo Empire, Birnin Ngazargamu, Akpa amongst others. As a consequence, understanding the contrasting environmental and social conditions within Nigeria is useful in appreciating the relative impressive level of urban development and resilience in Nigerian cities.

In line with the above authors' conclusion, it is imperative to explore the resilience ancient Nigerian cities. Historic evidence from National archives and National Commission for Museums and Monuments need to be integrated with individual, household and community record. Some of these historic relics of resilience in ancient Nigeria cities and communities are evident in Sukur Cultural Landscape - a World Heritage Site and the remains of Kano City wall, both of which are National Monuments. According to Cole (2013: 119) historical qualitative or narrative data can provide the context for joining up and understanding these relics and often fragmented historical data, including numeric data. The issue about the use of historical data (both qualitative and quantitative) and its integration is not a new one, but the integration of science and narrative as a resource base for decision-making remains a particular challenge.

In conclusion, policy makers in Nigeria need to building resilience along the four dimensions and 14 sub-drivers of the resilience framework in figure 1. This can be done by the use of indicators for evidence based policy making. These indicators should be composed based on the context, demography and size of cities. It is also imperative for policy – makers to include historic perspective (qualitative data) to comprehend the relics of disjointed historic data. These will provide information on the existing conditions that policy makers have to take into account when formulating policies and quantify the conditions of government policies. Stakeholders therefore need to develop their own indicators following the guidelines earlier stated. The indicators should be aligned to the different dimensions and aspects policy makers want to measure. These data can then be measured using any of the assessment methods such as

descriptive, assessment based or proxy-based and transform the values to create an aggregate resilience figure.

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