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Insight review on impact of infrastructural development in driving the SDGs in developing nations: a case study of Nigeria

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Abstract: The Sustainable Development Goals (SDGs) recognize the dominance of infrastructure as a panacea for the nation's development to improve the quality of people's lives. In Nigeria, inadequate infrastructure has impaired the prospect of attaining some of these SDGs. Some of the identified barriers causing the poor implementations of SDGs in Nigeria include poverty, poor accountability, inadequate domestic water supply, poor energy supply, poor human capital development initiatives, poor transportation and telecommunication networks, illiteracy level, and environmental degradation. But while the SDGs are a non-enforced agreement, the way and manner of implementation and the conditions under which the state acts in accordance with the agenda were not properly spelled out. However, the success of the SDGs in Nigeria requires commitment from government at all levels to provide adequate funding, financial prudence, stable polity, sound policies, availability of functional infrastructural facilities and ensuring value for money. This will result in achieved opportunities such as the establishment of new businesses, boosting of employment rate, ample growth opportunities, enhance risk-adjusted financial returns to investors, an increase in the rate of youth and adults in formal education and non-formal education, and promoting environment friendliness. This review further recommends that government should address the challenges faced in the area of power, telecommunication, corruption and access to agrarian areas in the country in order to have an inclusive infrastructural development that is positively driving growth. Moreover, assessment of projects should include initial capital investment, operational cost, maintenance, and disposal of the asset which will guarantee more sustainable infrastructure projects that are likely to perform much better through the lifecycle. Thus, successfully achieving the SDGs must involve innovative approaches to infrastructure financing and sustainable public procurement.

1. Introduction

Infrastructure has been seen by many as a key element in driving development in any nation. In several articles, it has been strongly endorsed as a catalyst in the development and improvement of a nation especially in improving access of social, human, natural and financial asset to the less privileged in a nation. Infrastructure can be referred to as physical and organizational structures and facilities considered crucial in ensuring the security of any nation, its public's health, safety and its economy growth [1]. It can be grouped into two namely, hard and soft infrastructure; hard infrastructure is the physical infrastructure of roads, sewers, highways, bridges, electricity, railroads, etc. while soft infrastructure deals with human capital and the establishments that cultivate infrastructure such as universities [2,1]. From a global outlook, sub-Saharan Africa has the lowest levels of basic infrastructure (Figure 1).



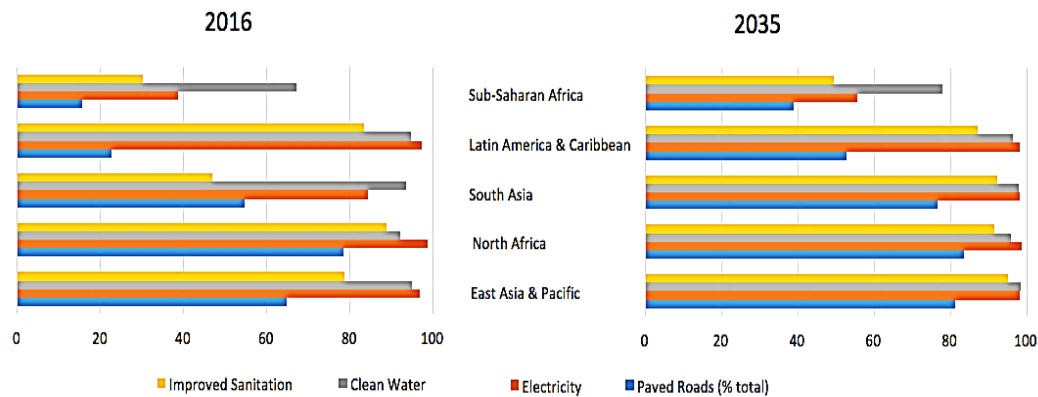


Figure 1: Levels of access to basic infrastructure (percent of population) in developing regions in 2016 and 2035
Source: <https://issafrica.org/iss-today/africas-future-seven-key-trends> [3]

Infrastructure development within the world's developing countries has not received the will and acceptable attention of consecutive governments, particularly in Nigeria and Africa as a whole. Infrastructural development of any nation is the creation of basic foundational services to enhance economic growth and quality of life. Developed nations have passed through periods of rigorous infrastructure building that have bettered efficiency and competitiveness. Some basic infrastructure development involves transportation such as rail and road networks, energy like solar panel and hydropower, water such as resource management, treatment and flood prevention, green infrastructure such as systems for reuse and recycling that prevent harmful waste from entering the environment, digital infrastructure, communication networks and computing facilities, social infrastructure such as schools, hospitals, emergency services, community support, public space, libraries and cultural institutions, resilience provision of shelter in time of natural disaster such as flooding and earthquake shelter and government services such as consumer protection and fair competition regulations and enforcement [1], [4],[5],[6], [7], [8], [9], [10].

Many researchers have reported the significant role of infrastructure development in invigorating foreign direct investment and also serve as impetus for foreign investors to operate successfully [11,12 13,14]. Availability of functional infrastructural facilities such as ports, roads, highways, railways, communication networks and electricity with a stable polity will contribute immensely to the success of the SDGs in developing countries [15, 12, 8]. Nigeria had an estimated population of 162 million people in 2011 and is projected to grow to between 230 and 450 million people by 2050 [16]. The population fraction of people earning less than US\$ 2 per day in Nigeria as at 2009 was eighty four percent (84%) and urban population was also recorded to be 51% in 2011. Presently, Nigeria holds the position as the 7th most populated country in the world and is expected to be the 3rd most populated country in the world after India and China by 2050. This situation thus calls for an urgent, pragmatic action that involves adequate planning and development strategies [16]. The objective of this study is therefore to examine opportunities, challenges and status of infrastructure in achieving the SDGs in Nigeria.

2. Background

The SDGs took effect on the 1st of January, 2016 as a global call to action to end poverty in all of its forms, protect the planet and ensure peace and prosperity for all people by year 2030. The 17 SDGs were built on the accomplishments of the Millennium Development Goals (MDGs) (2000 to 2015). The SDGs include; no poverty, zero hunger, good health and well-being, encourage lifelong learning opportunities for all and quality education, gender equality, and women and girls empowerment, clean water and sanitation, access to affordable and clean energy, economic growth and decent work, industry, innovation and infrastructure, reduced inequality within and among nations, sustainable cities and

communities, responsible production and consumption pattern, climate action, life below water, life on land, promotion of peace and justice strong institution for all and partnership to achieve goals [17, 18].

Nigeria, like many other countries of the world in September, 2015 signed the sustainable development goals treaty and vowed to work towards the actualization of the SDGs at the United Nations (UN) Sustainable Development summit in New York. The SDGs have adopted comprehensive techniques by taking note of some challenges faced in different nations and facilitating the collaboration of both the private and public sectors in implementing the goals. The UN report revealed that the percentage of people living in extreme poverty decreased by more than fifty percent worldwide, falling from 1.9 billion people in 1990 to 836 million people in 2015; improved enrolment rate in primary schools and the decline in the number of out-of-school primary school children worldwide from 100 million in 2000 to 57 million in 2015 [19]. More than 60% of the Nigerian populace live in rural areas with an income less than US\$1 per day [20]. A study by [21] reported poverty reduction rate of 41 percent, implying that about 403.2 million people were below the poverty line in 2015 in sub-Saharan area. The report also showed that Nigeria poverty rate was 71.5% and above the region's poverty rate with approximately 120 million people live below the poverty line. The poverty rate is on the increase every year. Nigerians have suffered a great deal from inadequacy of physical infrastructure since independence. [22] as cited by [21] reported that poverty alleviation can be achieved through huge investment in social infrastructure.

2.1. Infrastructural Development

Adequate infrastructure boosts a nation's success through economy growth, production diversification, population growth sustenance, dipping poverty and enhancing environmental conditions [1]. The high rate of population growth in sub-Saharan Africa has negatively impacted economic growth (Figure 2). Based on the poor state of infrastructure in developing countries such as Nigeria, efforts to grow the economic have proven abortive. According to [1], one of the most important limiting factors to economic growth and the achievement of the MDGs in several developing countries is the lack of infrastructure. It was argued that investment in infrastructure caused more than fifty percent of the improved growth performance in Africa between year 1990 to 2005 and increment in businesses.

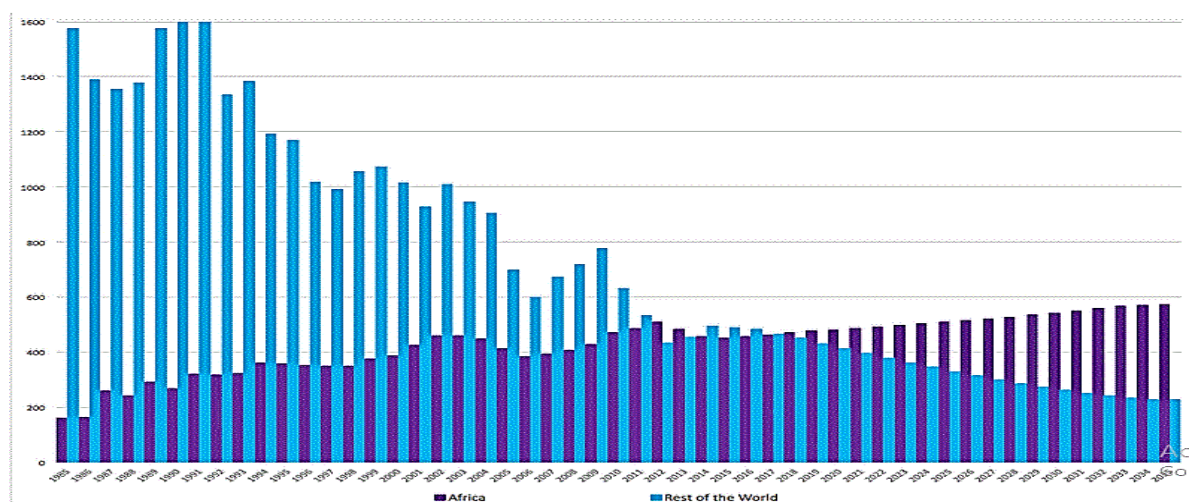


Figure 2. People living in extreme poverty (millions), Africa and the rest of the world, 1985-2035 (using a five-year moving average)

Source: <https://issafrica.org/iss-today/africas-future-seven-key-trends> [3]

Infrastructure development is vital in maintenance of growth and alleviation of poverty [1] and the socio-economic development of a nation can be accomplished by appropriate planning of infrastructure. Infrastructure most times is grouped into two main classes: social infrastructure (education, waste disposal plant, sporting facilities, health, recreation and housing) which boosts the quality of life (human

capital) and has multiple consequences on the economy. The enhancement of human capital will guarantee innovation, invention and advancement of productivity in the economy. The quality of social infrastructure, according to a recent World Bank survey affects urbanization which is directly proportional to gross development product. Secondly, physical infrastructure such as roads, electricity and telecommunication leads to economic growth and development of any country.

Africa is blessed with immense potentials which involves clean energy resources like solar, hydropower, biomass, geothermal, compressed natural gas, and wind, these problems still linger because investment have been drastically inadequate in the procurement new facilities and maintenance of existing infrastructure leaving many African countries with insufficient electricity service, poor quality roads, port, railway and inadequate information communication technology (ICT). Infrastructure can be described as the foundation on which other super-structures are built, specifically the economic and institutional infrastructures [23]. Infrastructural investment returns are very profitable with an average of thirty to forty percent (30-40%), above forty percent (40%) and eight percent (8%) for telecommunication, electricity generation and road investment respectively [1]. According to [24], for Africa to have met the MDGs in 2015, about fifteen percent (15%) of GDP would be invested in infrastructure. A report by [25] stated that \$14.2 billion would be invested annually in infrastructure in order to meet the infrastructure target for Nigeria apart from the involvement of private investors. It is evident that the foundation upon which sustainable development goal in developing countries can be built on is infrastructure among many other things.

2.1.1. The Rate of Agricultural Infrastructure in Driving the SDGs

In a report released in 2009 by the United Nations' Food Agricultural Organization, the population of the world is estimated to reach 9.1 billion. For the sustenance of the population, food production has to rise by seventy percent. A report revealed by [26] showed that there will be an increment from approximately 2.1 billion tons to 3 billion tons in grain production while meat production will rise from 200 million tons to 470 million tons per annum. The rapid growth in population will cause more demand for agricultural resources which are already scarce. In response to demand of agricultural produce, developing countries would have to increase agricultural production by 80% crop yield increment from existing resources and 20% increase from arable land expansion. Agricultural promotion is essential in meeting SDG 1, 2, 3 and 10 (poverty alleviation, zero hunger, good health and well-being and reduced inequality within and among nations). It is clear that agricultural productivity has to be raised to dismiss poverty and hunger and to expand food production which will bring about low food cost and sustainable production of food. Infrastructure as reported by [27] is a major determinant in the growth of agricultural productivity. They also highlighted three agricultural infrastructure which include irrigation technology, road networks and post-harvest technology. Agricultural infrastructure include all basic services, facilities, equipment and institution necessary for the effective operation of the food and fiber market [28].

2.1.2. Telecommunication Infrastructure in Driving the SDGs

Telecommunication infrastructure has been known to be a strong force in the technological development phase of nation. In Nigeria, as reported by [29] and [30], any investment in telecommunication infrastructure in Nigeria will produce a significant growth in economy. Strong telecommunications grids ensures fast stream of information which increases a country's economic efficiency. In a study conducted by [31], a positive connection between investments in telecommunication infrastructure and economic growth was observed. More so, [32, 42] showed statistically a significant relationship between ICT and economic growth, reporting that the emergence of mobile phones, personal computers and the internet have a major contributing import on all round economic growth. The biggest influence made by telecommunication infrastructure is improved organizational efficiency and diffusion of information. Through the use of high-speed internet connections, people could improve their skills and knowledge. Telecommunication infrastructure development which plays a role in achieving SDG 8, 9 and 11 are needed to ensure the achievement of the SDGs in developing countries.

2.1.3. Power Generation and Transmission in Driving the SDGs in Nigeria

Electricity is pivotal in achieving the SDGs in Nigeria. It would be difficult for Nigeria to realize any of the numerous objectives of the SDGs without significant improvement in the availability of electricity to the populace [33]. Member countries of the UN have adopted the SDGs to end poverty, protect the planet and ensure prosperity for all as part of a new sustainable development agenda. Each of the goals including good health, clean water, quality education, innovation and infrastructure among others, has specific targets to be achieved over the next 15 years but of the 17 SDGs cannot be achieved without electricity [20]. “Enormous energy consumption has always been associated with prosperous societies. The quality of electricity energy consumed by a country determines the level of economic activities, which lead to growth and development” [34]. Subsequently, to achieve sustainable development, Nigeria must give the power sector the serious attention it deserves, as availability of electricity will breathe new life into homes, industries, science and technological researches, and address challenges in areas like communication/entertainment, rural/urban population drift, and security. Also without power supply (electricity), some industrialization process will not take off. This process which would have provided jobs for the poor (unemployed) will not take off, thereby increasing unemployment. A review done by electrification cooperative in Costa Rica, on the aftermath of the rural electrification experience showed that there was an increase (15% to 86%) in major businesses [35].

3. Opportunities and Challenges of Sustainable Development Goals in Nigeria

There are many opportunities for the SDGs to be implemented holistically. It is imperative that every country should transform every relevant SDG into national plans of action. Some of the opportunities attracted to the SDGs include the start of new businesses, boost in employment rate, substantial growth opportunities, promotion of great risk-adjusted financial returns to investors, improved involvement rate of youth and adults in formal and non-formal education and training, fostered environment friendliness and driving positive change in developing countries like Nigeria. The SDGs for different nations have their peculiarities and perspectives. Moreso, attaining the SDGs in Nigeria would include huge implementation costs even with long-term benefits attached. Some of the challenges to success of SDGs in Nigeria includes inadequate financial resources for investments in SDG-related activities, humanitarian crisis in the North east, militancy in the Niger Delta, corruption, poor policies, unstable polity, weak public sector institutional capacities, up-to-date and reliable data, maintaining peace, measuring progress, accountability and decarbonization to check threat of climate change. Other bottlenecks are inadequate economic diversification and continued susceptibility to external economic shocks, massive infrastructural and technological deficit [36].

4. Roles of infrastructural development in driving the SDG goals in Nigeria

Infrastructure is both a clear goal and an unclear means to execute and accomplish majority of the SDGs. Achieving the SDGs in Nigeria has been unsuccessful due to several bottlenecks hindering its successful implementation. The major challenges to sustainable development in Nigeria include high inadequacy of domestic water supply, poverty, poor human development initiatives, poor transportation network and environmental degradation [36]. Nigeria population ranks 7th in the world and is expected to be the 3rd most populated country by 2050 after China and India. This estimation demands a rise in infrastructure development especially in improving economy. Expansion of energy-related infrastructure and electricity is essential in provision of energy needs in both rural and urban areas. Transportation infrastructure such as roads, port, airports, railways, canals, waterways is critical to the linkage between rural and domestic area, rural area and regional markets, rural and urban areas, and movement of people from one place to another thereby contributing to a country's economic growth. Sustainable water infrastructure will enhance lives through provision of water and assist in managing scarce resources in a sustainable manner. Building resilient infrastructure will promote sustainable industrialization and innovation. For the implementation of the SDGs, it is very necessary that infrastructure projects are assessed on the basis of the asset lifecycle value-for-money. Thus, to

successfully achieve the SDGs, infrastructure finance and sustainable procurement must be tackled with innovative approaches.

Achieving a large percentage of the SDGs is hinged on infrastructural development. SDG 1 target relates to access to good infrastructure for the provision of basic services and public service delivery such as health care services, education, roads, access to water, energy and electricity to everyone. SDG 2 relates to increase in rural infrastructure investment especially in agriculture, which shows the essentiality of infrastructure investment in rural and urban areas. SDG 3 concentrates basically on the need of quality important health-care services for which there will be serious development of health centers and hospitals in rural and urban areas. The fourth SDG targets the building and construction of education centers and learning services. SDG 5 focuses on providing infrastructure and public services for social protection. The sixth SDG targets availability and access to water and sustainable management of water, all which require strategic infrastructure projects. SDG number 7 focuses on provision of investment and development of energy infrastructure. SDG 9 is a call to increased investment in sustainable infrastructure. SDG 11 requires provision of sustainable infrastructure and planning of waste management system, transportation, climate change mitigation and adaptation and construction of safe homes. SDG 12 looks into sound policies that ensure procurement of infrastructure projects. SDG 13 focuses on provision of infrastructure that helps reduce climate change impact. SDG 17 focuses on involvement of public-private partnerships to ensure meaningful delivering of sustainable infrastructure [17].

5. Implementing sustainable Development Goals in Nigeria

Sustainable development is defined as any development that is anticipated to meet the aspirations and necessity of the present without compromising the ability to meet future generation needs. The implementation of the SDGs has experienced serious drawbacks due to some challenges peculiar to Nigeria situation. Recently, Nigeria found itself at a crossroad caused by economic recession, militancy in the Niger Delta, weak public sector institutional capacities, humanitarian crisis in the North east, poverty, corruption, political dislocations and upheavals, poor disaggregated comprehensive up-to-date and reliable data [36 - 37]. Policies need to be developed to accommodate the SDGs in the development of Nigeria and there is no doubt that Nigeria will have some challenges in implementing these policies. Policy implementation involves carrying out a formulated policy in reality and it requires the involvement of humans and money for its execution. A study by [37] opined that setting realizable goals is the beginning of public policy making. The challenges of implementing the SDGs in Nigeria could be linked to setting unrealistic goals that can be hardly matched by the system, government insensitivity to the environment, organization interpretation and application, non-involvement of target beneficiaries in implementation, not considering the needs of the people its intended for, adoption of foreign solutions to local problems without considering the social, economic and politics of the environment during implementation. The saying “a policy is a good plan when not correctly implemented” could be the case of Nigeria if proper attention is not given to the implementation of the SDGs [38] and [37]. Sustainable development is a pivot for balancing economic, social and environmental goals. Availability of information on sustainability tenets is still very poor on this basis. Identification of the best implementation practice of sustainability remains passive in the homebuilding industry. Implementation has some shortcomings between inter-linkages and interdependencies among goals, creation, internal conflicts and uncoordinated action. The SDGs are broad, unclear and unstructured. This is an indication that no particular measure can be used in pursuance. Implementing SDGs is a complex task to achieve and need appropriate tools and methods [39]. The SDGs are weakly institutionalized. Nigeria should set goals from the SDGs that are implementable. The implementation should include state and local government contents. The target beneficiary involvement in sustainable development goals policy design will ensure ownership and prevent a sabotage of the programme thereby making SDGs have significant impact in Nigeria. Participation of the target beneficiaries should be given credence in all stages of decision making, starting from identification of problem to solution formulation down to the implementation of solution and finally to the monitoring and evaluation stage. The government should consider the socio-political and economic environment of the target population in its implementation, to ensure the problems addressed are priority to the target community. This target community population

should include the civil societies, community-based organizations, non-governmental organization [40, 41].

6. Conclusion

The SDGs recognize the dominance of infrastructure as key to people's quality lives. Some of the challenges of attaining the SDGs in Nigeria with reference to infrastructural development rate include; poor implementation policy, financial accountability, crisis management, measuring progress and accountability, high inadequacy of domestic water supply, poverty, poor human development initiatives, poor transportation network, illiteracy level and environmental degradation. It is imperative for the implementation of the SDGs that the value-for-money of an infrastructure project should be evaluated based on the asset lifecycle. Assessment of projects should include initial capital investment, operational cost, maintenance, and disposal of the asset. This will ensure more sustainable infrastructure projects that are likely to have a high initial capital cost, however produce much better desirable result through the lifecycle.

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