

A Sustainable Funding for the Maintenance of Critical Urban Infrastructure in Nigeria

MOHAMMED ABUBAKAR MAWOLI

Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria

Abstract. Urban infrastructures foster rapid economic growth and development of cities, sub-national and national economies. However, most developing nations including Nigeria are experiencing huge infrastructural deficit which requires scarce financial resources to fix. Traditionally, governments used tax revenues and bonds/loans to fund public infrastructural development and maintenance; however, tax revenues have declined in Nigeria while bank loans are very expensive. Similarly, corporate financiers have now incorporated “sustainability” clause into infrastructural finances to mitigate and ameliorate negative impact of construction works on the natural environment, communities and livelihoods, which often increases project (infrastructural development) costs in the short-run but boosts financial and non-financial returns in the long-run. To overcome the infrastructural funding challenges, resources are now being pooled from the public, people and private (PPP) stakeholders and managed with sustainability doctrines.

Keywords: sustainable funding, physical infrastructure, social infrastructure, economic development, Nigeria

1. Introduction

Nigerian government has statutory responsibility of providing basic infrastructure to her citizens across the length and breath of Nigeria. Specifically, the Constitution of the Federal Republic of Nigeria (CFRN) (1999 as amended) states that Nigerian government has the obligation to “provide adequate facilities for & encourage free mobility of people, goods & services throughout the federation” (S.15:3a); “ensure that suitable & adequate shelter...are provided for all” (S.16:2d); “ensure that there are adequate medical & health facilities for all persons” (S.17:3d); and “protect and improve the

environment & safeguard the water, air and land, forest & wild life of Nigeria” (S.20).

Urban infrastructure such as electricity, water, roads, railway systems, bridges, airports, telecommunication, housing, hospitals, modern markets, parks, stadia and seaports are critical to the functioning, growth and development of every economy, including Nigeria. They are critical because their shortage, depletion, failure or collapse usually affect the socio-economic well-being of a state or nation adversely. Specifically, infrastructural deficit can cause untoward hardship to individual citizens and households on the one hand, and increase cost of doing business to the private sector on the other hand. Its abrupt total collapse due to poor design, construction, and maintenance or terrorist/enemy attack can lead to colossal loss of lives, sharp decline in government revenue and foreign direct investment, mass revolution and regime change.

Today, Nigeria is faced with huge infrastructural deficit across different industries, notably transportation (roads, seaports, airports, rail), energy, communication, water, waste management, and housing. Picking road infrastructure sub-sector of the transportation as an example, over 60 percent of 35 thousand kilometer federal roads in Nigeria are in bad condition, over 60 percent of the 17 thousand kilometer state roads in Nigeria are either unpaved or unmotorable, while over 90 percent and over 50 percent of the 150 thousand local government roads in Nigeria are unpaved and unmotorable respectively (Anaeto, 2018). Overall, the infrastructural deficit in Nigeria translates to three trillion dollars worth of future infrastructural investment (Ahmed in Adesoji, 2019) or conservatively 310 billion dollars worth of infrastructural investment (McKinsey in Okusaga, 2019). This signifies decades of gargantuan investment opportunities for the national and international infrastructural financiers and project

developers provided the right political leadership is produced and right decisions taken.

As the Nigerian governments plan and take actions to remedy the infrastructure deficit across the country in the years ahead, they need to equally pay attention to the issue of maintaining the existing physical and socio-economic urban infrastructure. Obviously, many of the existing urban infrastructure in Nigeria are aged and/or not properly maintained over the years, and therefore, nearly unusable and in some cases life threatening. To mention a few, the Tafawa Balewa Square and National Arts Theater in Lagos; National Stadium, Abuja; petroleum refineries in Kaduna, Warri and Port Harcourt; petroleum pipes and depots; and rail transportation assets of the Nigerian Railway Corporation. The current poor state of a majority of national infrastructure is believed to have been caused by lack of legislation on maintenance of public infrastructure, lack of maintenance policies, poor leadership, attitudinal problems, corruption, untrained maintenance technicians, users' indiscipline and ignorance, lack of proper incentives for the maintenance staff, shortage of maintenance equipment and spare parts, lack of timely information regarding failing or non-functional infrastructure, non-availability of funds to finance maintenance (Iruobe, 2011; Alani, 2012; Tijani, Adeyemi and Omotehinshe, 2016), vandalization for political and economic reasons, sabotage, and poor enforcement of laws guiding use of public infrastructure.

Efforts by the three tiers of Nigerian government to fill the infrastructural gap by renovating the existing facilities and constructing new ones to meet the increasing demand of the citizens, industries and economy at large have not been largely successful due principally to funding challenges: government revenue shortfalls, expensive bank loans, underutilization of state and local government bonds, and corporate lenders' preference for infrastructural projects that incorporate sustainability dimensions. Consequently, economic growth has not been adequately stimulated leading to slow economic recovery following the 2016/2017 economic recession. Against this backdrop, this paper seeks to review modes of financing critical urban infrastructure with a view to identifying the most sustainable funding mechanism for their maintenance.

The rest of the papers is structured into four sections: the 'conceptual clarification' section where key and recurring concepts are defined, the 'financing and funding maintenance of critical infrastructure' section

where traditional and modern methods of financing infrastructure are reviewed, the 'sustainable method of funding critical urban infrastructure' where the most efficient funding strategy is recommended, and the 'concluding remarks' section.

2. Conceptual Clarification

2.1 Critical Urban Infrastructure

In defining 'critical urban infrastructure', it is instructive to first review definitions of "infrastructure". Infrastructure refers to the basic services without which primary, secondary and tertiary types of production and activities cannot function (Hirschman, 1958). This definition supports the idea that infrastructure is the foundation for industrialization in any society. However, the definition failed to point out the provider(s) of the basic services (the infrastructure) and the nature of the infrastructure. Thus, Goel (2002) defines infrastructure as the physical framework of facilities through which goods and services are provided to the public. That is, infrastructure connotes a stock of tangible capital assets such as roads, ports, rails, gas pipelines, telecommunication networks, and electricity transmission networks that the private and public sector leverage on to provide goods and services for public (individuals, groups, households, organizations) consumption. However, Goel's definition neglected the intangible component of infrastructure otherwise called infrastructure support services; it is also silent about the provider(s) and/or ownership of the physical facilities. Bichi's (2017:3) definition: "infrastructure is a wide array of physical assets required to support both private economic and social services" only buttresses Goel's illuminatingly but suffers the same deficiencies. To bridge this gap, infrastructure is recognized in this paper as a combination of state and privately owned tangible and intangible assets or facilities that are usually very lumpy, long lasting, space-specific, and consumed by the individuals, households, and private enterprises as inputs for production, commerce and welfare.

Urban infrastructure are the physical facilities and social amenities that are located in cities such as Lagos, Kano, Port-Harcourt, Abuja, and most of the state capitals in Nigeria. The criticality of 'urban infrastructure' is associate with their strategic importance to the optimal functioning of an ideal city where facilities for transportation of people and goods; lightning of home, offices and industries; private and business communication; television and radio broadcasting; disposal of solid and liquid waste; production and marketing of goods and services;

teaching, learning and research; treatment of sick people, and protection of lives and property are available in the required quantity and quality and satisfy the needs and desires of users. Supporting our view, Rome and Vob (2015:11) define 'urban critical infrastructure' as "an asset, system or part thereof located in an urban area which is essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact in an urban area as a result of the failure to maintain those functions".

2.2 Sustainable Infrastructural Funding

Sustainability is a relatively new philosophy that strives to orient governments and the general public on the need to protect the environment and ecosystem for the benefit of current and future generations. Bossel (1999) and Robert, Parris and Leiserowitz (2005) stress that sustainability involves factors such as people and their general well-being and health conditions; the correlation between the economy and industrialization; the growing demand for more raw materials and its impact on natural environment; and the impact of pollution, energy consumption and depleting resources on the planet, wildlife and habitat.

When attributed to finance or funding, it connotes factoring environmental consideration (climate change mitigation and adaptation), social consideration (inequality, inclusiveness, human capital development, and labour relations) and governance consideration (provision of public goods/infrastructure and services to citizens) during investment decisions in order to benefit all stakeholders (clients, investors, developers, community, and public) in the long-run. In sustainable funding, lenders are conscious of the risk-and-return profile of every infrastructural investment. Lending risks include default payment, re-negotiation and extension of loan tenure, currency fluctuation, diversion of funds for unapproved projects, collapse of industry, product failure or decline, natural calamities, regime-change, political instability, and environmental degradation among others. Thus, the bottomline of sustainable funding and/or finance is to mitigate risk.

Literally, sustainable finance means a predictable, reliable, efficient, affordable, inclusive, dependable and enduring source of finance or funds that can be allocated to civil works and social services. Tamarisk Coalition (2011) defines "sustainable funding" as a perpetual revenue stream that is sufficient in

magnitude to accomplish a program's goals and reliable enough to confidently develop long-term maintenance and monitoring programs.

The renaming of Millenium Development Goals (MDGs) as Sustainable Development Goals (SDGs) by the United Nations primarily to bridge the gap between 'development' and 'environment' has popularized and universalized the concept of 'sustainability' or 'sustainable development'. That is, the correlation between funding, infrastructural development and environment degradation is elastic. Increased funding can increase stock of infrastructure and stimulate economic activities on the one hand, it can equally degrade the quality of the environment and destroy the source of livelihood of many on the other hand. Thus, the World Commission on Environment Development (1983) in Thomsen (2013) suggests that any sustainable Development project or initiative should be able to meet the needs of the the present generation (or a group of people) without compromising the ability of the future generation (or another group) to meet their own needs. Similarly, Rogers, Jalal, Lohani, Owens, Yu, Dufournaud and Bi (1997:44) defines sustainable development from economic and financial perspectives as "maximizing income while maintaining a constant stock or increasing stock of capital". To make this possible, the SDG-9 provides that national and sub-national economies should "build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation", while the SDG-11 tasks leaders to "make cities and human settlements inclusive, safe, resilient and sustainable".

2.3 Infrastructural Maintenance

Critical urban infrastructures are susceptible to depreciation and depletion due to constant use, abuse, attack, or weather effects. Maintenance is the facility management technique that seeks to preserve the conditions of critical urban infrastructures. Bivona and Montemaggiore (2005) define maintenance as the technical, administrative and managerial actions taken during the life cycle of an asset(s) to ensure that they continue to perform their intended functions or repairing such asset(s) that have failed, or to keep them running, and/or by restoring them to their required or favorable operating conditions. Similarly, Wireman (1990) see maintenance management as a combination of all technical, administrative and managerial actions during the life cycle of an item, intended to retain it or restore it to a state in which it can perform the required function. Some examples of existing and active specialized maintenance agencies

created by Nigerian government are Federal Road Maintenance Agency (FERMA), Niger State Road Maintenance Agency (NIGROMA), Kaduna State Roads Agency (KADRA), Lagos State Public Works Corporation, River State Road Maintenance and Rehabilitation Agency, and Ogun State Road Maintenance Agency (OGROMA) among others.

In this paper, infrastructural maintenance is regarded as effort by the owners, operators or managers of any urban infrastructure to initiate and ensure implementation and completion of repair, renovation, upgrade or modernization of existing physical and socio-economic urban infrastructures so that they continue to function effectively and meet the objective for which they are designed or procured.

3. Financing and Funding Maintenance of Critical Urban Infrastructure

It is important to point out that infrastructural funding is not the same as infrastructural finance, though the two concepts are used interchangeably by practitioners and commentators. There are two perspectives to the term 'infrastructural funding'. First, infrastructural funding is concerned with decisions on how to generate or recover and payback monies expended in building a capital asset usually through tolls, rents, and tariffs. In other words, infrastructural funding focuses on whether a built facility can generate adequate streams of income in the long run to pay for its total cost of construction (the principal and interest). Fay, Martimort and Straub (2018) substantiate that funding is essentially cash flow based and addresses the issue of where the money injected in the construction and operation of the service-providing piece of infrastructure come from or be recovered. Second, infrastructural funding is regarded as funding of projects through government's internally generated revenue (Congressional Budget Office, 2018).

In contrast, infrastructural finance is concerned with decision on how to raise capital or financial resources required for the construction, provision or maintenance of small or large scale physical or social facilities. In project financing, emphasis is on borrowing or raising infrastructural capital (bonds, loans, equity) upfront from individual, corporate or government investor(s). To Emenike (2015), infrastructure finance is the consideration of all methods available for mobilizing resources required to finance physical assets or services which are fundamental to the growth and development of an economy. Another perspective on 'financing' is that it is mainly concerned with government's non-

revenue sources of raising capital for the construction of critical urban infrastructure (Congressional Budget Office, 2018). Fight (2006) affirms that project finance is a non-recourse or limited recourse financing structure in which debt, equity and credit enhancement are combined for the construction and operation, or the refinancing, of a particular facility in a capital-intensive industry. To avoid confusion in the use of the two concepts (financing and funding), phrases like 'public funding' and 'private financing' are devised by financial experts. In fact, the title of a publication "From Funding to Financing: Transforming the SDG Finance for Country Success" by the World Economic Forum in 2019 is very instructive and illustrative.

In this paper, the explained conceptual distinctions between financing and funding are not recognized. Thus, funding and financing are used interchangeably to mean both upfront sourcing of financial resources as well as recouping of expended financial resources for/from urban infrastructure development and maintenance.

4. Methods of Financing Critical Urban Infrastructural Maintenance

Financial management scholars have suggested several modes of financing capital projects including urban infrastructures. For example, critical urban infrastructure can be financed through equity, development loan, subordinate loan, unsecured loan, secured loan, syndicated loan, world bank group financing sources, bonds, investment funds, institutional lenders, leasing companies, sponsor loans, supplier financing, and host government financing (Fight, 2006); infrastructural bonds, municipal bonds, corporate bonds, stock issues, private equity, bank loans, government grants, and current revenue and taxes (Grigg, 2010); domestic public financing, domestic private financing, international public financing, international private financing, and blended financing (UN, 2014); and budget, loans from multilateral financial institutions, capital market, special tax interventions, municipal funds, Public Private Partnership (PPP), and local financial institutions (Bichi, 2017). The aforementioned specific modes of financing infrastructural development, especially by a sovereign state, can be grouped into three: revenue, debt, and partnership.

Government Revenues: This refers to incomes received by a government from taxes and non-tax sources for the purpose of providing and maintaining physical and social infrastructure, and for the general

running of the government. With the exception of Lagos and Ogun States, virtually all state governments in Nigeria depends more on Federation Account Allocation (FAA) for sustenance because their IGRs are less than the monthly statutory allocation from the federation account (see Appendix II). By implication, most states are not economically viable because their IGRs can neither offset their recurrent expenditure nor significantly bridge the infrastructural deficit gap in the states, and therefore, cannot stimulate economic growth and development of the states rapidly.

Tax Revenues: Tax is a compulsory levy or financial charges imposed on eligible individuals and business establishments by the government for the purpose of generating income to fund public expenditure. Worlu and Emeka's (2012) study showed that tax revenue stimulates economic growth through infrastructural development. Appendix I shows a list of taxes and levies collectable by the three tiers of government in Nigeria.

All tiers of the governments in Nigeria have performed poorly in the area of tax administration in the past decades. This is not only evidenced by the Nigeria's national budget deficit in the last couple of years, but supported by the research findings of Akinleye and Ogunmakin (2016) where it was reported that 61 percent of expected annual revenues from Value Added Tax (VAT), Pay As You Earn (PAYE), Capital Gain Tax (CGT) and Withheld Tax (WIT) in Southwest Nigeria were lost to tax avoidance through non compliance with collection and remittance. Similarly, OECD (2019) revealed that Nigeria's tax revenue effort (tax-to-GDP), defined as ratio that indicated the tax collection effort of a country, was 5.3 percent and 5.7 percent in 2016 and 2017 respectively, far behind that of Ghana (13.7 percent in 2016 and 14.1 percent in 2017), Kenya (18.3 percent in 2016 and 18.2 percent in 2017), and African average of 17.2 percent. Factors responsible for abysmal revenue are corruption, free rider problem, tax avoidance, tax evasion, poor collection mechanism, inadequate tax personnel, terrorism and militancy, rich tax dodgers, tax run, welfare cost of taxation (administrative and compliance costs), and falsification of records (Enahoro and Olabisi, 2012 and Ndubuisi, 2018). The low tax revenues have made it practically impossible for the governments to fund maintenance of the existing infrastructure and as well provide new ones to meet the increasing demand of the public. This development necessitated tax reforms at federal and state levels primarily to increase the tax base, expand the tax net, update the tax records, and encourage payment of outstanding

tax liabilities by tax evaders. Worth mentioning is the Voluntary Asset and Income Declaration (VAID) of Federal Government of Nigeria, and Lagos, Kano and Kaduna States' tax reform efforts that have yielded greater tax collections. Ogbonna and Appah (2012) and Nwaru (2015) are of the view that tax reforms can improve revenue generating machinery of government to undertake socially desirable expenditure that will translate to economic growth in real output and per capita basis.

One of the new tax initiatives that has foster highly capital intensive infrastructural development in Nigeria of recent is the Tax Credit Scheme under Road Trust Fund (RTF). Conceptually, a 'tax credit' is that portion of owed tax that a tax payer is allowed to subtract from the total tax due for payment to the government. Specifically, the Nigeria's Tax Credit Scheme is designed by the Federal Government of Nigeria to enable private companies use their funds to construct roads that they consider critical to the survival and growth of their businesses, while the expended funds are subtracted from the company's annual tax for a period of ten years or less. For example, the Apapa Road in Lagos State is being reconstructed by Dangote Group under the Tax Credit Policy at the cost of 72.9 billion naira. Some of the expected benefits for the participating companies are 100 percent recovery of costs incurred on road infrastructure as tax credit against total tax payable over a three-year period, accelerated depreciation to enable cost recovery in three years rather than four years for standard assets, and ability to intervene in roads critical to a company's business. The Federal Government and the country at large can benefit from the scheme through increased funds for road development and accelerated road provision across the nation, alternative funding to the government for road infrastructure development which will reduce pressure on the Federal Budget, and efficient delivery of road projects and reduction of project costs.

Another worth mentioning tax savings initiatives for infrastructural development in Nigeria is the Nigerian Infrastructural Funds (NIF), which is one of the three Funds under National Sovereign Investment Authority (NSIA). NSIA is an Agency of the Federation set up to manage funds in excess of the budgeted hydrocarbon revenue. NIF is aimed at enhancing the development of Nigerian infrastructure in sectors such as power, healthcare, real estate, agriculture, transport, and water resources. The 2nd Niger Bridge, Kaduna-Abuja Express Road, and Lagos-Ibadan Express Road are funded from NIF.

Non-Tax Revenues: These are sources of revenue to the government other than taxes enumerated in Appendix I and include rents, concessions, royalties; revenues from state owned enterprises; revenue from sales of state assets; fines collected and assets forfeiture; donations to the state; foreign aids; and grants. Table 4 shows that non-tax revenue (excluding oil revenue) is 28 percent in 2019 (with Government Owned Equity [GOE] and independent revenues taking the lead) and 43.9 percent in 2020 (projected) (with GOE, signature bonus, and independent revenues taking the lead). Thus, further discussion as regards funding of critical infrastructure will be limited to equity finance, independent-revenue-sources finance, and grants. A study by Morrison (2009) found that increase in non-tax revenue is associated with regime stability in both democratic and dictatorial governments. Also, Mohanty and Patra (2016) revealed that per capita non-tax revenue has significant and favorable effect on per capita revenue expenditure in the economic service sector.

Equity Finance: Equity means owners stake or interest in a company. Equity finance is a method of raising fresh capital for reinvestment through issuance or sale of shares to the public. Unlike debt financing which requires repayment of both principal and interests at the agreed time intervals, equity financing is a permanent source of investment capital to a company and only requires payment of dividends to the shareholders annually when profits are made. Shareholders in need of funds can trade their shares in the stock market through the help of stockbrokers. Equity finance is germane in public finance because governments in the developed and developing countries actively and directly participate in production and commercial activities just like privately owned enterprises do, primarily to further social outcomes, provide physical infrastructure, and to create market stability within and across the supply chains. Such enterprises are commonly called ‘Government or State Owned Enterprises (GOEs or SOEs)’ and defined as enterprises where state has significant control through full, majority, or significant minority ownership (OECD, 2005). For example, SOEs represents 23 percent of the Global 500 listed companies in 2014 by the Fortune Magazine (PwC, 2015), which suggest that SOEs do raise equity capital for investment purpose. However, fully SOEs in Nigeria such as Nigerian National

Petroleum Cooperation (NNPC), Nigerian Security Printing and Minting Company Limited (NSPMC), Nigeria Coal Corporation, Transmission Company of Nigeria (TCN), and Nigerian Railway Corporation (NRC) are not quoted in the Nigerian stock market, none the less equity finance remains a viable infrastructural financing option for these companies especially in areas that can strengthen their operations for improved business performance. In particular, the establishment of Presidential Infrastructural Development Funds (PIDF) that is financed from Nigerian Liquefied Natural Gas’s (NLNG) dividend account ammounting to 650 Million Dollars is commendable. Similarly, the setting-up of Infrastructural Company (Infra-Co) with a seed and equity capital of One Trillion Naira will expand funding opportunities for infrastructural development and maintenance in Nigeria especially from a business or revenue generating perspective rather than social services. Wang, Xu and Zhu (2003) found that public listing impacted positively on the SOEs’ ownership structure and finance. They also note that corporatization in general and public listing in particular may be a viable alternative to privatization in the long-run in China and beyond.

Independent-revenue-sources finance: Revenue from independent sources consists of recovered looted monies through court orders or plea bargain as the case may be. Such recovered monies are originally appropriated for infrastructural development but diverted into private pockets, thereby worsening the infrastructural deficit situation. The recoveries are commendable provided they will be re-channeled for the construction of the critical infrastructures they are meant for. United Nations (2014) affirms that combating corruption and ensuring transparency are crucial for effective fiscal management. Thus, state and local governments need to cooperate with anti-corruption agencies in information gathering and sharing with a bid to recovering diverted infrastructural funds for re-budgeting.

Grants: Otherwise called “intergovernmental revenue”, is an important source of revenue from foreign countries, regional institutions, private bodies, or multilateral institutions to Federal and State Governments that can be utilized in the construction of critical urban infrastructure.

Table 4: Distribution of FGN Revenue (2019-2020)

Revenue	Percentage	
	2019	2020
Share of oil revenue	52.9	32.3
Share of dividends (NLNG)	-	1.5

Share of non-oil:		
<i>Share of CIT</i>	11.5	10.3
<i>Share of VAT</i>	3.3	3.6
<i>Share of Customs</i>	4.3	7.6
<i>Share of Federation Account Levies</i>	-	0.67
Revenue from GOEs (excluding NNPC)	-	12.1
Top 10 GOEs operating surplus	-	-5.4
Independent revenues	9.0	10.4
JV equity restructuring	10.2	-
FGN's balance on special levies account	-	3.7
FGN's share of actual balance in special accounts	-	4.2
Signature bonus/renewals/early renewals	1.2	11.5
Domestic recoveries + Asset + Fines	2.9	2.9
Stamp duty	-	2.5
Exchange rate differential (Non-FAAC)	-	1.5
Grants and donor funding	3.0	0.5
Others	1.7	-
Total	100	100

Source: Budget Office (2019), 2019 Budget: Appropriation Act, Federal Republic of Nigeria.

Debt: This means borrowed funds used to finance infrastructural development and maintenance. Debt instruments such as loans, bonds and debentures are characterized with fixed interest rates; repayment of the principal at par, discount or premium; and unsecured or secured against a borrower's assets. Debts constitute 70-90% of the total capitalization of infrastructural projects (Griggs, 2010). Issuance of corporate bonds in Nigeria is approved by Security and Exchange Commission (SEC) while that of the sovereign or government bonds is coordinated by the Debt Management Office (DMO) in collaboration with Central Bank of Nigeria (CBN) as the Issuing House and Registrar. Debt instruments commonly used in financing urban infrastructural development are explained below:

Infrastructural Bonds: This refers to bonds specifically packaged to finance infrastructural development and maintenance. According to Grigg (2010), bonds are predominantly used by government authorities to finance the investment needs of infrastructure. Infrastructural bonds are in different forms:

Sovereign bonds: These are bonds issued by the Federal Government of Nigeria usually for the development of physical and socio-economic infrastructure within the country. Several Sovereign Bonds have been issued from 2017 by the Federal Government of Nigeria.

State Government Bonds: These are bonds issued by any state government in Nigeria for infrastructural development within the state. State government bonds are considered attractive by investors because repayment plans are tied to states' accounts funded by Statutory Allocation of Federal Government or IGR (Ofeimun, 2017).

Municipal or local government bonds: These are loans issued by any local government in Nigeria for

the development of physical and social infrastructure under their responsibility. Lagos Island and Nasarawa Local Governments are the only two Local Governments that issued municipal bonds in the history of Nigeria, and at a time when local governments had financial autonomy during the military era. Such feat is very difficult in the current regime of 'joint account' where local governments' statutory allocations are hijacked by state governments in the guise of pooled funds for rapid development which never materialized for over a decade. However, this financing option can leapfrog infrastructural provision in local governments in Nigeria if activated and explored.

Corporate bonds: These are bonds issued by corporate entities or public enterprises like NNPC for acquiring capital assets or investing in exploration and refining. However, private and public corporations can issue debenture stocks (bonds that are secured by company assets), debenture (unsecured corporate bonds) and mortgaged bonds (bonds secured by company's physical property) for the provision of certain infrastructure.

Green Bonds: The type of bonds issued to raise funds to mitigate climatic change and preserve the ecosystem. Green bonds cover areas such as renewable energy, pollution prevention and control, clean transportation, terrestrial and aquatic biodiversity conservation, and sustainable water management. Examples of such bonds in Nigeria are the First and Second Sovereign Green Bonds of N10.69bn and N15bn issued in 2017 and 2019 respectively, which were both over-subscribed. The bonds were aimed at realizing Nigeria's commitment to Paris Agreement on climate change, which include Off-grid solar and wind farm, irrigation, afforestation, reforestation and ecologic restoration projects (Udo, 2019).

Catastrophe Bonds: Shortened as ‘cat bonds’, catastrophe bonds are issued to rebuild core public infrastructure destroyed by the occurrence of natural disaster such as thunderstorm, windstorm, flood, hurricane, tsunami, or even Covid-19. For instance, African Development Bank (AfDB) issued a three year maturity \$3 billion “Fight Covid-19” Social Bond with 0.75 percent coupon for the purpose of raising and channeling the funds to health care services and infrastructure as well as economic palliatives to African population (AfDB, 2020).

Sukuk Bonds: These are interest-free and *Shari’a* compliant bonds used in financing public infrastructure. Federal Government of Nigeria issued N100bn Sukuk for road construction in 2017, and Osun State issued N60bn Sukuk for new roads, schools, and urban renewal in 2012.

Government bonds can be further classified as general obligation bonds, revenue bonds (industrial, agricultural, economic development, toll road, toll bridge, and hospital and healthcare revenue bonds), special tax bonds, public housing bonds, and re-funding bonds.

Multilateral agencies and development banks involved in financing infrastructural development across the world are International Bank for Reconstruction and Development (IBRD) known as World Bank, International Finance Corporation (IFC), and Multilateral Investment Guarantee Agency (MIGA). Others are regional development banks such as African Development Bank (AfDB), Arab Fund for Economic and Social Development, Asian Development Bank, European Bank for Reconstruction and Development (EBRD), European Union, European Investment Bank (EIB), Inter-American Development Bank (IDB), Islamic Development Bank (IsDB), Nordic Investment Bank (NIB), Nordic Development Fund (NDF), and OPEC Fund for Investment Development.

Partnership: Infrastructure development can be financed solely by a government body (public finance), private body (private finance), or through partnership between government and private entities (hybrid or blended finance popularly coined ‘Public-Private Partnership’ [PPP]). Perhaps, the strongest point against private finance is that it creates market failure – an imperfect market situation where certain financial products are overproduced and overpriced because of speculations and greed for higher financial returns (for instance, the cloned mortgaged loans that partly caused 2007 financial crisis in USA was based on speculation), or under-produced and over-priced

as result of scarcity created by lenders who collude as a monopoly. However, government interventions in the form of financial regulations are required to correct market failure or even forestall its occurrence in the first place. None the less, over-regulation and under-regulation can equally caused government failure – a situation where by government interventions or regulatory measures lead to the financial market outcomes that are less efficient than if government had done nothing, or where lack of government intervention lead to financial market outcomes that are less efficient than if government had acted. Hence, the need for PPP to synergize the benefits of private and public finances and overcome their inherent challenges.

Despite its popularity, PPP’s success depends largely on the institutional, legal and regulatory framework. For example, the enactment of The Infrastructural Concession Regulatory Commission Act 2005 to regulate PPP contracts over federal government assets, the development of National Policy on Public Private Partnership in 2009 to provide conducive environment for private sector engagement in the delivery of infrastructural services, and the creation of PPP Department in the Federal Ministry of Works to advice and oversee the administration of PPP contracts are right steps in the right direction.

The following are modes of financing infrastructural development through PPP:

Service provision contract: Otherwise called outsourcing, is the type of PPP in which a private operator is contracted by a government body to operate a public owned infrastructure or asset for a specified short period of time while the asset ownership and general maintenance of the asset remained that of the government. The government body pays the private operator for services rendered. Service Provision Contract is suitable when there is strong opposition to wider involvement of the private sector or upward review of prices.

Operations and Management contract: This is slightly different from Service Provision Contract in the sense that infrastructural operations and maintenance, as well as management control and authority are transferred or outsourced to the private operator by the government body for a medium term of three to five years. As regard urban road maintenance, the private operator may be entrusted with the tasks of axle-load weighing, toll collection, traffic management, and traffic counting. However, the government body retains asset ownership and major risks associated with commercial and capital

investments. Compensation may be fixed or tie to performance.

Lease and operate contract: In this type of PPP contract, a government body lease out public infrastructure like building or park to a private company to operate for a period of ten to fifteen years while ownership is retained by the government throughout the contractual period. The lessee (private company) pays the lessor (government body) out of the user fees realized, while the balance serves as returns for investment. Types of lease arrangement are Lease-Develop-Operate (LDO) and Lease-Renovate Operate-Transfer (LROT). LDO is an arrangement whereby government leases out a piece of land to a private firm with the agreement that the firm will develop the piece of land and operate the structure on it for a determinable time period. LROT, as the name indicates, involves leasing an existing under-functioning capital asset by a private firm, renovating it to function effectively, then operating it for fees, and finally transferring the facility back to the government after expiration of the lease period.

Concession: This type of PPP requires the engagement of a private company by a government body to invest funds in the construction of a new public infrastructure or rehabilitation of existing ones, and equally taking charge of operations, service delivery, maintenance, and management of the facility. Depending on the agreement, the concession contract may last for two to three decades after which the property is transferred back to the government client or the concessionaire allowed to take ownership of the public asset. Concessionaire usually recovers his investment through user fees such as tolls, tariff, and prices; hence, the name ‘user pay’ project.

Design-Build (Turnkey) contract: Here, a government body determines a public infrastructural specification and contracted a private operator to design and build the infrastructure in accordance with specification for a fixed price. Similar PPP arrangements are Design-Build-Operate (DBO) (engaging a private entity to not only design and build a public infrastructure in accordance with specification, but to also operate it afterwards for an agreed period of time), and Design-Build-Finance-Operate (DBFO) (engaging a private company to design and build the required public infrastructure and get paid by government, and the private company continues to finance the operations of the facility and paying fees to the government for a specified period of time after which government takes ownership).

Build-Operate-Transfer (BOT): A government body contracts the building and operation of a public infrastructure to a private organization for a long period of time, after which the property possession is transferred back to the government for continuous use. In other words, the private firm finances the construction and operations of the public infrastructure and recovers his total investment plus reasonable returns through user fees, and finally transferring the facility to government. Similar to BOT are Build-Own-Operate (BOO), Build-Own-Operate-Transfer (BOOT), Build-Own-Operate-Remove (BOOR), Build-Operate-Train-Transfer (BOTT), Build-Lease-Transfer (BLT), Build-Lease-Operate-Transfer (BLOT) and Build-Lease-Operate-Transfer-Maintain (BLOTM). In BOO, government permits a private investor to finance the building of a critical urban infrastructure and thereafter also assume full ownership and operating responsibility of the facility perpetually. Government only regulates payment of tariffs and protects the interest of the private company through legal monopoly. While in BOOT, ownership of the urban infrastructure changes from the private financier to the government after attainment of the agreed time. BOOR differs slightly because the private investor is obliged by the contractual agreement to remove or dismantle the infrastructural asset after a specified period. BOTT contract imposes additional responsibility of personnel training on how to operate the newly constructed facility by the private company. BLT is the type of partnership in which a private company raises funds to build urban infrastructure for a government, then lease the facility from the government for an agreed period of time, and thereafter transfer the facility back to the government. BLOT differs slightly from BLT because the private company has additional obligation of operating the facility during the lease period. BLOTM is a PPP contract where by a government body engages a private firm to finance the building of an urban infrastructure in accordance with specification, then the firm leases the facility from the government and equally operate it for an agreed period, and further undertake to continue to maintain the facility after its ultimate transfer to the government body.

Buy-Build-Operate: Government body sells an existing public asset to a private firm for upgrade as well as technical and commercial operations.

Joint Venture: Here, a public infrastructure is co-financed, owned and operated by both private and public entities. Returns on investment are jointly shared between parties involved.

From the forgoing, it can be deduced that PPP contracts are flexible and the contractual parties can originate new forms of agreement (PPP contract) different from the ones explained above as long as they are attuned to the principles of contract formation and existing PPP laws and policy.

5. A Sustainable Funding Method for Maintaining Critical Urban Infrastructure in Nigeria

In view of the reviewed literature on the modes of funding critical urban infrastructure, it suffices to recommend a funding approach that meet sustainability criteria (environmental, social and good governance dimensions), blend the sectoral strengths and best practices, and balance the capital structure. That is, such method should utilize both revenue and debt finances, integrates public and private financing capabilities, and improve quality of natural and human environment.

The scientific consensus is that a sustainable funding method for maintaining critical urban infrastructure should be PPP inclined (a combination of social service and business venture models of building and maintaining infrastructure). Such PPP arrangements should be based on tax and fee, regulatory, lending, market, and philanthropic revenue generating mechanisms. The tax and fee based sustainable funding are revenues and fines for environmental degradation/damage (e.g. green tax, severance tax, road toll, bridge toll). The regulatory based sustainable funding (also called compensatory mitigation fee) are aimed at enforcing infrastructural usage regulations; for example, owners of overloaded vehicles can be sanctioned. Lending based sustainable funding is usually tied to specific projects; the total costs (principal and interest) of building infrastructure are recovered through tolls and fee (e.g. revenue bonds, revolving loan funds). Market based sustainable infrastructural funding entails private financing initiatives in which 'environmental mitigation credits' are packaged and sold to the developers. The voluntary and philanthropic based sustainable funding has to do with free labour and donations from individuals and groups that reduces projects' costs to affordable rate.

6. Conclusion

The bedrock of modern cities across the globe is adequate functioning urban infrastructure. Consequently, there have been concerted efforts by federal and state governments in Nigeria to mobilize funds to maintain and re-construct critical urban

infrastructure to stimulate economic development, increase job creation and curb internal security threats across the country. However, the recorded results so far can best be described as "a drop of water in the ocean" as the country is still far-off the targeted infrastructural requirements, largely due to governments' revenue shortfalls, overdependence on the traditional infrastructural funding methods especially at the state and local government levels, starving local governments of funds, and wide spread corruption. To fast track the course of rapid infrastructural development in Nigeria, all tiers of government need to explore, identify and exploit sustainable funding mechanisms for the maintenance and construction of critical urban infrastructure in Nigeria. Sustainable funding of critical infrastructure hinges on partnership and collaboration between the public and private sectors in the areas of revenue generation, project design, project construction, project operation, facility maintenance, and facility ownership.

References

- Adesoji, B.S. (2019, September 24). Nigeria needs 100 billion naira annually to fix infrastructure deficit – Finance Minister. *Nairametrics*.
- AfDB (2020, March 27). African Development Bank launches record breaking \$3 billion "Fight Covid-19" social bond. Website: <https://www.afdb.org/en/news-and-events/press-releases/african-development-bank-launches-record-breaking-3-billion-fight-covid-19-social-bond-34982>. Retrieved on 17/3/2020
- Akinleye, G.T. and Ogunmakin, A.A. (2016). The effect of tax avoidance on government budget implementation in Southwest Nigeria. *International Journal of Accounting and Taxation*, Vol. 4, No. 1, pp. 55-68.
- Alani, A.A. (2012). Maintenance culture as threat to educational accessibility in Nigeria: implications for sustainable open distance learning in Nigeria. *OIDA International Journal of Sustainable Development*, Vol. 5, No. 11, pp. 63-69.
- Anaeto, E. (2018, October 1), Infrastructure deficit: challenges and opportunities. *Vanguard*.
- Bichi, R.S. (2017). Alternative modes of infrastructural finance: a review of issues and challenges. *Being a paper presented in a 2-day specialized workshop on "finance and development of capital projects – emerging solutions", in Westown Hotel, Lagos.*

- Bivona, E. and Montemaggiore, G.B. (2005). Evaluating fleet and maintenance Management strategies through system dynamics model in a city bus company. Website: www.systemdynamics.org/conferences. Retrieved on 21/3/2020
- Bossel, H. (1999). Indicators for sustainable development: theory, method, applications. *International Institute for Sustainable Development*. Winnipeg, p. 138.
- BudgetIT (2019), Niger State Government, Federal Republic of Nigeria, 2019 approved budget. Website: yourbudget.com/wp-content/upload/2019/07/NIGER-STATE-APPROVED-2019-BUDGET. Retrieved on 22/3/2020.
- Budget Office (2019), 2019 Budget: Appropriation Act, Federal Republic of Nigeria. Website: <https://budgetoffice.gov.ng/index.php/resources/inter-national-resources/budget-documents/2019-budget>. Retrieved on 19/3/2020.
- Congressional Budget Office (2018), Federal support for financing state and local transportation and water infrastructure. Website: www.cbo.gov/publication/54549. 20/3/2020
- Constitution of the Federal Republic of Nigeria (1999). Federal ministry of justice, Abuja.
- Debt Management Office (2019). Federal Government of Nigeria Benchmark bonds as at January 30th, 2019. Website: <https://www.dmo.gov.ng/fgn-bonds/fgn-bond-updates/2724-federal-government-of-nigeria-benchmark-bonds-as-at-january-30-2019/file>. Retrieved on 20/3/2020
- Eminike, K.O. (2015). Infrastructural finance mechanism and challenges in Nigeria, *Independent Journal of Management and Production*, Vol. 6, No. 3, pp. pp. 827-836.
- Enahor, J.A. and Olabisi, J. (2012). Tax Administration and Revenue Generation of Lagos State Government Nigeria,
- Fay, M., Martimort, D. and Straub, S. (2018). Funding and financing infrastructure: the joint use of public and private finance. *Working paper, Toulouse School of Economics*.
- Fight, A. (2006). *Introduction to project finance*, Amsterdam: Butterworth-Heinemann.
- Goel, D. (2002). Impact of infrastructure on productivity: case of Indian registered manufacturing. Website: www.cdedse.org/pdf/work106. Retrieved on 25/3/2020
- Grigg, N.S. (2010). *The business of infrastructure for a sustainable future*, New Jersey: John Wiley and Sons.
- Hirschman A. O. (1958). *The strategy of economic development*, New Haven: Yale University Press.
- Iruobe, O.J. (2011). Effective maintenance of engineering infrastructure for national development: a case study of building. *IRCAB Journal of Science and Technology*, Vol. 1, No. 1, pp. 127-133.
- Mohanty, A. and Patra, S.K. (2016). Impact of non-tax revenue on revenue expenditure in sub-national public finance in economic sector, *IOSR Journal of Economics and Finance*, Vol. 7, Issue 5, pp. 47-62.
- Morrison, K.M. (2009). Oil, non-tax revenue, and the re-distributional foundations of regime stability, *International Organization*, Vol. 63, Winter, pp. 107-138.
- Ndubuisi, O. (2018). Taxation alternatives source of revenue Nigeria: a domineering evidence of petroleum profit tax, *European Journal of Business and Management*, Vol. 10, No. 20, pp. 41-55.
- Nwaru, C.K. (2015). Tax revenue performance: a comparative study of oil and non-oil tax revenue on Nigeria's GDP. Website: <http://ssrn.com/abstract=2644602>. Retrieved on 22/3/2020
- OECD (2005). OECD Comparative Report on Corporate Governance of State-owned Enterprise. Website: <https://www.oecd.org/corporate/guidelines-corporate-governance-soes.htm>. Retrieved on 10/2/2020
- OECD (2019). Revenue statistics in Africa – Nigeria. Website: www.oecd.org/countries/nigeria/revenue-statistics-africa-nigeria.pdf. Retrieved on 22/3/2020
- Ofeimun, E.O. (2017). Exploring bonds and sukuk for infrastructural development, *Being a paper presented in NIQS workshop, Abuja*.
- Ogbonna, G. N. and Appah, E. (2012). Impact of Tax Reforms and Economic Growth of Nigeria: A Time Series Analysis. *Current Research Journal of Social Science*, Vol. 4, No. 1, pp. 62-68.
- Okusaga, B. (2019, August 5). Bridging Nigeria's infrastructural deficit. *Punch*.
- PwC (2015), State Owned Enterprises: Catalyst for Public Value Creation. Website: <https://www.pwc.com/gx/en/psrc/publications/assets/pwc-state-owned-enterprise-psrc.pdf>. Retrieved on 10/2/2020.
- Robert, K.W., Parris T.M. and Leiserowitz A.A. (2005). What is sustainable development?bGoals, indicators, values, and practice. *Environment: Science and Policy*

- for Sustainable Development. Vol. 47, No. 3, pp. 8-21.
- Rogers, P., Jalal, K.F., Lohani, B.N., Owens, G.M., Yu, C., Dufournaud, C.M. and Bi, J. (1997). *Measuring environmental quality in Asia*, Cambridge M.A., Harvard University Press.
- Rome, E. and Vob, N. (2015), State of the art report (I): urban critical infrastructure, RESIN: EU.
- Tamarisk Coalition (2011). Sustainable funding options for a comprehensive Ripavean restoration initiatives in the Colorado River Basin.
https://riversedgewest.org/sites/default/files/files/Sustainable_Funding_Options_for_a_Comprehensive_Riparian_Restoration_Initiative_in_the_Colorado%20River%20Basin_2011.pdf. Retrieved on 30/3/2020
- Tijani, S.A., Adeyemi, A.O. and Omotehinshe, O.J. (2016). Lack of maintenance culture in Nigeria: the bane of national development. *Civil and Environmental Research*, Vol. 8, No. 8, pp. 23-30.
- Thomsen C. (2013). Sustainability (World Commission on Environment and Development Definition). In: Idowu S.O., Capaldi N., Zu L., Gupta A.D. (ed.), *Encyclopedia of corporate social responsibility*. Springer, Berlin, Heidelberg.
https://doi.org/10.1007/978-3-642-28036-8_531.
- Udo, B. (2019, June 13). Nigerian 2nd sovereign green bond issue yields 220% subscription – DMO, *Premium Times*.
- United Nations (2014). Report of the intergovernmental Committee of experts on the sustainable development financing, New York: UN Publication.
- Wang, X., Xu, L.C. and Zhu, T. (2003). State-Owned Enterprises going public: the case of China. Website:
<https://pdfs.semanticscholar.org/deaf/81af5c141277ad59f477c6246366c812d96f.pdf>. Retrieved on 20/2/2020
- Wireman, T. (1990). *Total production maintenance – an American approach*, New York: Industrial Press Inc.
- World Economic Forum (2019). *From Funding to Financing: Transforming the SDG Finance for Country Success*. World Economic Forum Publication, Geneva: Switzerland.
- Worlu, C. N. and Emeka, N. (2012). Tax Revenue and Economic Development in Nigeria: A Macroeconometric approach, *Academic Journal of Interdisciplinary Studies*, Vol. 1, No. 2, pp. 211-223.