International Journal of Advanced Studies in Business Strategies and Management
ISSN Hard Print: 2354-4236 Online: 2354-4244
ASBSM: 014:2:3

ECONOMICS OF INFRASTRUCTURE ON SUSTAINABLE NATIONAL DEVELOPMENT IN DEVELOPING COUNTRIES

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Abstract
The premise of sustainable national development is measured by the quantum of investment in national food security, sustenance of human capacity development and its' utilization, technological advancement and its' deployment in the production lines, socio-cultural advancement, peace and security that subsist in a nation. This premise, is perhaps well encapsulated in the United Nations Millennium Development Goals (MDGs), which of course, can be attained given the available economic infrastructure that can support poverty reduction, elimination of all forms of exclusion, enhanced and sustained national food security, health care delivery, advancement in the application of Industrial technologies, as well as attainment of self-sufficiency in all sectors of production. This scenario is possible when the requisite economic infrastructures that are relevant to, and consistent with the variables of national development are positively correlated. However, in developing economies, the likely positive correlation of these variables, determine to all extent, how sustainable national development can be attained, based on the economies of scale of the nations' economics infrastructure in the context of development.

Keywords: *Economic Infrastructure: Sustainable Development: Investment: Economies of Scale: Exclusion*

Background to the Study

The premise of this paper is derived from the theme of a national conference on "Economic Infrastructure and Sustainable National Development: Multi-disciplinary Assessment". This is a multi disciplinary perspective, as it is strictly an economic type. Therefore, given the economic perspective, one is of the stance that, the demand for economic infrastructure and sustainable national development is a derived demand. This is because, in the analysis of type of demand, these are among others, autonomous and derived demand. According to Dwivedi (2002), while the autonomous demand / direct demand for a community is one that arises on its own, out of a natural desire to consume or possesses such a commodity, thus, it is independent of the demand for any other commodity, derived demand on the other hand, is a demand for a commodity that arises because of the demand for some other commodities called parent product, examples of such are Land, agricultural tools and infrastructure.

It must be recalled that economic infrastructure is critical to sustainable national development as it is measured by the quantum of investment in national food security, sustenance of human capacity development and its utilization, technological advancement and its' deployment in the production and services lines as well as the peace and stability that subsist in a country. These measures, according to Eboy, Okoye and Ayichi (1995) constitute the theoretical and empirical bulwark of sustainability in development, and they are defined by equity, stability, food security, co-evolutionary growth and participation. Thus, envisioning sustainable development in developing countries that takes the dimensions of economic, environmental, human capital, institutional, technological among others, must build on policy options focusing on;

1. Investment in human capital formation / accumulation;
2. Protecting the environment;
3. Ensuring food security;
4. Creating growth, employment incentives and wealth; and
5. Empowering / capacitating rural people

The above vision is realized only on the platform of a well established economic infrastructure. This by implication is that, without economic infrastructure, the premises on which sustainable development can take-off is baseless.

In a related development, the eight-point Millennium Development Goals (MDGs) can only be achieve given that the requisite economic infrastructure are in place. Recall that the MDGs focus on reduction of poverty, elimination of all forms of exclusion, through the sustenance of gender equity, reduction of illiteracy rate by 50% within a timeframe among others. These goals have been achieved to certain extent in some developing countries of the south, but the sustenance of these goals is strictly dependent on infrastructure. In the Nigerian context, economic infrastructure is critical to the attainment of the MDGs, and transformation of all section of the national economy for sustainable development.

Statement of the Problem

Given that economic infrastructure, is widely recognized as a ingredient in a country's economic success, one is however worried, following up the series of questions that were raised by Henckel and Mckibbin (2010) in a paper on “The Economics of Infrastructure in a Globalised World: Issues, Lessons and Future Challenges” Among other things, Henckel and Mckibbin (2010) raised the following questions namely: What is the nature of infrastructure? What are its' salient features that distinguish it from other factors of production? What are the returns to infrastructural investment? How is infrastructure investment evaluated and delivered? How does infrastructure affect an economy's growth rate? How should infrastructure be provided? Should it be provided by the government? By the private sector under strict government regulations? By the private sector with little, if any, government regulation? Should infrastructure provision be affected by the stage of a country's economic development?

Review of Literature

The Compact Oxford English Dictionary (2009) describes infrastructure as the basic "physical" and "organizational" structure needed for the operation of a society or enterprise. Sullivan and Steven (2003) defined infrastructure as the services and facilities necessary for an economy to function. It is thus, seen as the set of interconnected structural elements that provide a framework supporting an entire structure of development. Hence, Fulmer (2009) defined infrastructure as "the physical components of interrelated systems providing commodities and services essential to enable, sustain or enhance societal living condition".

Deductions from the concept are that, infrastructure facilitates:

1. Production of goods and services;
2. Distribution of finished products to market; and
3. Distribution of basic social services such as schools and hospitals.

In another development, Ogunnowo and Oderinde (2012) noted that the concept of infrastructure has been viewed from different perspectives in recent times, but they were quick to provide that, infrastructural facilities refer to those basic services and structures without which primary secondary and tertiary productive activities cannot function. It was concluded by Ogunnowo and Oderinde (2012) that, infrastructural facilities are elements in the package of basic needs, which community would like to procure for better living.

In Keynesian economics, the word infrastructure was exclusively used to describe public assets that facilitate production but not private assets of the same purpose. In post-Keynesians times, however, the term has grown in popularity, and it has been applied with increasing generality to suggest the internal framework discernible in any technology system or business organization.

Nature and Perspectives on Economic Infrastructure

They are two main types of infrastructure, but all are central to economic activities that are critical to the attainment of the social-well-being of a people. These are; hard and soft infrastructure (Stephen, 2008). Hard infrastructure refers to the large physical networks necessary for the functioning of a modern industrial nation, whereas, soft infrastructure refers to all the institutions which are required to maintain the economic, health, social, cultural, standards of a country, such as the financial system, education, health care system, system of government, and law enforcement, as well as emergency services (Stephen, 2008).

Economic infrastructure, while depending on the hard, or physical infrastructure, determine the attainment of sustainable development. Therefore, it is important to highlight four critical variants of the economic infrastructure that are central to sustainable national development. These include:

1 Financial system; including the banking system, financial institutions, the payment system, exchanges, the money supply, financial regulations, as well as accounting standards and regulations;

2 Business logistics facilities and systems, including warehouses as well as shipping management systems;
3 Manufacturing infrastructure including parks and special economic zones, mines and processing plants for basic materials used as inputs in industry, specialized energy, transportation and water infrastructure used by industry, plus the public safety, environmental laws and regulations that govern and limit industrial activities and standards organizations; and
4 Agricultural, forestry and fisheries infrastructure, including specialized food and livestock transportation and storage facilities, major feedlots, agricultural price support systems (including agricultural insurance), agricultural health standards, food inspection, experimental farms and agricultural research centres and schools, the system of licencing and quota management, enforcement systems against poaching forest wardens (guards) and fire fighting (Nicolas, Fizzli and Vincent, 2011).

Economies of Scale of Infrastructure on Sustainable Development

Sustainable development originated rather uniquely in the wake of strong criticisms of existing neo-classical development models and theories (Akintayo and Oghenekohwo, 2004). Among these criticisms are failure of neo-classical models to address key developmental issues such as poverty, human welfare and environmental health as well as failure of economic growth (neo-classically indexed by per capita gross national product) to translate into improved human welfare and healthier environments (Eboh, Okoye and Ayichi ,1995). Therefore, sustainable development becomes systematically ambiguous as a concept. This is on account that the economic definition focuses on optimal resource management, that is, maximizing the net benefits of economic development, while maintaining the services and quality of natural resources (Barrier, 1989). Elsewhere, the ecologist stresses using renewable natural resources in a manner that does not degrade or diminishes their renewable usefulness for future generation (Goodland and Lader, 1987). Nevertheless, there was a consensus reached on the concept of sustainable development as provided for by the Bruntland Commission (1987) that, sustainable development is the development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. It is against this world submission that Abumere (1997) referred to the concept to mean that, in our use of environmental resources to satisfy current demands; we must not inflict irreversible damage on the environment in such a way as to jeopardize the ability of future generation to meet their needs.

Sustainable national development must then take the dimensions of economic, environmental, human, institutional, technological and socio-cultural, with options not limited to;

1. Investing in human development;
2. Ensuring food security;
3. Creating growth and employment incentives;
4. Empowering rural people; and
5. Protecting environment

Methodology

The study adopted a content analytical research method which mainly relied on data collected through secondary sources some of which were documented empirical evidences. These data were subjected to content analysis in the discussion of results for this study.

Findings

While responding to those questions raised by Henckel and Mckibbin (2010), under the statement of the problem, it is important to note that, the first issue in question is pivotal to the other three questions. And in this discourse, the first issue is fully addressed in terms of the main characteristics of infrastructure that make it special to a country's sustainable economy, whether it is by scope, scale or longevity of different types of infrastructure development. The second issue raised is central to boosting overall productivity and to raising living standards. The third issue is central to the policy rebate about infrastructure investment, with a long and growing list of open questions such as what is the most efficient way to finance infrastructure spending? What are the optional infrastructure pricing, maintenance and investment policies? The final issue relates to developing countries, whose infrastructure is typically less sophisticated and extensive than developed countries' infrastructure and additionally often more poorly managed and less efficiently used. With focus on the economic infrastructure, it is evident that the last issue is very germane because, it is the stage of infrastructure development that determines the sustainable development of a country.

Economic infrastructure on the short and long run satisfy the returns to infrastructure as Henckel and Mckibbin (2010), reported some deliverables associated with investment in economic infrastructure. Accordingly, it was noted by economists that infrastructure investment is necessary for a country to industrialise. From a sustainable development perspective, infrastructure offers two key benefits, namely; raises productivity and reduces the cost of private sector production. Besides, it has a disproportionate effect on the incomes and welfare of the poor, by reducing the costs to access markets, raising returns on existing assets, facilitate human capital accumulation and facilitating agglomeration economics as well as the dissemination of knowledge (Jones and Paul, 2010). Meanwhile, Calderain, Moral-Benito and Servein (2009) reported that a 10 percent in infrastructure assets directly increases GDP per capita by 0.7 to 1 percent. There is little evidence that output of the aggregate production functions filters across countries. In specific, the output elasticity of infrastructure does not seem to vary with countries level of per capita income of their infrastructure endowment, or the size of their population. To the extent that infrastructure is vital for a country's economic development, it is also crucial as a benefit, in improving the quality of life for the poor (Straub, 2010).

Infrastructure investment influences a country's absolute and comparative advantage by mitigating the constraints of factor endowments and promoting intra- and inter-regional integration. Thus, infrastructure determines the types or patterns of trade, vice versa. As a country develops, its' economy typically moves up the value claim. This process is reinforced by concrete infrastructure, a crucial factor in attracting overseas investment and thereby contributing to the knowledge transfer to developing countries (Calderon, Enrique and Luis, 2009).

Also, as the economy moves up the value chair, its' infrastructure needs to adapt to reflect the changes in production structures and the ever-changing patterns of movement of goods and people. Easterly and Levine (1998), Coller and O' Connell (2007) established that a 1 percent increase in neighbour's infrastructure growth increases a country's own growth rate by 0.4 to 0.7 percent. Similarly, findings exist in the United States where research suggests city-level spillovers from infrastructure investments.

In a similar perspective, the Canadian International Development Agency (CIDA) in 2008, provided a template for stimulating sustainable economic growth. Among the variables of focus in its sustainable economic growth strategy includes:

1. Effective policies and institutions with its attendant variants of rule of law, political stability, transparency, adequate and properly enforced laws, efficient fiscal management and resource allocation, appropriate regulatory systems, and sound public financial systems are all essential to stable economic growth.
2. Infrastructure, as, CIDA noted, is key component of an enabling environment for sustainable development.

Therefore, to achieve high rates of sustainable economic growth CIDA noted that essential elements needed in developing countries must include:

1 accountable government – transparency

2 open and effective markets – business

3 environment that stimulates entrepreneurship, open to competition and market expansion, imports outside knowledge and maximizes investment opportunities

4 infrastructure

5 capable human capital

6 equality of opportunity

7 sound environmental management

Once these essential elements are in place, CIDA proposed that, sustainable economic growth will follow three pathways namely;

1. Building economic foundations – putting in place necessary legislative and regulatory business, industrial and financial framework (economic infrastructure) upon which sustainable growth can take place and develop;
2. Growing businesses – enhancing the financial viability (infrastructure), productivity and competitiveness in macro, small and medium – sized private

sector enterprises, leading to increasing engagement and participation in the economic sector; and

3. Investing in people – improve the employment potential of individuals to increase access to and benefit from, opportunities in the formal and informal business sectors.

Infrastructure in Developing Countries

With infrastructure as a key driver of economic growth, developing countries are particularly aware of their infrastructure needs. For low-income countries, infrastructure investments that provide access to energy, clean water and basic transport may mean the difference between life and death. Basic infrastructure helps alleviate poverty directly and provides the poor with the environment in which they can grow their way out of poverty. Not only is the stock of infrastructure capital in advanced countries much greater than in developing countries (by a factor of up to 50), but there also exist large disparities within the developing world. For example, whereas electricity consumption in 2005 was approximately 4,000 kWh per capita in East Asia, it was less than 200 kWh per capita in South Asia. (OECD countries) consumed on average more than 11,000kWh per capita in the same year (Lee, 2010).

The Asian Development Bank (ADB), one of Asia's main aid and development agencies, estimates that on average, Asia needs to invest about $750 billion per year in infrastructure, especially energy and transport, during 2010-2020 to create the Bank's vision of a "Seamless Asia", a well-integrated, equitable and fast-growing economy. The ADB argues that the region's vast domestic savings can be the main source of financing for Asia's infrastructure with the private sector taking on a major role in funding and delivery. The experience of private sector participation, seen as a crucial path to help meet the growing investment needs in many countries, is mixed. This may be in part due to a lack of experience and expertise. For example, in 2003 private financing in water supply and sanitation accounted for less than 10 percent of total infrastructure investments in developing countries. And more than 70 percent of this financing was in the form of concessions (Gunatilake, 2010).

Benefits of private participation such as increased competition and greater productive efficiency are not always evident. According to studies conducted by the ADB, poor regulation tends to give private suppliers excessive monopoly power; markets are thin, offering incumbent firms ample opportunity to collude; and technology is not sufficiently varied to allow new entrants to shake up the market. Furthermore, at least in the water sector, there is no statistically significant difference between the efficiency of public and private operation in developing countries.

Developing countries face a host of challenges going forward. First, the public sector faces severe budget constraints and so, developing can only be expected to fund a small proportion of investments. Second, the private sector in many developing countries is still not very resilient, it took 10 years for private sector infrastructure investment to recover from the 1997-98 Asian crisis. Third, public – private partnerships offer a promising solution to the financing needs, but there are considerable risks associated with inefficient procurement policies and

inadequate contracting arrangement. Sound legal frameworks are vital, especially if developing countries wish to attract foreign investment. Fourth, donors and aid agencies need to provide better financial and technical support, with an improved understanding of investment priorities and local needs. Finally, many developing countries would benefit from greater cross-country coordination to fully capture the spillovers of infrastructure service, especially in transport (Gunatilake, 2010).

Inclusive Economy and Infrastructural Development

Having examined the benefits of infrastructure to sustainable development, it is critical to consider certain infrastructure matters that are germane to overall sustainable national economic development. For example, Fay and Toman (2010) in their submission on infrastructure and sustainable development "at the Korea-World Bank High Level Conference on Post-Crisis Growth and Development" noted three issues that relate to the elements of exclusion in the development of infrastructure.

Common sense, according to Fay and Toman (2010) suggests that, modern economies cannot function without infrastructure, which provides a variety of critical services in determining any country's production and consumption possibilities. Given the necessity of infrastructure for the functioning of modern economies, unfortunately, more infrastructures may not necessarily translate to more growth or sustainable development. The binding constraints may lie elsewhere than simply in the total quantity of infrastructure investment. These constraints are what we refer to in this paper as the exclusion variables in the translation of infrastructure to sustainable development. Such exclusion variables are, but not limited to:

1 Poor managerial incentives or externalities from missing markets;
2 Deliberate policy of non-investment in key economic infrastructure;
3 Sustenance of inequality in the infrastructure investment;
4 Poor maintenance and low value attachment to economic infrastructure;
5 Deficit in decision – making towards maintaining and adding value to infrastructure investment;
6 Infrastructure deficit also affects productivity and firms' ability to compete;
7 Significant increases in infrastructure require very large, often lumpy, upfront investment. Many governments, faced with competing priorities or difficult fiscal situations, simply do not or cannot chose to allocate the resources needed to reach desirable levels of access or quality infrastructure;
8 Infrastructure services are public goods and/or natural monopolies in many developing countries. As such, they are either run or regulated by public entities and so; suffer from some common inefficiencies of public services; and
9 Private participation in infrastructure has brought additional financing, and in many cases, has contributed to improvements in productivity. However, PPI is limited (excluded) by cost recovery potential and the quality of the regulatory framework.

Therefore, these exclusion factors in sustainable development are derived from costs, insufficiency, inefficiency, and poor maintenance of the available infrastructure, which can be effectively and efficiently managed if the private sector participation is encouraged by the public sector.

Recommendations

As noted elsewhere, and flowing from the way forward in Hay and Toman (2010) submission, the central focus of this paper as critical to infrastructure investment is that, more, better and clearer investment can be achieved. This is because, more infrastructure investment and better quality infrastructure services requires overcoming a number of obstacles related to cost and governance, as well as refining how public and private sector participation can be better enhanced. While these exclusion variables are real, so are the opportunities for reducing them, given the political will, and for developing economies, affordability can be improved. Some of the critical things to be done as way forward are derived from the views of Fay and Toman (2010) as regard the important follow-up actions.

Follow-up Actions

1 Promote collaborative efforts to greatly increase and improve collection and sharing of data on infrastructure investment and its impacts;
2 Develop am action plan for increasing public and private financing of infrastructure, as well as improving it efficiency. It involves three steps; and
   a. assessing the potential for increasing fiscal space in developing countries
   b. assessing the potential for increasing private investment and reducing its costs
   c. assessing how to move cost-effectively and integrate environmental consideration into infrastructure investments
3 Develop an action plan for providing increased technical and financial assistance to developing countries in their efforts to improve infrastructure efficiency, enhance the investment climate, and integrate environmental factors with sustainable economic concerns.
4 Build economic foundations which reflect the right conditions and institutional frameworks as a foundation upon which to encourage investment, innovation and sustainable economic growth.
5 Growing businesses – Enhancing the productivity and competitiveness of enterprise to critical component of sustainable economic growth driven by investment in economic infrastructure.
6 investing in people – people are at the centre of sustainable development. Infrastructural development need to encourage the creation of economic opportunities that enable the reduction of poverty, provide jobs, sustain business ownership and investment. Success in economic infrastructure provides that, those individuals, especially women and youth, develop new skills and expand their knowledge to meet the challenges of exclusion from development opportunities.

Conclusion

Economic infrastructure is vital to the attainment of sustainable development. It has been established that four critical economic infrastructure significantly predict inclusive economic growth, which of course, enhance poverty reduction, eliminate all forms of exclusion, ensure and sustain national food security, by growing businesses and supporting economic foundations, health care systems, advancement in the application of industrial technologies and protection of the environment.

It is also established in this paper that investment in infrastructure is part of the capital accumulation required for sustainable economic development and, have impact on socio-economic measure of welfare (Ballesteros, 2010). The causality of infrastructure and economic growth has always been in discourse. In developing countries, expansion in economic infrastructure show marked growth in economic development. However, the relationship does not remain in advanced nations who witness more and more lower rates of return on such infrastructure investments. Nevertheless, economic infrastructure yields indirect benefits through the supply chain, land values, small business growth, consumer sales, and social benefits of community development and access to opportunity. Therefore, the demand for economic infrastructure is a derived demand for sustainable national development.

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