Sustainability in Transportation Infrastructure in Global Economic Challenges in Nigeria

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Abstract

Sustainable development as a new practice in the organizations has a lot of challenges. A definition was given by the Brundtland in 1987 during world commission on environment and development which says "sustainability development is the development that meets the needs of the present without compromising the ability of future generation to meet their own needs". The definition given by Brundtland commission has touched many disciplines. Sixteen sustainability initiatives around the world were reviewed selecting the sustainability initiatives of other civil infrastructure system that found in the research literature. The outcomes show that there is no standard definition for transportation sustainability but emerging consensus that in order to be effective, it must consist of economy, environment and the social being. The objectives of the research are to underline some drivers used for sustainability in transportation infrastructure. The choices plan in construction infrastructure, how, where to build and how long to stay in process has an effect to our sustainability. The challenges facing the sustainability in transportation infrastructure in Nigeria such as climate changes, increase in population, congestion and creating green economy/reaching zero waste still remain in position. In facts, there is no standard transportation sustainability definition rather than common goals. Time has done when single regulations, indicators and measurement concept will be provided globally for the program success. Sustainable transportation will be achieving if demand and operation management, pricing policy, vehicle technology improvement, clean fuel and integrated land use and planning are efficiently use in Nigeria

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Key words: *Sustainability, transportation, infrastructure, development*

Introduction

There are many and various definitions of sustainability given by various scholars in different field of studies. Although the definition of sustainability that mostly quoted by the scholars is the world commission on environment and development given by the Brundtland in 1987 which says "sustainability development is the development that meets the needs of the present without compromising the ability of future generation to meet their own needs" (Litman, 2006). This definition is not universally used and is subject to various interpretations. The sustainability development idea emerged since 1970s, about 30yrs of research and conversation but still no one universally accepted definition due to short background and wide subject coverage (Becky, 2006). The recent advanced definition for sustainable transportation considering welfare of environment, society and economic by the Canadian centre for sustainable transportation as, "triple bottom line" which adopted by AASHTO and many other organizations too. Similarly, one state department of transport (DOT) in USA has defined sustainability as "the provision of safe, effective and efficient access and mobility into future while considering the economic, social and environmental needs of society". University of Toronto transportation engineering and planning has defined sustainable transportation as system aiming to reduce emissions, fossil fuel consumption of the agricultural land, park land as well as wild life habitat (poor, 2009).

The comprehensive definition of a sustainable transportation system developed by the Canadian centre for sustainable transportation states that sustainable transportation (Poor, 2009):

- Allows the basic access needs of individuals and society to meet safely and in consistent manner with respect to human, ecosystem health and equity between the generations;
- Affordable, efficient in operations, provide transport mode choice and strengthen a vibrant economic;
- Limit the GHG emissions and the waste in the planet and ability to absorb them, minimizes the consumption of non-renewable energy and the resources to some certain level, reuses and recycles its components and minimizes the use of land and the creation of noise.

Transport policies must recognize that road transport network is the leading infrastructure that can possibly and amicably link or provides for all other mode of transport. Therefore, there will be no integrated transport system if the road network is incomplete and over loaded (road, reality and customer). According to the world bank (2002) estimated that 0.5million people in the developing countries die each year from transport-related air borne diseases and traffic accident. There is growth of urban population in the developing world that is approaching 50% and rapidly growth. Regarding to developed countries of the world, the level has already reached 75% urban population (Kennedy, 2005). Moreover, transport infrastructure as one of the pillars of economic development of society and at the sametime one of the largest contributor to greenhouse gases (GHG) emission that principally motivated by the road and air transport systems. Global transport-related GHG emissions are anticipated to double in the year 2050 in the inattentive of new framework from the national and sub-regional government. UNDESA has commission that the world population will outspread up to 9 billion in the year 2075 and by 2025 most society will live in metropolises. This condition has already demonstrated itself in developed countries and many developing countries are changing speedily. Moreover, our motorization and transport are mostly characterized by (OECD, 2012):

- Reliance on road transport for freight and logistic
- Declining in walking and increase in limited cycling
- Continued dependence on imported vehicle from USA, Japan among other in some countries
- Greater provision to greenhouse gases (GHG) emissions from the use of energy by road transport due to the large use of hydro for electricity generation
- Higher incidences that is related to air pollution with transport as one of the major contributor
- Increase numbers of people who fall under the victims of traffic accidents
- Increase in congestion in several urban area or cities

The outcomes show that there is no standard definition for transportation sustainability but emerging consensus that in order to be effective, it must consist of economy, environment and the social being.

Study Objectives

The purpose of this report will be discussed with respect to the following points:

- To reduce greenhouse gases emissions in the cause of transport
- To reduce energy consumption
- Reduces transport congestion and improve road safety
- Increase in public fitness and health

The essence of this objectives mentioned above with respect to transportation system is to serve as indicators in the journey or during the implementation process which can be measure to know whether the operation or the implementation process of the programme is going in positive direction or opposite direction to the plan as feedback.

Methodology

This research work was exclusively relied on the previous literatures reviews of various scholars from different organizations such as government report, Non-governmental reports, groups reports and individual report as well. Transportation field of study was very wide; air transportation, land transportation, water transportation and pipeline transportation as well. Therefore, the objectives of this research all consider the above various transportation modes. This research focused on sustainability in transportation infrastructure in global economic challenges in Nigeria.

DRIVERS FOR SUSTAINABILITY IN TRANSPORTATION INFRASTRUCTURE (HA, 2012; MTO, 2009; BS Guideline, 2010; Twinomugisha, 2007; Craig, 2008; CEO, 2012):

- Reducing operation cost
- Protection or enhancing reputation
- Stakeholder/shareholder
- Government regulation/legislation pressure
- Top management commitment
- Globalization
- Knowledge economic
- Socially responsible investment

Implementation

As we know that sustainability development is a new practice in the global economic that needs the support of national, state and local for implementation. Sustainability comprises of three spheres namely; economic, social and environment. These three spheres of sustainable development have a dynamic relationship. Meaning that they are interdependent. You cannot consider economic aspect alone without affecting the social or environment. If that is the case all human endeavour need to fully considered for the successful of programme. The implementation stage is divided into two phase; we have the internal operators and the external operators. We will discuss each phase one after the other (MTO,2009):

Internal Operators (mto, 2009):

Business planning:

Organization carries a business activity, operation or services must have principles and certain characteristics peculiar to it. Adopting the principle of sustainability as business importance, capital requirements and performance indicators will ensure that the desirable finding and outcomes of the program will be attaining efficiently and cost commendably as well. Similarly, the implementation steps should go alone with the assessment, recording as feedback for the purpose of modifying any error in the policy or during the implementation phases.

Standard and Practices:

Regulation in any aspect is very vital particularly in transportation system. Integrating standard in designing, construction, operation and maintenance will really support in sustainable economy, social and environmentally. The pavement design standard creates road construction more sustainable through maximizing the lifespan of the pavement, reduces noise, use of raw material, reuse and recycle. These practices will help in less energy consumption and less GHG emission.

Environmental Impact Assessment:

Transport infrastructure is one of the main contributors to climate change and therefore need eco-friendly valuation in carrying any plan. Transportation impacts are well-understood and some can be predicted base on familiarity. Therefore, it will be good to study any project undertaken to pass all necessary deliberation that may affect the environment and offer a proper endorsement.

Employee Education and Awareness:

Employees are essential that any business use to initiate, implement any new plans. As a result, it will be necessary to train them the elementary aspect of the sustainability in a formal and informal method. This can be obtaining through:

- ✓ Developing workshop
- ✓ Lunch and learn
- ✓ Ride-sharing
- ✓ Sustainable office practices to reduce significant resources such as energy, water and paper
- ✓ Establishment of vehicle facilities

Employee Recognition:

Staff recognition to integrate sustainable business practices will help significantly in full awareness of the business matter. There is need for celebrating any success or initiative contributes by any staff, this will encourage them to continue to find means in integrating sustainability into their actions.

External Operators:

Legislation and Regulation:

Legislation and regulation are parameters the planners used in trying to stabilize the transportation system. For example, mandating the use of speed limiters in defining

speed, prohibition of old age vehicles will really support in reduces GHG emissions, road safety and fuel economy.

Policies and Programs:

The policy of reducing the movement of vehicles during summer period will help in reducing GHG emission as well as the immediate heat of the environment that increase illness to lungs related diseases. The policies also determine the schedule of all programs.

Infrastructure:

The choices plan in construction structure, how, where to build and how long to stay in process has an impact to our sustainability. Expansion of road to reduce congestion, protecting natural and agricultural land and asses the environmental impact before and after the project completion is vital.

Public Education:

Sustainability matters is all about changing people behavior with respect to their daily activities for better existing. There is need people to be educated on what are anticipated to change their conduct. The medium that are used to achieve this are:

- Incorporating sustainability in beginners'' drivers' education curriculum,
- Preparing and distributing books to schools,
- Educating people impact on climate change,
- Educating people on sustainable mode, available mode, travelling information as well as the implication of each,
- Organizing conferences for all sort of organization.

Monitoring/ Stakeholders:

Supervision and reviewing of activities for correction and develop by the leader. Stakeholders are instrument in raising and solving problems. Working closely with them will produce an insight into our perspective of the users of the transportation system and this can assist in achieving our goals.

Challenges

Climate change: According to United Nations Intergovernmental Panel on Climate Change (IPCC), the earth climate is changing drastically and industrialization of human activities and burning of fossil fuels are the large responsible and to be blame. Before the past economic and development, Co_2 concentration in the atmosphere of parts per million was around 280. Now the concentration level of ppm of carbon dioxide has reached 380 this resulted to ice melting, flooding, coral reefs are dying and other causalities. In 2003, 35000 people died as a result of Europe heat wave. If no proper effort were taking to reduce the GHG emissions the level will reach 750ppm in the future which will result to serious disaster in the world (MTO, 2009).

Increase In Population: UNDESA has commission that the world population will reach 9 billion by the year 2075 and by 2025 must people will live cities. This situation has already revealed itself in developed nations and many developing countries are fast changing. Inappropriate management of such rise in the population will lead to air pollution, scarcity of transport infrastructure, decline of water quality and so forth.

Congestion: Transportation network that is reliable is essential in giving access to goods and services to society. Transportation system is the most vigorous machineries of business logistic cost in economic activities. One third to two third of the expenses of enterprises logistic cost is spending on transportation (Jeon, 2005). The major impact of population in transportation system is traffic congestion. Congestion cost losses in business to substantial figure of currency from £7b to £20b on different estimate. Hence, relieving congestion will be really good to the economic, social and environmentally (Joseph, 2000).

Creating Green Economy/Reaching Zero Waste:

Transportation network is one of the key drivers in any society, chosen between environmental protection and a sound economy. New prospects can happen from protecting the natural environment and reduces our GHG emission (MTO, 2009). The most popular and widely definition used of sustainability development is the one derive from the Brundtland commission in 1987. Since then sustainable development practice became an international priority in the 1980s and 1990s. Sustainability of the infrastructure becomes a growing area of interest in practice, research and education (Hayashi et al., 2003). Sixteen practitioners and research initiatives on

transportation sustainability were reviewed to resolve the present definition, indicators and metrics that are being used to adopt transportation system. The initiatives include "two national studies in the USA, seven national studies in Canada, two world wide-level studies, three Europe studies and other studies was conducted in UK. The common target of these initiatives are to foster on appropriate indicators that will measure sustainability in terms of particular demand and arrest a unique definition of sustainability. The initiatives make clear that there is no standard definition for transportation system sustainability. But there is consensus among the authors that progress must occur on at least the three spheres of sustainability; however, a standard framework for assessing steps forward does not exist. A common plans and dimensions are found in these frameworks as follows:

- Linkages-based framework
- Impacts-based frameworks
- Influence-oriented framework

The sixteen selected framework mentioned above each can be placed into one of the three categories. Therefore, organization may choose to accept or implement a process-based approach, largely representatives, shareholders and stakeholder in defining a vision for sustainability and adopt it.

Conclusion

The definition of sustainability that mostly quoted by the authors in their books and other form of writing given by Brundtland on world commission on environment and development in 1987 was not universally used and is subject to various interpretations. This happened as a result of different disciplines that the definition comprises of. There are some major issues that dominated the sustainability development internationally such as GHG emission, global warming, landslide, congestion, water quality, land degradation among others. So the national, state and local level has their own priority different from that of international concept. As there is no standard transportation sustainability definition rather than common goals, the same thing happened to the laws, indicators and measuring level of the three spheres of sustainability. Sustainability is not just about recognizing the relationship between the three spheres but rather is long-term decision, knowing today's decisions will influence tomorrow choice. Any mistake we committed will not only reflect on our environment today but also affect the next generations. Time has done when single regulations, indicators and measurement concept will be provided globally for the program success. Sustainable transportation will be achieving if demand and operation management, pricing policy, vehicle technology improvement, clean fuel and integrated land use and planning are efficiently use in the country Nigeria.

Recommendations:

As far as the Sustainability in transportation infrastructure in global economic challenges in Nigeria to be improve, the following recommendations should be observing:

1. Transport demand and operation management should be improving
2. Road pricing policy must be put in place in our roads.
3. Improve vehicles technology in our industries and provide clean fuel.
4. Planning and integrating land use effectively.

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