Potentials of Light Rail Transit in Nigeria

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Abstract
The inadequacy of road transport to cope effectively with the movement of passengers in Nigeria cannot be overemphasised as this has implications on the economy. Rail transport plays a key role in the socio-economic development of nations. However, the non-functioning of the railway system due to neglect over the years further compounded the problem. Due to the ever-increasing passenger traffic especially in the urban centres, there is urgent need to introduce a transit system that is fast, safe, reliable, and clean with high passenger capacity to address the transportation problem. The light rail transit is advocated because it has high passenger capacity and cheaper to construct than the metro rail line. It also has the potentials of reducing congestion, travel time and environmental pollution experienced on road. Furthermore, it improves the urban environmental quality, productivity and economy. It is important that government should revitalize the rail system by developing programmes that encourage light rail transit. This can be achieved faster through the public-private partnership especially in the area of finance and management in which government has limited capacity and expertise.

Keywords: light rail transit, railway system, highway, paratransit mode, congestion

1. Introduction

The high rate of urbanization experienced in most cities across the world has led to increase in motorization. This is as a result of predict and provide policy of some government in the past which led to uncontrolled use of private car to satisfy travel needs. This situation exacerbated threats like traffic congestion, environmental pollution, accident, delay, late deliveries and other externalities that have impacts on the people, environment and city economy. This has prompted transport experts and city government to seek for an alternative means of transportation especially in the highly populated urban centres. The alternative must be a transit system that is fast, safe and clean with high passenger capacity. Rail transport possess the characteristics and attributes required.

Adeniji (1995) reiterated that the benefits of an efficient and effective rail system are cheap transit fare (after initial costs), opening up of towns and rural areas to development, reducing environmental pollution, easing pressure on the poorly maintained and congested highways, cohesion among people in different regions, haulage of large quantity of goods and high number of passengers over long distance with high speed, small space consumption along rail networks especially in urban areas, development and maintenance of rural telephony and electrification and creating employment. These benefits have made rail transit an effective transport system to address the problem of traffic congestion in urban areas.

Rail transport has continued to play an important role in socio-economic development of many countries. For instance, in North America and Europe, the emphasis has shifted from providing additional road capacity to devising policies that restrain private car usage, upgrading of rail system and bus service to provide an alternative form of movement for commuters especially in the central areas of city (Turton, 1999). This light rail offers cost effectiveness, affordability (cheap), energy saving and environmentally friendly transport system in densely populated urban areas (World Bank, 1994). Its capacity which is further accentuated by its safety and security factors as well as its ability to travel longer distance, with ease and lower unit costs, places it in good steady to serve as the hub of a transport system of a nation (Nwanze, 2002). There has been total neglect of rail sector in Nigeria. The existing rail network inherited from the colonial administration after independence over fifty years ago is in a comatose state. For instance, the country with a distance of 923,768km has 3,505km rail network compared to over 150,000km road network (Jaekel, 1997). The share of rail mode in the transportation sector is not encouraging as it plays an insignificant role in urban mass transit in the country. For example, the few intra-city rail transit system in operation render unsatisfactory services to the passengers due to limited train speed and comfort caused by obsolete technology and sharp curves on railway network (Agunloye and Oduwayne, 2011).

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The existing use of paratransit modes for urban mass transit is grossly inadequate and has caused the commuters and nation economy untold hardship. The rail transport has great potentials for urban passenger transit in terms of capital costs, passenger capacity, cheap fare (affordability) and environmental friendliness more than road transport. Hence, there is need to the revitalize of the rail transit system. The introduction of
an efficient light rail transit system is capable of achieving a sustainable urban mobility and increase productivity.

2. The development of railway transportation in Nigeria

The first railway line in the country was constructed from Lagos-Ibadan between 1898-1901 by the colonial administrators. The Lagos-Ibadan line was extended to Jebba in 1909, which later linked Kano-Baro line in 1915. The Port-Harcourt line was extended to Enugu in 1916 while several other towns and cities such as Kaduna, Jos, Zaria, Gombe and Maiduguri were connected with railway line up till 1966. This rail network comprises 3,505km single-track narrow gauge (1076mm) line in which more than half of its length can only attain a maximum speed of 65km/hr due to sharp curves. The rail network in the country has two major rail lines: the western line connects Lagos with Nguru in Yobe and the eastern line that connects Port-Harcourt in the Niger Delta and Maiduguri in the north eastern State of Borno. The rail network provided the only mode of freight movement between the southern and northern part of the country for many years. The extension of rail network was abandoned until the early 1990s when the Itakpe-Ajaokuta-Warri rail line construction began. The project is 276km standard gauge (1435mm) rail line that connects the country’s steel mill at Ajaokuta to Warri a major oil hub. Also, there is 19km standard gauge rail line project from Eleme to Onne deep-sea port.

The early railway lines were critical instrument for development of commerce, commercial agriculture, administrative control, regional growth and development, politics and military control (Ademiluyi, 2006; Amba and Danladi, 2013). In its earliest days, the railway line was used to transport agricultural products such as cotton, cocoa, groundnut and coal from the hinterland to the coastal areas such as Lagos and Port-Harcourt for shipment to European market (Agbaeze and Onwuka, 2014). The railway transportation was efficient and flourished during the colonial administration as it aided the flow of commodities and contributed immensely to the economic fortune of the country.

After independence, government developed plans and programme to improve the rail sector. For instance, in the in the country’s First National Development Plan (1962-1968) and Second National Development Plan (1970-1974) government allocated the sum of ₦60.6 million and ₦100.4 million respectively for the development of rail transportation which achieved meaningful results (Ighodaro, 2009 and Onokala, 2012). The railway transportation was used as a catalyst to achieve economic development in the country at the time.

The situation changed when government abandoned the development of railway transportation in the late 1970s to early 1980s, which had hitherto boosted the economy of the nation. This period witnessed the beginning of change in fortune as both the passenger and freight volume carried by Nigerian Railway started to decline. The reasons for this can be attributed to the discovery of crude oil in commercial quantity and the transition of the economy solely to oil-base; the rapid increase in the use of motorized transport and lack of maintenance of the railway infrastructures (Onokala, 2012; Amba and Danladi, 2013 and Agbaeze and Onwuka, 2014). The transportation of crude oil does not need to pass through the railway system since it is explored in the coastal area where it can be easily pumped into vessels for shipment (Enebeli-Uzor, 2012). This situation led to the neglect of agricultural commodities development and trade and subsequent decline in railway patronage in the country. The total abandonment of railway system in the country by successive governments stalled the expansion of the existing railway network and plunged railway transport into comatose state. In expressing the extent of decay, Odeleye (2000) noted that the Nigeria Railway Corporation rolling stocks that stands at 257 locomotives, 339 carriages and 3,885 wagons in 1960 declined to 70 locomotives, 150 carriages and 1,500 freight wagons in 1995 to serve over 150 million citizens.

Recently, government rose to the occasion by realizing the important role railway transport play in national development. However, what is needed to resuscitate the railway system in terms of fund, investment and expertise is far beyond the financial and managerial capability of the government. As a result, government developed a 25-years (2002-2027) strategic plan to revitalize the railway system as a key driver in the transport sector (FGN, 2002). This plan provides for the concession of the existing railway facilities and services to private partners who are willing to invest in railway business. Government has not been too serious with their plan to resuscitate the rail system in the country. There is only two major intra-city rail transit systems Lagos light rail and Abuja light rail being developed in the country.

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3. Problems of railway transportation in Nigeria

Rail transport is considered the oldest overland transport in Nigeria (Agunloye and Ilechukwu, 2011) and most suitable and cheapest mode of transportation for heavy traffic flows in the densely populated urban areas. However, its total neglect since the 1980s plunged the railway system into comatose. This has resulted to numerous problems identifies by Adesanya (2002) to include poor funding; lack of expansion of rail lines to new urban centres; obsolete and inadequate locomotives, rolling stocks and navigational facilities; loss of patronage to road transport; track defectiveness and weak political will and commitment by government. There has been poor budgetary allocation to the railway sub-sector by government. The federal government favours road sub-sector in the allocation of funds appropriated to transport sector at the detriment of rail sub-sector. For instance, the allocation to rail sub-sector dropped from 14.03% in 1990 to less than 1% since early 2000 (Oni and Okanlawon, 2010).

The country has experienced stagnation in the expansion of rail network. This has made it difficult to link new growth points (urban centres) that emerged through the economic growth experienced in the country. For example, the length of rail line has remained almost the same 3,505km single-track narrow gauge and 295km standard gauge for more than 50 years. The locomotives, rolling stocks and other facilities have become obsolete and grossly inadequate to move the ever-increasing passenger trips efficiently. For example, in 2004, out of the 3,987 wagons owned by Nigerian Railway Corporation (NRC), only 36.6% were functioning, while the remainder is either defective (57.5%) or have no economic vale (5.9%). There were 683 coaches of rolling stocks with 34.6% fit for use, while the remaining had outlived their useful lifespan. The communication and signaling facilities are also outdated and grossly inadequate to run a smooth and efficient train operation. Furthermore, there is serious imbalance in the modal share of passengers and freight traffic between rail and road transport in the country. Agbaeze and Onwuka (2014) reiterated that the rail passenger traffic that stood at 15.5 million in 1984 declined to less than 2 million in the early 2000 and has remain so till date. The freight conveyed for the same period remained 170,000 tonnes per year compared to about 3 million tonnes of goods carried in the early 1960s (see figure 1).

The poor quality of services rendered by Nigerian Railway Corporation as a result of poor funding and lack of adequate management led to loss of patronage of both passengers and freight traffic to road transport. For example, Nigerian Railway Corporation lost some of its major freight customers such as Nigerian National Petroleum Corporation (NNPC), Peugeot Automobile of Nigeria (PAN) and Lafarge cement. For passenger transport, Agunloye and Oduwaye (2011) noted that intra-city rail transit in Lagos metropolis are characterized by slow speed, which causes late arrival of trains. This made the travel time to be longer than expected. The passengers spent up to 2 hours on a trip that is less than 30km in trains (Agunloye and Ilechukwu, 2011). The slow speed is caused by defects such as worn rails, steep gradient and sharp curve in tracks and lack of spare parts and equipment to undertake routine maintenance due to obsolete nature of the facilities being used. This to a large extent hinders the productivity and performances of Nigerian Railway Corporation operations.

There is lack of commitment from government in implementing the programmes that will resuscitate rail transport in the country. Though they realized that rail transit system offers a better and effective solution to the difficulties being experienced in moving the ever-growing passengers and freight traffic in the country, they only pay lip service to the development and modernization of railway system.

4. Light rail transit (LRT)

Light rail is an urban transit mode that uses rail cars to operate passenger transit service. It normally serves the city centre or the inner suburban areas where traffic is dense mostly in Europe, North America and Asia. Light rail can either operate on its exclusive right-of-way (that is easily convertible to metro line when demand rises) or share road space with other forms of transport. The rail cars are driven by electrical power from an overhead or underground electric cable. The term “light” refers to light loads and fast movement rather than physical weight. The main difference between light and heavy rail is that the former operate with fewer trains at moderate speed on shared track and passengers can board with ease at road surface or low platforms. Light rail has capacity to carry more passengers than road vehicles. The passenger carrying capacity fall between 6,000-12,000 per hour in one direction but could be up to 36,000 on exclusive or dedicated track. Light rail provides an alternative to bus services on very busy road corridors.

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capacity and usefulness of light rail is better enhanced when integrated with other modes of transport such as bus and ferry services. Light rail can be used to change ridership from private car to rail transit in city centres because the system offers speed, comfort and reliability than bus services.

**Figure 1:** Passenger and Freight Traffic (1970-2004)

![Passenger and Freight Traffic Chart](image)

**Source:** Nigerian Railway Corporation

Light rail has gained popularity in recent time due to its lower capital costs and increased reliability than heavy rail system. The cost of light rail construction depends on land acquisition, tunneling, elevations and technology required. The cost of constructing light rail can be reduced if it is combined with highway expansion. Thus, light rail that share road space with other forms of transport is lower in costs than those operated on exclusive right-of-way. The rail transit cost efficiency improves as the ridership increases. For example, the same rail line with similar capital and operating costs is more efficient if it carry 20,000 passengers per hour in one direction than carrying 2,400 passengers. Furthermore, the capital cost of light rail system is more expensive than highway. However, the cost efficiency of light rail improves over bus transit with increase in ridership. For instance, light rail track can carry up to 20,000 passengers per hour in one direction compared with 2,000–2,200 vehicles per hour for a highway lane. The operating cost is far more efficient carrying 20,000 people per hour than carrying 2,200 people (in cars) or 3,600 people (in bus rapid transit).

Light rail provides a good option for government seeking to increase mobility and modal choice for commuters in city centres (TTF, 2010). It is an efficient, comfortable, high capacity passenger mode of transport that can co-exist with other forms of transport. It has the advantages of reducing traffic congestion, travel time and environmental pollution with improved safety, ease of access for passengers and urban quality (Andersen, 2012).

5. **Benefits of light rail transit in Nigeria**

Public transportation in Nigeria is a fait accompli because majority of the citizens depend on it to satisfy their travel needs (Okoko, 2006). Today, more than 80% of passenger trips in the country are made by road due to underdevelopment of other modes. The paratransit public transport system in operation characterised by low occupancy vehicles such as minibuses and shared taxis is grossly inadequate to move the high population in major cities effectively. For instance, Lagos has a population of about 18.5 million in
2006 (Badejo, 2011). There are approximately 2 million vehicles in Lagos (FRSC, 2010) with an estimated 6 million passengers’ trips daily that are being satisfied by 75,000-90,000 mini-buses and shared taxi plying the metropolis, while the rest is largely by cars. The bus rapid transit (BRT) launched in 2006 still operates on selected routes while effort is being made to extend the services to other areas of the city. The rail and water transport accounts for less than 1% of the trips (Federal Ministry of Housing and Urban Development, 2006). The public transport situation in Lagos can best be described as chaotic as passengers spent many hours in the morning and evening commuting to and from work to their homes. The situation in Lagos is similar to other major cities in the country such as Ibadan, Port-Harcourt, Kano, Kaduna, Abuja and Enugu.

The introduction of light rail transit is canvassed to address the transportation problems experienced by residents in these cities. In fact, Bolade (1993) declared that the light rail mass transit is feasible and appropriate in Lagos to move the people effectively. Realising its potentials, the Lagos State government in 2003 initiated the construction of a light rail transit to replace the expensive metro line cancelled by the military government in 1979. The light rail is cheaper to construct and involve less demolition along the existing rail lines corridor and road set back. The planned light rail transit is intended to carry more than 10,000 persons per hour. It is anticipated that the project would bring about efficient transport, aid multimodal expansion programme and provide a fast, safe, and reliable passenger transit service. This will relieve congestion, overcrowding and parking difficulties being experienced in Lagos. The successful implementation of the project will have positive impact on socio-economic development of the State. The construction and operation of light rail in the country will be beneficial in many ways. Some of the benefits include:

1. Reduced traffic congestion – Majority of the roads in the country are seriously congested. The traffic situation is so worse that Fadare and Wojuade (2007) found that the maximum travel speed in Ibadan metropolis was 17.5 km/hr against the recommended 30 km/hr. This speed is even lower in Lagos metropolis where vehicles and passengers population is higher. The introduction of light rail will reduce traffic congestion currently experienced in major cities across the country. This is due to high passenger carrying capacity which will reduce the number of vehicles on the highway. Also, it will improve the journey time and provide transport choices for passengers.

2. Reduced environmental pollution – Generally, cities that depend on automobile suffer from high level of pollutant or greenhouse gases that cause global warming. For instance, pollution from automobiles account for more than 80 percent of CO₂ emissions in European Union countries in 2011 (European Commission, 2013). The situation is worse in Nigerian cities because there are no alternatives to automobiles. Light rail is more energy efficient and sustainable form of transport than the internal combustion engine because it is powered by electricity. The electricity is usually generated at some distance from the place of its operation thereby keeping the urban environment clean. Hence, modal shift from internal combustion engine to light rail will reduce the environmental pollution in cities. Presently some light rails are powered entirely on renewable energy and they produces minimal noise compared to vehicular traffic in cities.

3. Better urban environment – Light rail development encourages urban sprawl and has potential to increase urban quality. This promotes business, renewal of public space, improves liveability, amenities and property values along rail corridors and foster interaction between individuals and communities (Brown and Werner, 2008 and TTF, 2010). Furthermore, it can be used for development of inner urban areas by reducing competition for space and increase mobility and modal choices in the inner city. Also, light rail encourages the residents, passengers and tourists to have a better view of the cityscape which enhances their experience and city reputation.

4. Improved economy – Light rail has a great asset utilisation than buses due to its capability to convey thousands of passengers within an hour. This will reduce congestion on the highway and save huge fund being lost to congestion yearly. Also, there will be greater urban mobility through reliable rail transit services which will increase productivity and improve the city economy. Furthermore, it can stimulate housing and commercial developments in areas that are not accessible before as well as increasing property values along the rail line. This will increase patronage of passengers along the rail corridors thereby increasing the cost benefit of the rail system.

5. Lower operating cost – The initial capital cost of light rail infrastructure is more expensive than highway. However, light rail’s ability to move more passengers than bus increase its cost effectiveness. For instance, as patronage of light rail transit grows the capital and operating costs per passenger diminish. This can lead to competition as the fare charge per trip reduces in comparison to bus transit.
6. Attractiveness – light rail is attractive to the commuters due to the speed it offers especially in the city centre. It has no parking hassle or holdup in traffic as experienced by bus. The passengers have time to themselves during the trip to read or work on laptop. Light rail provides a fast, safe, comfortable and reliable ride to commuters than any other road transit. The attractiveness can lead to modal shift from private car and bus transit to rail transit among the commuters having realised the benefits.

5. Conclusion
The shift in focus to highway development for passenger transport and total neglect of the rail system has dealt an untold hardship and loss on the people and economy of the country. The inability of road transport system to move the citizens effectively especially in major cities is a pointer to the fact that there is no better substitute to light rail transit. Government has recognized this by developing a 25 Year Strategic plan to resuscitate railway development. However, due to huge capital costs of light rail construction, it is expected that government should partner with the private sector that can provide both finance and expertise required for the management of the transit system. This would alleviate the transport problems experienced in major cities in the country and improve the economy.

References


