



## Prace Komisji Geografii Komunikacji PTG

2021, 24(4), 30-40

DOI 10.4467/2543859XPKG.21.020.15736

Otrzymano (Received): 10.10.2021

Otrzymano poprawioną wersję (Received in revised form): 09.12.2021

Zaakceptowano (Accepted): 10.12.2021

Opublikowano (Published): 31.12.2021

---

# AN ASSESSMENT OF THE GEOMETRIC GROWTH OF RAILWAY TRANSPORT IN NIGERIA. A LITERATURE-BASED STUDY FROM 1970 AND 2016

## *Ocena geometrycznego wzrostu transportu kolejowego w Nigerii. Studium literaturowe z lat 1970 i 2016*

Adeniyi Olufemi Oluwakoya (1), Seun David Ogundipe (2)

(1) Department of Transport Management, Redeemer's University Ede, Osun State, 232102, Nigeria

e-mail: oluwakoyaa@run.edu.ng

 <https://orcid.org/0000-0002-7775-6813>

(2) Department of Transport Management, Redeemer's University Ede, Osun State, 232102, Nigeria

e-mail: ogundiped@run.edu.ng

 <https://orcid.org/0000-0001-8241-4685>

### Citation:

Oluwakoya A.O., Ogundipe S.D., 2021, An Assessment of the Geometric Growth of Railway Transport in Nigeria. A Literature-based Study from 1970 and 2016, *Transport Geography Papers of PGS*, 24(4), 30-40.

**Abstract:** Rail transport offers a huge benefit to Nigeria's socio-economic activities because of its capacity to pull huge volumes of freight and convey large numbers of passengers. Despite these, commerce and socio-economic cohesion have been badly affected as road transport still dominates in overland transport. The revitalization of the rail mode towards economy recovery has suffered greatly since the 1970s. This study examines the spatiotemporal development of the railways in Nigeria. The methodology comprises longitudinal research design spanning over 30 years, from 1970 to 2016. The study reveals the spatiotemporal influence of rail transportation on the spatial development of localities and cities by attracting passengers, cargoes, and revenue receipts. The findings reveals also that rail transportation is experiencing a remarkable transition but has not attained the optimal level in rail development and performance across the country. Therefore more investment and better management are still needed.

**Keywords:** spatial, temporal, railway transport, development, Nigeria

---

## 1. Introduction

Transportation plays a vital role in economic development. It is also one of the criteria used to measure the level of progress attained in the country. An effective transportation system, especially railway transport, plays a crucial role in any economy by safely transporting people and goods from one location to another. Stable and dependable transportation infrastructure is an agent for all nations' socio-economic advancement; hardly any town or city can operate reliably and effectively without one (Pius *et al.*, 2018). Due to its capacity to convey vast quantities of freight and many passengers at a low cost, rail transport plays an essential role in the Nigerian economy's trade and industrial activities. Rail transport is among the oldest forms of transportation in Nigeria, started in 1898 in Lagos. Since this period, it expanded across the country; rail transport over the year is known to have exerted a lot of positive contributions to the socio-economic transformation and development throughout the nation. The Nigerian Railway Corporation (NRC) is the apex body saddled with regulation and management of rail transport; it supervises, manages, and controls its operations (NAT, 2002). Thus, one of the significant problems facing public-owned transport organizations in Nigeria is the low quality of service delivery (NRC, 2012; Esan, 2010).

The rail corporation faced the challenges of offering efficient transport service to serve the needs of commuters and guarantees value for money. However, this goal seems to be an unachieved utopia due to several factors; moribund traffic, migration, weak infrastructure, and poorly motivated staffs have been diminishing its capacity to meet customer needs, resulting in a considerable loss to income for the corporation (NRC, 2012; Esan, 2010).

Jaekel (1997) opines that a successful NRC would serve as an aid to the development of other sectors such as agriculture, natural resources, tourism, and manufacturing, by effectively transporting people and products across the country to and from the seaports, connecting companies with the outside world. Past studies have focused on the established rail networks (Pius *et al.*, 2018). The Nigerian Railway Corporation (NRC) level of service in the study by Amba and Danladi (2013) appraised the transportation sector in Nigeria between 1995 and 2006. This paper seeks to analyze the spatial and temporal patterns of railway infrastructural development and performance in passengers and freight carriages between 1970 and 2015.

## 2. Related literature

This section elucidates the various ways of evaluating railway development as an enabler of geographical

node place development by discussing railway development's conceptual and theoretical sources. This relationship links geographical place development and transport infrastructural provision (Papa, Bertolini, 2015; Zhang *et al.*, 2020). The possibility of national interaction nationwide and near the core of the plan for mass transit-oriented growth envisioned around railway nodes is essential for the economy. In this regard, the improvement and exploitation of the railway development will serve as a unifying concept.

The influence of transportation infrastructure expenditures on growth, particularly on a regional or local scale, continues to be a source of debate among transportation planners and academics, with few agreed-upon points and many unknowns (Barros, 2006).

According to Haynes (1997), transportation infrastructure improvements have short- and long-term effects on local economies. Topics like the dimension of productivity yields, the intensity and sustainability of production development, and the enhancement of regional competitiveness, which remain a wide area for studies and research initiatives, have gotten very little attention (Barros, 2006).

The economic implications of transportation infrastructure should not be underestimated or ignored since they affect the economy both directly and indirectly when considering changes in inaccessibility (ESCAP, 2001; Araújo, 2006; Eberts, 2000). In the first scenario, accessibility indicates a region's flow capability for transporting commodities and people. In the second situation, transportation infrastructure tends to touch the most dynamic sectors of the economy, which produce money and jobs through multiplier effects (Resende, 2003; Almeida, 2012).

## 2.2. Lösch's Location Theory

Lösch (1957) relates the works of the scholars who came before him, according to Ramos and Mendes (2001) and adds to their work with original and essential materials. Lösch takes the question of industrial location and extends it to the entire economic system, using a general equilibrium theory still relevant today. Lösch examines the issue of location from the standpoints of both the producer and the consumer to develop the concept. His concept is predicated on the existence of an unlimited, homogenous plain with comparable transit circumstances and manufacturing costs at all points. As a result, the people and raw materials are divided equitably throughout the plain. Furthermore, the number of locations must be sufficient to fill the entire space. When it comes to buying consumer products, Lösch argues that customers have equal

interests, and those who live on the outskirts are indifferent to adjacent manufacturers (Breitbach, 1998).

This mechanism works as follows: a territory must be stocked with outputs from a production unit, and the quantity of goods sold is a direct function of price. As a result, the cost varies depending on the cost of transportation (distance). This is the boundary of the market area. As expenses decline, prices fall, causing the bordering line to shift, increasing the market area. When a production unit, for example, desires to expand its market area by delivering outputs to places other than its own, this will be lowered. Because of the considerable distance between manufacturer and customer, transportation expenses boost prices in this situation. Demand will be suppressed by higher product prices, resulting in a smaller market area (Breitbach, 1998). The market area, according to Lösch, will decide the location option (Maia, 2001). Minimal manufacturing and lower transportation expenses are used to attain the optimum market area. As a result of the formation of new market areas due to the introduction of new firms, certain companies' market areas overlap, resulting in shorter distances being catered for. As a result, transportation expenses are reduced, and final prices are reduced. At equilibrium, all companies' production and transportation costs are the same, and they will produce and sell the same amount of goods in the market (Souza, 1997).

Given that issues affecting transportation costs are taken into account in picking the optimal site and developing a market region, Lösch's Location Theory plays a critical role in assessing the link between transportation and economic growth.

### 3. The transportation and economic development

The study of the relationship between transportation and economic growth has a long tradition. This study quickly assesses the literature on the factors that may explain the relationship between transportation and economic growth. According to Litman (2010), economic development is the process of achieving a community's financial goals, such as increased employment, income, productivity, property values, and tax revenues. For economic development to occur, persistent quantitative and qualitative improvements in nearly all areas of the economy are required.

Mera (1973), Ratner (1983), and Biehl (1993) pioneered the use of macroeconomic models to quantify the link between infrastructure expansion and total economic growth (1986). Mera (1973), Ratner (1983), and Biehl (1986) were among the first to investigate the economic contributions of public infrastructure

to economic productivity. Policymakers got attracted to Aschauer's (1989) study of the economic contribution of public investment, of which transport capital is a part, for the G7 countries using panel data from 1966 to 1985.

Amadi *et al.* (2013) investigated the relationship between government investment in transportation infrastructure and economic development in Nigeria. The researchers used the Ordinary Least Square (OLS) regression approach to evaluate the data. The statistics revealed that government investment in transportation infrastructure is inconsequential to growth. Gross domestic product was shown to be favourably associated with private capital stock by one-year lag GDP  $t-1$ , and power supply was found to be adversely related to recurrent and capital expenditure, except for defence and technological change. They also discovered that, while the lagged value of gross domestic product boosts output in Nigeria, other explanatory factors are unimportant in explaining outcomes in Nigeria individually. Loto (2006) used a co-integration and error correction model to examine the impact of infrastructure on economic growth and discovered that infrastructure positively affects economic growth when measured physically. National development encompasses social, political, and economic development and is defined as achieving modernization ideals such as increased productivity, social and economic equity, improved institutions, and values. As a result, economic growth is a crucial part of every country's overall development (Falodun *et al.*, 2010).

#### 3.1. Nigerian rail transport and energy consumption

Rail transport is typically the best means of transportation for heavy traffic flows because of the decreased cost per passenger per load as the trainload grows.

With steam engines, boilers, and cylinders, were the forerunners in passenger and cargo rail transportation worldwide, including Nigeria. The steam locomotives had low efficiency, a large labour force and emitted significant flue gases. In Nigeria, in 1955, steam locomotives were replaced by 10 no. DEL with type English Electric SRKT of 504 kW output, 89 km/h, and a weight of around 53 tons, produced by English Electric, to solve the drawbacks of steam locomotives and enhance hauling capacity. Heavy mineral cargoes could not be transported through high grades in Northern Nigeria to ports in the south with these 504 KW locomotives. In 1972, 12 no LE of Hitachi diesel-electric (MAN6V22/30ATL) of 1118 KW with 80 tons and 54 no LE of ALCo 8.251E, rated with the weight of 100 tons, both of 1130 kW, were imported for the use of NRC. Most of the LE mentioned above have

been dismantled and are no longer part of the NRC locomotive fleet. Like Nigerian flour mills limited in Apapa, Lagos, retired LE were converted to standby generators to supply energy. The majority of the train in today's Nigeria has now been powered by diesel, which is more fuel economical. However, most developed countries embrace a sustainable form of transportation by accessing an alternative sustainable fuel source like the electric train.

### 3.2. World Economic Forum Global competitiveness on rail infrastructure

Sala-i-Martin (2007) have defined "competitiveness as the set of institutions, policies and factors that determine the level of productivity of a country". The goal of competitiveness is to ascertain a nation's productivity, which is the central plank for sustainable prosperity. This is particularly true because the more competitive an economy, the higher the income level for the citizens. The concept of competitiveness is both static and dynamic. Firstly, its emphasis on productivity determines a country's ability to sustain a high level of income. Secondly, productivity also determines returns on investment, which is one of the explanatory factors for an economy's growth potential. Thirdly, competitiveness measures enable a country to identify its strengths and weaknesses for sustainable economic growth to build on its unique strengths. From all indications and theoretically, "a more competitive economy is likely to grow faster over the medium to the long run" (Sala-i-Martin, 2007).

Competitiveness is a concept that attempts to measure a nation's potential and actual wealth.

Global Competitiveness Index (GCI), according to World Economic Forum (2007), "provides a weighted average of many different components each of which reflects one aspect of the complex reality that we call competitiveness". The GCI has 12 components, also called the 12 pillars of competitiveness. Infrastructure is one of the pillars of competitiveness.

Mamatzakis' (2008) calculations suggest that the infrastructure is an essential component of economic activity in Greece. The efficient infrastructure supports economic growth, improves the quality of life, and is necessary for national security (Baldwin, Dixon, 2008). The researchers analyze the impact of infrastructure in various aspects: regional competitiveness, economic growth, income inequality, output, labour productivity, the effect on the environment and well-being (in time and cost savings, increased safety, the development of information networks) (Bristow, Nellthorp, 2000). Some authors argue that investment in infrastructure can stimulate organizational and management

changes: the construction of the railway system will lead to the standardization of the schedule, which leads to increased revenue and having a better railway service (Mattoon, 2004). Public infrastructure provides the geographic concentration of economic resources and broader and deeper markets for output and employment (Gu, Macdonald, 2009). It affects the markets and resources of the finished product, helps to determine the spatial patterns of development and provides an extensive network of individual users at low prices.

Nijkamp (1986) confirms that the infrastructure is one of the tools for the region development. It can directly or indirectly affect the social-economic activities and other regional capacity and factors of production. The author emphasizes that infrastructure policy is a condition of the regional development policy: it does not guarantee regional competitiveness but creates the necessary conditions for achieving regional development objectives. Snieska and Bruneckiene (2009) say that many different factors determine the economy's competitiveness, and indicator of infrastructure is one of them.

The Nigerian economy's size and over two decades of impressive growth rates have not correspondingly translated into any appreciable advancement in its global competitiveness performance. The Nigerian economy, which now accounts for 35% of Sub-Saharan Africa's GDP (IMF, 2015), has consistently fallen behind Tunisia, South Africa, Mauritius, Egypt, Morocco, Botswana, Namibia, and Kenya globally competitiveness ranking. Dropping for the second consecutive year, Nigeria ranked 127<sup>th</sup> out of 144 economies in 2014 to fall 21 places behind Gabon, 16 places behind Ghana, and 15 places behind Senegal.

As of 2019, Mauritius registered the highest score in the global competitiveness index among countries in Africa, at 64.3. South Africa and Morocco followed the country with 62.4 and 60 points, respectively. The indicator measures factors and attributes that drive productivity, growth, and human development in a given country on a scale from 0-100, where 100 represent an ideal state with no obstacles to productivity. Nigeria was ranked 16<sup>th</sup> in African countries.

### 4. Spatiotemporal analysis of railway transport development

The secondary data constitute the majority of the dataset. Data from the Nigerian Railway Corporation and documentary sources are collected. The documents from scholarly journals and the National Bureau of Statistics reference. The schedule is from 1970 to 2016.

With the increasing demand to link the ports with the hinterland, the railways developed in the late



and early 19th and 20th centuries are essential. The first Railway in Nigeria started in 1898, and the line between Lagos and Ibadan finished in 1901. The immediate plans for building rails were to open the country to trade with England and an instrument of administrative regulation, regional growth, and development (Ademiluyi, 2006). During the colonial era, the principal mode of travel between northern and southern sections was single-nail-gauge rail. The line between Lagos and Ibadan reached Jebba in 1909 and later joined Kano and Baro's line in 1915. The Port Harcourt line arrived Enugu in 1916 in the East part of Nigeria. From 1916 to 1966, cities such as Jos, Kaduna, Zaria, Namoda, Nigwu, Ifo, Maidugouri, and Gombe linked later to the train line. Alesa Eleme oil refinery connected to the Enugu line in 1966 to Eleheruwa in Port Harcourt (Ademiluyi, Dina, 2011). The Nigerian network has a total length of 3,505 kilometres (the gauge is 1,067 meters), with a single train running parallel to the northeast and southeast to the northeast of the country.

The 1788 km is made up of 1,600 sharp curves ranging from 4 to 10 degrees, lowering the highest allowable speed to 65 km/h since independence. The government has not had significant track extensions in the last five decades, which invariably made the rail transport system comatose. This occurred due to the complete abandonment of the rail sector by successor governments after independence. The Nigerian Railway Corporation started to have financial losses after 12 years of independence, and this pattern has persisted and escalated enormously. For instance, the sector lost more than N83 million in 1981 alone (Ademiluyi, Dina, 2011). Studies by Solarin (2000); Abubakar (2002); Ademiluyi (2006) further confirm that there had been a steady downward trend in Nigeria Railway's fortunes. The exponential growth in numbers of motor transport has also resulted in a steep decline in rail passenger and cargo skipping.

For Nigeria to join the league of world-developed economies as planned, it would require a mode of transportation, such as rail, that has a capability advantage over other land modes and is energy-efficient and cost-effective. The modern railway network will thus become a pivot to sustainable industrial development and growth (Oni, 2010).

Construction of the railway lines began in 1892 and lasted until 1965. Early railway development lacked planning and circumstances that should have contributed to the city's significant social contribution. However, foresight may have dictated that higher building costs could also have compensated for the advantages of service reliability, efficiency, and linkage between major cities and villages across Nigeria. As a result, the line stretches

diagonally from South-West to North-East and from South-East to North-West, respectively, with junctions in Kafanchan and Kaduna (Jaekel, 1997; Okanlawon, 2006).

The short-sighted building developed a rail infrastructure was not favourable to traffic flow designed for internal growth in East and West, which left large parts of the world unrelated. These regions remained relatively underdeveloped until roads and highways began development in 1960, when the country became independent. Travelling times had been lengthy, and due to steep curves, inappropriate tracking devices, abrupt turns, and the short gauge of the rail tracks, the travel speed had been reduced to a maximum of 65 km/h. While there is over 100,000 km of national highways, the current railway infrastructure expanded, new lines built to serve particular industrial areas, and the country needs more robust integration by providing cheaper transport (Jaekel, 1997; Oni, 2010; Ademiluyi, Dina, 2011).

"Despite all of these intrinsic flaws" Ademiluyi and Dina (2011) noted, "the rail mode enjoyed a virtual hegemony in the transport sector until the 1960s". It also noticed that the output of the railways started to degrade rapidly in the mid-1970s. As a result of insufficient funding and near neglect by subsequent governments of the government, the evident collapse of the companies' facilities witnessed at the time continues to this day.

The individual governments' involvements were mainly for electoral agitation. They were generally a short-term effort to gain acceptance for the new administration – consequently, the current state of rail service shortfall and the NRC's slow performance to date (Akwara *et al.*, 2014).

The historical development of Nigerian railway network is presented in tab. 1.

## 5. Distribution of railway network in the Nigerian states

Figure 1 below shows the different railways covering the territory of Nigeria. There are several weaknesses of the country's railway system. Only two out of five seaports are attended to by rail, and none of the airports is connected to the country's railway system. Besides, almost half of the 36 states in the country do not have any railways; the network distribution is grossly uneven (NRC, 2006). For example, we can see from Fig. 2 that about half of the total rail length lies in only five states. The implication is that the nation relies solely upon on-road transportation to move people, goods, and services. The attendant heavy fuel consumption and resources expended on hardly visible road infrastructure tend to slow the economy's growth.

Tab. 1. Nigeria’s railway system network in its historical period.

No	Year	Segment	Gauge Type	Distance
1.	1898-1901	Lagos – Ibadan	Narrow	193
2.	1901-1909	Ibadan – Jebba	Narrow	295
3.	1907-1911	Kano – Baro	Narrow	562
4.	1909-1915	Jebba – Minna	Narrow	255
5.	1914-1916	Port Harcourt – Enugu	Narrow	243
6.	1916-1924	Enugu – Markurdi	Narrow	220
7.	1922-1927	Kaduna – Kafancha	Narrow	179
8.	1922-1927	Kafancha – Bukuru	Narrow	101
9.	1958-1961	Bukuru – Bauchi	Narrow	238
10.	1961-1963	Bauchi – Gombe	Narrow	166
11.	1963-1964	Gombe – Maiguduri	Narrow	302
12.	1990-2003	Itakpe – Ajaokuta– Warri	Standard	287
13.	2011-2016	Port Harcourt – Onne (Under Construction)	Standard	330
14.	2011-2016	Kaduna – Abuja (Completed)	Standard	457
Total Distance (Kilometres)				3,828

Source: Abioye, 2016; Authors compilation from NBS, 2017.

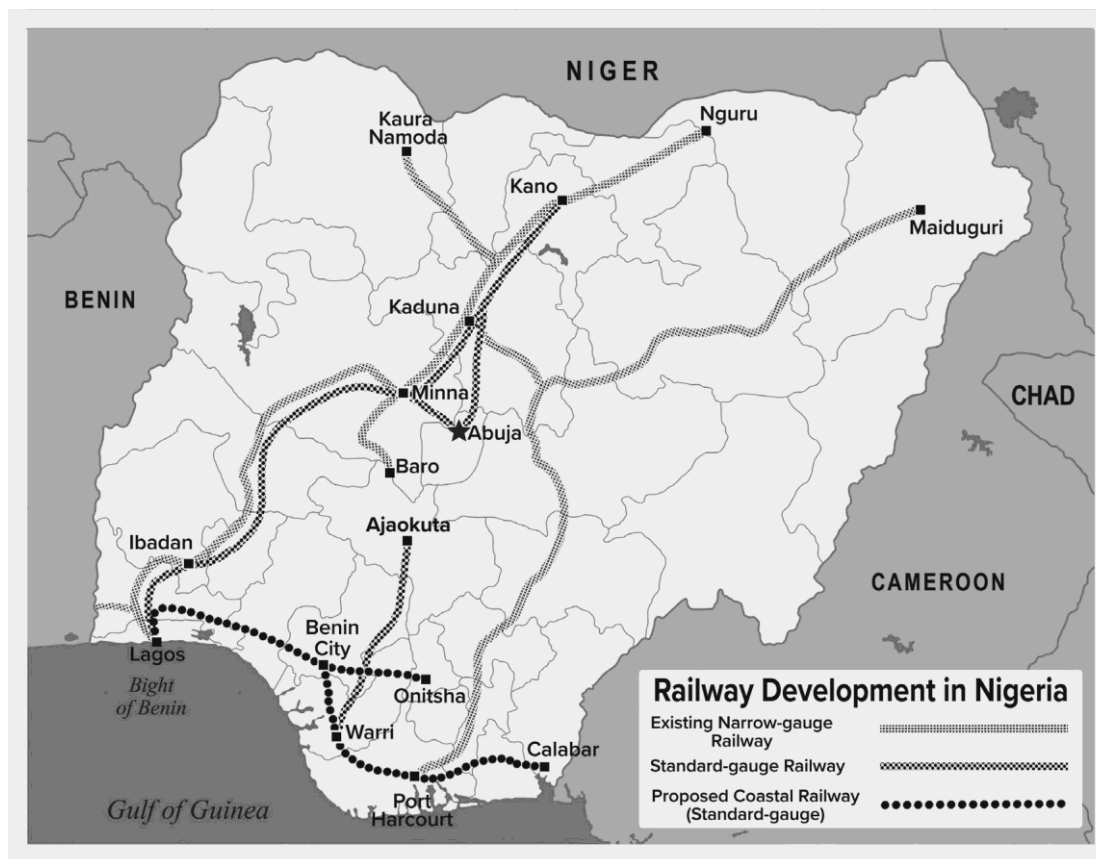


Fig. 1. Nigeria Railway Network Distribution.

Source: Chen, 2018.

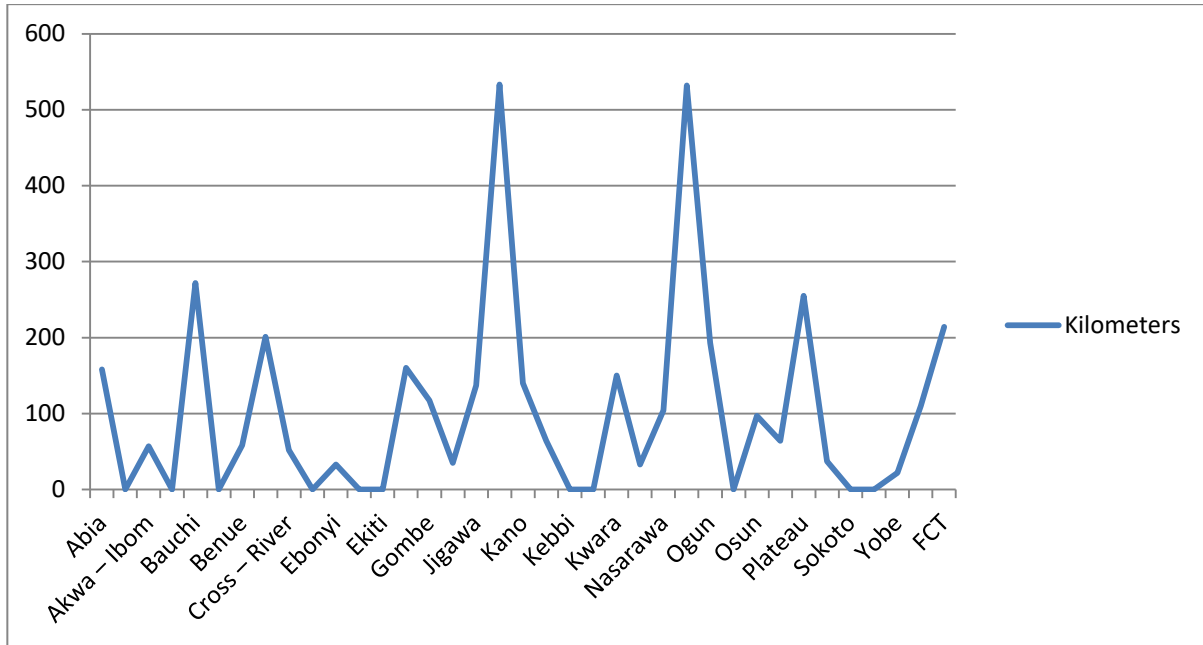


Fig. 2. Distribution and length of railway network lines in the Nigerian states.

Source: Abioye, 2016.

Figure 3 below shows the number of passengers who used the country’s railway to commute from one place to another. There was a peak period of passenger preference for rail as a means of transportation in 1984. In the lower trajectory, the number of passengers fluctuated sharply compared to a high freight track carrying over the same time 1998. This statistic also means trains have more freight to offset the shortfall when passengers’ rail services fall. Another trend saw a sharp growth in the number of passengers in 2000,

as the cargo in 2000 fell sharply. In other words, the number of passengers has increased, and there has been a decline in cargo shipment.

During the heyday of railways in Nigeria, it helps export goods like cotton, groundnut, hides and skins, tin and columbite, and tar. This development encourages growth and development in the production areas (Onakomaiya, 1975). The Nigerian Railways company was sponsored by Peugeot Automobile, Inland Containers Limited, Steel Rolling Mills, West Africa Portland

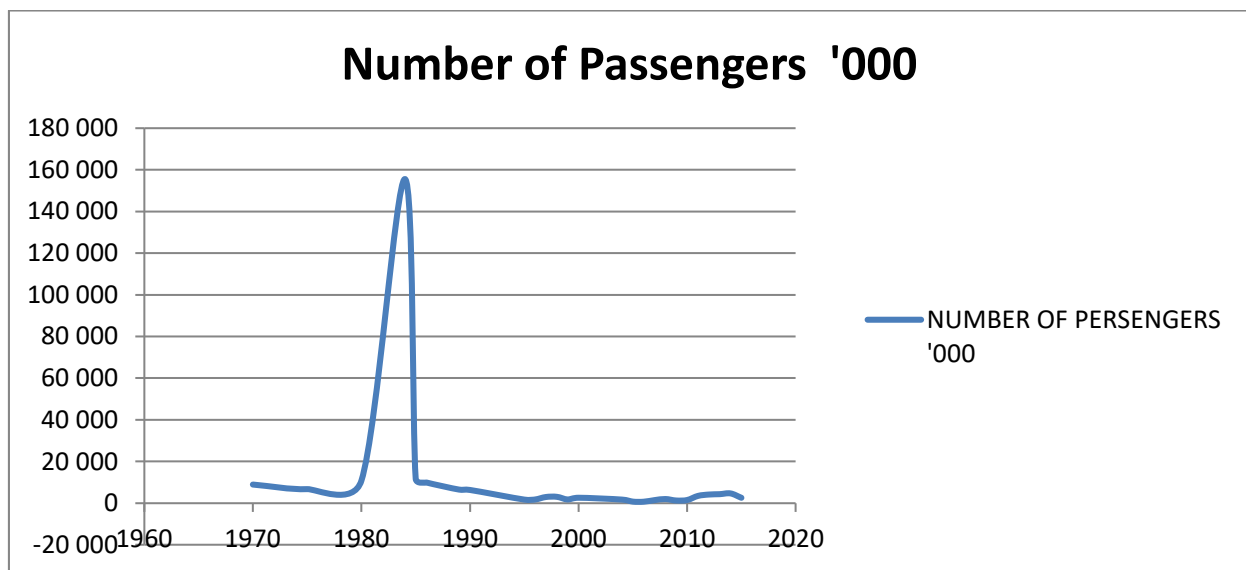


Fig. 3. Number of passengers.

Source: Abioye, 2016.

Cement (now Lafarge), Flour Mills, and the Nigerian National Petroleum Corporation, and by cattle traders amongst others, as a consequence of the oil boom in the early 1970s (Adesanya, 2002). Furthermore, rail freight flow from and to Nigerian seaports was a significant proportion. Moreover, the rail transport industry partially led to economic development and interregional exchange and trade.

Since 1998 there has been a steady decrease in passenger numbers, with the 1998 peak in freight traffic being sharp in comparison (Fig. 4). Consequently, as passenger demand for rail services declined, trains had to transport more freight to compensate for their

deficiencies. Another trend was that passengers increased dramatically in 2000, even as cargo decreased sharply. In 1998 there was a dramatic decrease in the number of passengers compared to the freight travelling over a similar time. Therefore, those modifications mean that trains carried more freight to compensate for depletion as demand for the railway services was reduced by passengers. In 2000, passenger numbers increased dramatically in further growth, compared with the steep decline in freight in 2000.

This Fig. 5 reflects the number of passengers using the rail means of transportation and the total tonnage of freights carried through the rail from a monetary

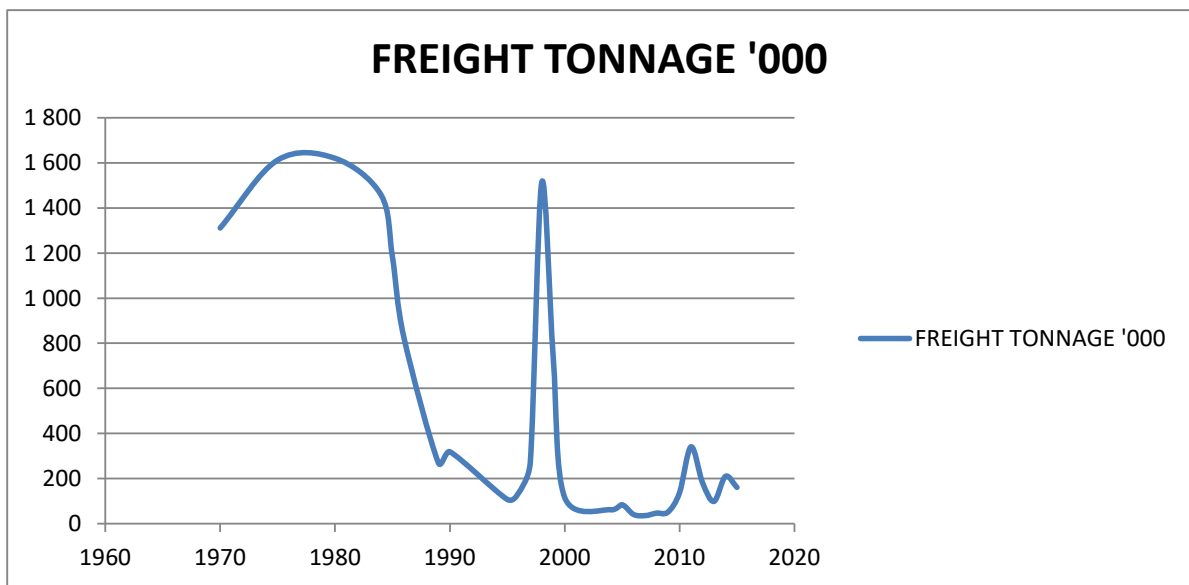


Fig. 4. Freight tonnage.

Source: Abioye *et al.*, 2016.

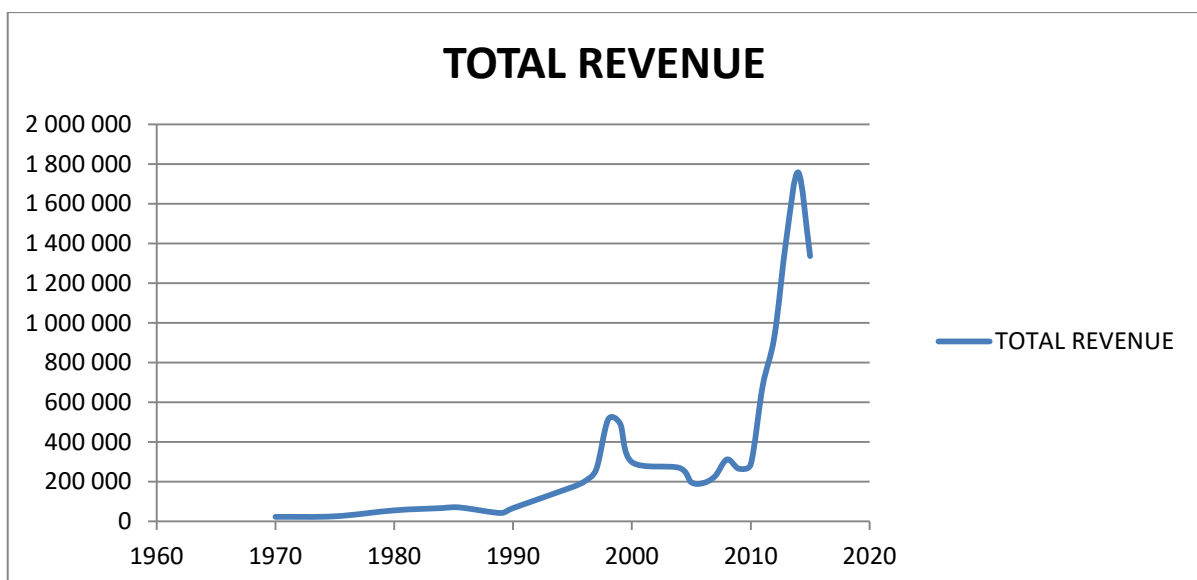


Fig. 5. Total revenue.

Source: Abioye, 2016.



point of view. This description is the gross income of the number of passengers and cargo transported between 1970 and 2015. In 1998, the income produced peaked; in the same year, freight traveled to the highest level, and passenger numbers fell dramatically over the same time. This move means that the train system makes more profits than passengers in freight transport. Rail revenues started to deteriorate in 2000 due to the almost negligible activity in the training sector due to the downward trend. The railway revenue was at its peak in 2014, making it the year with the highest revenue within the years observed.

## 6. Nigerian Railway Corporation and the future

Train transport has many benefits over other modes of transit in terms of environmental friendliness. It also takes up the least amount of land and offers riders the lowest commuting costs instead of different modes of land transportation (Ademiluyi, 2006).

The current government has been improving the rail transport infrastructural gaps by embarking on several rail transport sectors' projects. The Nigerian railway modernization project aim was to substitute the current narrow gauge system with a more robust standard gauge system that would facilitate high-speed train operations on the network. The primary purpose is to boost the country's economic performance.

The Western trunk line from Lagos to Kano was upgraded successfully. As a result, the colonial narrow gauge track could be replaced by a standard gauge track. The colonial railroads were mainly used for extractive purposes, linking port cities to inland agricultural and mineral supplies shipped to colonial metropolises (Chen, 2018). From Abuja to Kaduna, a 187-kilometer standard gauge track was completed in 2014. A 312 km standard gauge segment from Lagos to Ibadan was completed recently, bringing the rail sector further forward.

According to Chen (2018), railways have outstanding properties over road networks in economies of scale. They need less frequent maintenance and have more incredible speed and effectiveness over long-distance routes, making them a highly beneficial low-cost freight choice with enormous potential for trade promotion.

Railway growth also has a positive spillover effects for upstream manufacturing supply chain complementary industries like steel and construction materials. It stimulates retail and service demand, which helps to create jobs. A central trunk corridor will open up agriculture and mining industries in the middle belt and plateau areas. Similarly, the western Lagos–Kano corridor would benefit the northern cattle and leather

sectors, which are now undercut by low-cost imports due to shipping prices.

Low-cost transportation often facilitates mobility and movement between countries, where current road networks are often in bad condition, congested and insecure. This social mobility would also aid in integrating countries, cultural and ethnic groups. Before their demise, the colonial railways assisted agricultural populations in connecting to coastal gateways and facilitated rural-urban migration. New railways will encourage similar mobility, increase cultural and economic integration, and provide secure and inexpensive transportation for migrants seeking jobs and economic opportunities. The completed Abuja–Kaduna line, which has seen strong demand from commuters, demonstrates these benefits, not just for its reliability but also for the added protection it offers over road transport.

## 7. Conclusion and recommendations

The study examines the spatiotemporal pattern of railway development in Nigeria from 1970 to 2016. Every nation's economic, political, and social development is dependent on transportation. Without a viable means of movement, no two locations will interact effectively. As a result, rail transportation can contribute significantly to the movement of passengers and freight.

Railways will provide the most cost-effective, affordable, energy-saving, and environmentally safe mode of transportation in Nigeria if taxpayers pay enough attention to them. Rail transportation has the opportunities to engage producers and consumers, making it simple to transport raw materials, commodities, and manufactured goods.

Furthermore, an increase in the volume of passengers and freight does have the ability and opportunity to generate economic growth and employment in Nigeria if the government can keep increasing its investment in the rail transportation sub-sector. A rise in locomotives, coaches, and cargoes would enhance passenger and freight movement, strengthen trade and commercial operations, increase productivity, create direct and indirect opportunities, and increase government revenue.

Conclusively, the rail sector needs a more aggressive track development and investment for effective operation and nationwide expansion. However, the following policy recommendation could help boost the development of the rail sector in Nigeria:

- i) The intensive rehabilitation of all the major tracks in Nigeria focuses on the six geopolitical zones.
- ii) There is a need to develop the rail transport infrastructure in Nigeria, which will reduce the use

of both long-distance and local truck services in the country. When fully developed in Nigeria, rail transport will reduce the use of trucks for conveying most of the tangible goods, excluding heavy equipment. A train can use the energy used by two trucks to transport what five trucks would have carried to the same destination earlier. This will lead to considerable savings in terms of energy consumption.

- iii) More recent and sustainable trains that use electricity as an energy source could be used.
- iv) The upgrade of all the existing narrow to standard gauge to facilitate movement and speed.
- v) The government should facilitate the training within the sector by establishing institutes and universities to cater to the need of the industry solely.
- vi) All the state capitals are linked with functioning rail systems.
- vii) Improved rail staff training should be implemented regularly across the board, including in collaboration with the railway manufacturer, to better understand their brand's technicalities.
- viii) The government should implement a strategy that would encourage significant investment in all Nigerian rail industry aspects.

## Acknowledgements

The researchers would like to acknowledge the contributions and feedbacks from faculty members of the Department of Transport Management Redeemer's University on the article. The feedbacks generated has to a large extent, sharpen the focus of this work.

## References

- Abioye O., 2016, *Privatization of the Nigerian Railway Corporation: An evaluation of critical choices*, Ph.D. Thesis submitted to Cardiff Metropolitan University, Repository.cardiffmet.ac.uk.
- Ademiluyi I. A., 2006, Rail transport system in Nigeria: It contributions, constraints and the way forward, *Knowledge Review*, 12(4), 1-8.
- Ademiluyi I. A., Dina O. A., 2011, The Millennium Development Goals and the Sustainable Future for Nigeria's Urban Environment: A Railway Strategy, *Journal of Human Ecology*, 33(3), 203-209.
- Adesanya S. A., 2002, *Correlates of Marital Stability among Couples in South Western Nigeria*, Unpublished PhD Thesis, University of Ado-Ekiti.
- Akwara A. F., Udaw J. E., Ezirim G. E., 2014, Adapting Colonial Legacy to Modernism: A focus on Rail Transport Development in Nigeria, *Mediterranean Journal of Social Sciences*, 5(6), 465-475.
- Almeida C. F., 2012, *Elaboração de rede de transporte multimodal de carga para a região amazônica sob o enfoque de desenvolvimento econômico*, Tese de doutorado em transportes, Universidade de Brasília, Departamento de Engenharia Civil e Ambiental, Brasília.
- Amadi Ch., Amadi N. N., Nyenke Ch. U., 2013, Public Spending on Transport Infrastructure and Economic Growth in Nigeria, 1981-2010, *Journal of Sociological Research*, 4, 2, 438-446.
- Amba D. A., Danladi J. D., 2013, An Appraisal of the Nigerian Transport Sector: Evidence from the Railway and Aviation Sub-Sectors, *Journal of Economics and Sustainable Development*, 4, 10, 161-171.
- Araújo M. P., 2006, *Infraestrutura de transporte e desenvolvimento regional: uma abordagem de equilíbrio geral inter-regional*, Ph.D. Thesis, Universidade de São Paulo, Escola Superior de Agricultura "Luiz de Queiroz", Piracicaba. (in Portuguese).
- Aschauer D. A., 1989, Is Public Expenditure Productive?, *Journal of Monetary Economics*, 23, 177-200.
- Baldwin J. R., Dixon J., 2008, Infrastructure Capital: What is it? Where is it? How much of it is there?, *Canadian Productivity Review, Research Papers*, 16, Canadian Statistics, Ottawa.
- Barros J. M. A. M., 2006, *Infraestrutura de Transporte e Desenvolvimento – Interações e Complexidades*, Ph.D. Thesis, Universidade Federal do Rio de Janeiro. (in Portuguese)
- Biehl D., 1986, *The Contribution of Infrastructure to Regional Development*, European Communities, Luxembourg. <http://catalogue.nla.gov.au/Record/577598>
- Breitbach A. C. M., 1998, *Estudo Sobre o Conceito de Região. Secretaria de Coordenação e Planejamento*, Fundação de Economia e Estatística, Porto Alegre. (in Portuguese)
- Bristow A. L., Nellthorp J., 2000, Transport project appraisal in the European Union, *Transport Policy*, 7, 51-60.
- Chapple K., 2014, *Planning sustainable cities and regions: Towards more equitable development*, Routledge, London.
- Chen Y., 2018, *China's Role in Nigerian Railway Development and Implications for Security and Development*, The United States Institute of Peace. <http://www.jstor.com/stable/resrep20230>.
- Eberts R., 2000, Understanding the impact of transportation on economic development, *Transportation in the New Millennium*, <http://www.nationalacademies.org/trb/publications/millennium/00138.pdf>.
- Esan S., 2010, Minister of Transport Visit Nigerian Railway. Rail News Yearly, *Journal of the Nigerian Rails Corporation*, 7(1), 2-11.
- ESCAP – Economic and Social Commission for Asian and the Pacific, 2001, *Review of Development in Transport in Asian and the Pacific*, New York.
- Falodun A. B., Omogiafo P. N., Ezeaku L. C., 2010, *Round-Up for Senior Secondary Certificate and Matriculation Examinations Economics*, Longman, Lagos.

- Gu W., Macdonald R., 2009, The Impact of Public Infrastructure on Canadian Multifactor Productivity Estimates, *The Canadian Productivity Review*, Research Paper, 21.
- Haynes K., 1997, Infrastructure, *Journal of Transport Geography*, 5(1), 23-24.
- IMF – International Monetary Funds, 2019, *The World Economic Forum Global Competitiveness index on rail* [https://govdata360.worldbank.org/indicators/h767919d2?country=NGA&indicator=41510&countries=EGY,MAR,ZAF&viz=bar\\_chart&years=2019&indicators=944](https://govdata360.worldbank.org/indicators/h767919d2?country=NGA&indicator=41510&countries=EGY,MAR,ZAF&viz=bar_chart&years=2019&indicators=944)
- Jaekel F., 1997, *History of Nigerian Railway*, Vol. 2, Spectrum Books Limited, Ibadan.
- Litman T., 2010, *Evaluating Transportation Economic Development Impacts*, Victoria Transport Policy Institute – [http://www.vtpi.org/econ\\_dev.pdf](http://www.vtpi.org/econ_dev.pdf) [dostęp: 26.05.2017].
- Lösch A., 1957, *Teoría Económica Espacial*, Librería “El Ateneo” Editorial Florida 340, Córdoba–Buenos Aires.
- Loto M. A., 2006, The State of Infrastructural Facilities and its Implications for Private Investment-Led Growth in Nigeria, [in:] O. Akano, K. A. Familoni (eds.), *The National Economic Empowerment and Development Strategy: Philosophy, Opportunities and Challenges*, University of Lagos Press, Lagos, 474-487.
- Maia M. F. R., 2001, *A importância da Indústria Têxtil no Desenvolvimento do Município de Montes Claros*, M.Sc. Thesis, Universidade Federal de Minas Gerais, Faculdade de Ciências Econômicas, Centro de Desenvolvimento e Planejamento Regional, Brasil. (in Portuguese)
- Mamatzakis E. C., 2008, Economic performance and public infrastructure: an application to Greek manufacturing, *Bulletin of Economic Research*, 60, 307-326.
- Mattoon R. H., 2004, *Infrastructure and State Economic Development: A survey of the issues (I-G)*, Economic Conference: Emerging Challenges. New Insights on the Economy and Society, Statistics Canada, Ottawa.
- Mera K., 1973, Regional Production Functions and Social Overhead Capital: An analysis of the Japanese Case, *Regional and Urban Economics*, 3, 2, 157-185.
- NBS – National Bureau of Statistics, 2010, <http://www.nigerianstat.gov.ng/>
- NRC – Nigerian Railway Corporation, 2006, *Nigerian Railway Corporation Facts and Figures*, Nigerian Railway Corporation Press, Lagos.
- Nijkamp P., 1986, Infrastructure and Regional development: A multidimensional policy analysis, *Empirical Economics* 1, 1-21.
- Okanlawon K. R., 2006, Towards Enhancement of Light Rail System in Efficient Transportation of commuters in Lagos State, *Journal of Social Policy and Society*, 1(1), 22-27.
- Onakomaiya S. A., 1975, *Internal Trade in Specialty Foodstuffs in Nigeria: a study of collection and distribution processes*, Ibadan University Press, Ibadan.
- Oni O. A. G., 2010, Tackling Road Traffic Congestion in a Developing Country – A Contemporary Approach, *Journal of Applied Sciences Research*, 6(5), 529-542.
- Papa E., Bertolini L., 2015, Accessibility and transit-oriented development in European metropolitan areas, *Journal of Transport Geography*, 47, 70-83.
- Pius A., Nwaogbe O., Ogwude I., 2018, *An Investigation into the Nigerian Rail Transport Quality of Service: From the Passengers' Perspective* [in:] Canadian Transportation Research Forum 53rd Annual Conference-The Future of Canada's Transportation System//L'avenir du système de transport du Canada-Gatineau, June 3-6, Québec.
- Ramos R. A. R., Mendes J. F. G., 2001, *Introdução às Teorias da Localização*, Universidade do Minho, Departamento de Engenharia Civil, Guimarães. (in Portuguese)
- Ratner J. B., 1983, Government capital, Employment and the Production for US Private Output, *Economic Letters*, 13, 213-217.
- Resende M. F. C., 2003, *Troca Intertemporal Entre Economias Desenvolvidas e em Desenvolvimento*, Texto para Discussão no. 201, Universidade Federal de Minas Gerais, Minas Gerais. (in Portuguese)
- Snieska V., Bruneckiene J., 2009, Measurement of Lithuanian Regions by Regional Competitiveness Index, *Engineering Economics* (1), 45-57.
- Sala-i-Martin X., 2007, *Global Competitive Report 2007*, World Economic Forum.
- Solarin A. M., 2000, *An Appraisal of Rail Transport and Its Effect on Freight Mass Transit in Nigeria*, M. Sc. Thesis, Unpublished Ago-Iwoye, Centre for Transport Studies, Ogun-State University, Nigeria.
- Souza N., 1997, *Introdução à Economia*, Atlas, São Paulo. (in Portuguese)
- World Economic Forum, 2006, *Nigeria Falls to 101 Rank in the World Economic Forum's 2006 st Global Competitiveness Rankings*, 27 September 2006, Press Release, Geneva – [mark.adams@weforum.org](mailto:mark.adams@weforum.org)/[www.weforum.org](http://www.weforum.org).
- Zhang X., Zhang W., Lee P.T.W., 2020, Importance rankings of nodes in the China Railway Express network under the Belt and Road Initiative, *Transportation Research Part A: Policy and Practice*, 139, 134-147.



© 2021 Adeniyi Olufemi Oluwakoya, Seun David Ogundipe – Artykuł o otwartym dostępie objęty licencją: Uznanie autorstwa. Międzynarodowa licencja 4.0 (CC BY 4.0)