e-ISSN 2795-3248
p-ISSN 2795-3222

www.gphjournal.org
SOCIAL SCIENCE AND HUMANITIES RESEARCH
Open Access
Global Publication House International Journal

10.5281/zenodo.8239047 Vol. 06 Issue 07 July - 2023 Manuscript ID: #0978

TRANSPORT INFRASTRUCTURAL CHALLENGES AND LOGISTICSPERFORMANCE OF MANUFACTURING FIRMS IN SOUTH-SOUTH REGION OF NIGERIA

*[1]Victoria, OKECHUKWU, and [2]Osi, S. AKPOGHOMEH
[1, 2]Centre for Logistics and Transportation Studies (CELTRAS), University of Port Harcourt, Port Harcourt, Rivers State.

Corresponding Author: okechukwuvictoria6@gmail.com

ABSTRACT

This study examined transport infrastructural challenges and logistics performance of manufacturing firms in Nigeria's South-South zone. The study objectives were to determine the effect of nature of route on manufacturing firm logistics performance and the effects of road traffic management system and safety of therouteon manufacturing firm logistics performance. The descriptive survey design was used in the study, and 318 (100.0%) respondents were sampled using a structured questionnaire. The data were evaluated using percentages, mean, and Pearson Product Moment Correlation was used to test all hypotheses. Major results from objective one revealed that the nature of route have great effect on logistics performance of manufacturing firms with mean of 3.42, statistical analysis showed the correlation coefficient was found to be greatly and statistically significant ($r = 0.963$, $p<0.001$). Objective two revealed a mean of 3.45, the correlation coefficient test was substantial at 0.980. This accounted for 96.04% of the variance in logistics performance of manufacturing firms. Objective three; indicated a significant mean value, while the correlation coefficient test was found to be greatly positive and statistically significant ($r=0.957$, $p<0.001$). Conclusion; there is a valuable insight into the factors affecting transport and logistics performance of manufacturing firms regarding route characteristics, road traffic management systems, and route safety, and their impact in south-south Nigeria. The study recommends that government priority in this region should be on improving transport infrastructural development investment. The study suggest that road safety measures should be enhanced through strengthening and strict implementation of road safety regulations.

KEYWORDS

Infrastructure, transport, performance, manufacturing firms, logistics, South-South.

1. Introduction

Transportation is one of the stimulant components of the economic development of Nigeria. Road transport in Nigeria constitute all means of transport, which include; cars, buses, trucks and among other logistics vehicles. Around 1950's, dual – purpose wagons were majorly used in carrying both passengers and freights but this means of logistics transport were seamlessly overtaken by 10, 15 and 30 tonnes trucks that carry containers for the movement of goods and other products by road (Onokala & Olajide, 2019).

Transportation infrastructure connects cities with many economic, social, and environmental systems and accommodates human activities. According to Luqi, et al., (2018), the development of transport infrastructure connecting cities promotes urban aggregation and dispersion, which significantly increases regional and governmental economic growth. Sustainable development is inherently difficult for any country to achieve without reliable, efficient, and adequate infrastructure (Ogwo & Agu, 2016). An effective transportation system is viewed as a key component of economic development and growth on a global scale. (Leopoldo & Daniel, 2019).

The transport sector is the economy's fulcrum, the pivot around which the economy rotates, and ignoring this sector impedes progress, according to Njoku (2009); Ikechukwu and Ureal (2012). The importance of transport to a country's economic health and production cannot be overstated. Distribution of goods from the producing location to the relevant market at the appropriate time, while taking into account the proper quantity and quality to ensure customer happiness and profit, is a key manufacturing goal. Consumers and a sizable chain of firms would suffer economically from any considerable disruption of the supply (Ogwo and Agu, 2016).

The growth of every country still depends heavily on its transportation infrastructure. Throughput, logistics performance, market integration, and export volume are all negatively impacted by inadequate transportation infrastructure (Senquiz & Diaz, 2021). Among the necessary infrastructure amenities (hospitals, energy, water, transportation, etc.), the transportation infrastructure shines out (Ogwo & Agu, 2016).

The region's insufficient transport infrastructure appears to be having the most impact on Nigerian manufacturingfirms in the south-south corridors. No less than 500 firms in Nigeria stopped functioning between 2009 and 2011 as a result of excessive operational expenses, mostly brought on by transportation and energy distribution issues (Ogwo and Agu, 2016).Many manufacturing firms in Nigeria's south-south have struggled over the past 20 years as a result of the terrible and crumbling status of the federal, state, and municipal roadways. Due to severe and hopeless traffic jams, truck breakdowns, committed as a result of the inadequate state of the transportation infrastructure, and lost markets from customers who could not wait for the delayed arrival of ordered goods, products worth billions of naira have been damaged throughout the supply chain (Ogwo and Agu, 2016). In fact, significant sections of all truck A and B roads leading to the southern states, including Enugu-Port-Harcourt,Aba-IkotEkpene, Bende-IkotEkpene, Umuahia-IkotEkpene, and part of the East-West Road, among others remain largely impassable.

The efficient product distribution, just-in-time delivery, and the high cost of logistics truck maintenance are only a few of the problems that the expanding industrial companies in south-south Nigeria face. These problems make it difficult for manufacturingfirms to operate sustainably and perform well in logistics. In support of this assertion, Ayantoyinbo (2021) affirm that logistics function has a positive and significant effect on financial performance of manufacturing companies in

Nigeria. Inadequate transportation infrastructure poses a danger to manufacturing firm's logistical operations in a certain region or zone, which can result in limitations, failures, and complaints. The goal of this research is to monitor and reduce this risk.These issues led to the idea for this inquiry. The study examined the following objectives: (i) examine the effect of the nature of route on logistics performance, (ii) ascertain the effect of road traffic management system on logistics performance, and (iii) examine the safety of transport route and its effect on logistics performance.

The Study Area

The South-South region of Nigeria, located between latitudes 4° 30'N and 6° 20'N, and longitudes 5° 00'E and 8° 30'E, is characterized by diverse geographical features, including coastal plains, mangrove swamps, and riverine areas (Ogunware et al., 2020). It is comprised of six states: Akwa Ibom, Bayelsa, Cross River, Delta, Edo, and Rivers. The region experiences a predominantly tropical climate influenced by its proximity to the Atlantic Ocean, with high temperatures, abundant rainfall, and high humidity throughout the year. The average annual temperature ranges from 25°C to 32°C, and the region receives approximately 2,500mm of rainfall annually (Ojo et al., 2019).The South-South region's climate exhibits a tropical monsoon pattern, with distinct wet and dry seasons and the highest precipitation occurring between May and September (Akande & Salami, 2021). The region's minimal temperature variations, averaging around 25-32°C throughout the year, contribute to its climatic conditions. The region is known for its significant oil and gas reserves, particularly in the Niger Delta region, which serves as the primary hub for oil exploration and production in Nigeria (Onuoha, 2019).Apart from its oil and gas industry, the South-South region's economy is also supported by agricultureand manufacturing plants (Nwajiuba et al., 2020).

2. Methodology

The study employed a descriptive research design to appraise the transport infrastructural challenges and logistics performance of manufacturing firms in the South-South Region of Nigeria. Both primary and secondary data sources were used. Primary data was obtained from household survey, interviews and field observation. Secondary data was obtained through desktop review of available relevant literature and information from relevant government agencies and transport establishments in the region. Structured questionnaires were designed with open and close ended questions. The study population consisted of 1560 transport and logistics staff operating in 114 manufacturing industries in the south-south region of Nigeria. Due to the large population of manufacturing firms, a manageable sample size of 318 was obtained using the Taro Yamane formula. The inclusion and exclusion criteria were employed to select manufacturing firms based on their operational characteristics, such as location, products manufactured, and involvement in transport and logistics. The questionnaire was administered to 318 respondents in the study area. Four (4) States were randomly selected from the six (6) States of the south- south region. The four selected States are: Akwa Ibom State, Delta State, Edo State, and Rivers State. In each of the State,318 respondents were randomly selected from the four sampled States based on the number of manufacturing firms sampled as follows: Akwa Ibom State (70), Delta State (88), Edo State (80) and Rivers State (80) respectively. Special attention was paid to number of manufacturing firms, types of manufactured products and types of operational vehicles in place in the study area. This aided the assessment of the transport infrastructural challenges and logistics performance of manufacturing firms in the study area. The data obtained was analysed using descriptive statistics such as percentages, frequency distribution and meanscore count

while Pearson Product Moment Correlation statistics were employed to test the hypotheses. The instruments used which is questionnaire, despite its usefulness in generating required information, limited the diversity of narratives about the people's perceptions and experiences with the transport infrastructural challenges and logistics performance of manufacturing firms in the study area. Experience has shown that perception data often times do not agree with official data from statutory organizations.This therefore constitutes a limitation to the study.

The study utilised a Four Point (4 to 1) Likert scale tool as an instrument to measure the perception of respondents on the various variables of interest as utilised in the study objectives. The benchmark used as the standard for comparing mean in this study is the average mean of the values assigned to the four (4) point Likert scale, thus; the study statistically arrived at a mid-point of 2.5. This was determined by the sum of 4+3+2+1=10/4= 2.5. All values from the Mean of 2.5 and above is regarded to be significant and accepted to be positive to this study variables of interest, and values below 2.5 is regarded to be insignificant and thus rejected.

3. Results and Discussion of Findings

Table 1: The effect of the nature of route on logistics performance

The nature of route	SA	A	D	SD	Total	Mean	Remark
The number of lanes on the route enhances logistics performance.	145	123	31	19	318	**3.24**	Accepted
The tarred road enhances logistics performance.	249	69	0	0	318	**3.78**	Accepted
Route without pot holes enhance logistics performance.	156	162	0	0	318	**3.49**	Accepted
Presence of functional street lights enhances logistics performance.	146	131	16	25	318	**3.25**	Accepted
A route with a physical divider enhances logistics performance.	181	134	3	0	318	**3.55**	Accepted
A route with lay-bys enhances logistics performance.	165	110	16	27	318	**3.30**	Accepted
A route with road shoulders enhances logistics performance,	125	188		5	318	**3.36**	Accepted
Cumulative Mean						**3.42**	

Source: Researchers' Analysis, 2021.

As shown in Table1, it can be inferred that the respondent's perception on effect of the nature of route on logistics performance in the study area with the highest mean of 3.78 and 3.55 are that the tarred road enhances logistics performance and the route with a physical divider enhances logistics performance while the least mean of 3.24 which state that the number of lanes on the route enhances logistics performance. However, the average mean for the effect of the nature of route on logistics performance in the study area is 3.42. The effect of the nature of route on logistics performance of manufacturing firms in the southern zone of Nigeria with mean above the average mean value include all the items in the table which are:the number of lanes on the route;the tarred road;route without pot holes;presence of functional street;a route with a physical divider; a route with lay-bys;a route with road shoulders all enhances logistics performance. However, factors higher than the criterion of 2.5 where accepted while those below where rejected.

This finding is corroborating the work ofFilani (2013) affirm that poor state of roads contributed to long travel time and delay in Just-in-Time delivery, considering the high volume of logistics activities going on around the study region through transportation and distribution of manufactured products. Ogunsanya (2008) had previously asserted that rural roads are characterised by a strong relationship with transportation and underdevelopment.

The importance of standard transport routes in south-south zone of Nigeria cannot be overstated, the region house thousands international organisation companies (IOCs), among other manufacturing firms, 85% of respondents interviewed indicate that the regions suffer from absence of government present especially on major (highways) roads connecting various states in the zone. The lamented on the effect of the dilapidated east west roads which a route with high vehicular and logistics traffic.

In addition, 48% of truckers affirm that the federal government has failed her citizens in providing basic transport infrastructural amenities but government agencies like the Nigeria Police and other security outfit constantly harassed motorist on road worthiness, extortion and harassment amidst the challenges faced by manufacturing firms in losing its goods, trucks and revenue to poor state of transport routes in the zone.

Test ofhypothesis one

H_0: There is no significant relationship between nature of the route and logistics performance of manufacturing firms

H_1: There is a significant relationship between nature of the route and logistics performance of manufacturing firms

Table 2: Correlation coefficient between the nature of the route and logistics performance of manufacturing firms in the South-South Zone of Nigeria.

Correlations			
		Nature of the route	**Logistics performance**
Nature of the route	Pearson Correlation	1	.963**
	Sig. (2-tailed)		.000
	N	318	318

Logistics performance	Pearson Correlation	.963**	1
	Sig. (2-tailed)	.000	
	N	318	318
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Researchers' Analysis, 2021.

The correlation coefficient of the nature of route and logistics performance of manufacturing firm in the south-south zone of Nigeria in Table 2 was found to be highly positive and statistically significant ($r= 0.963$, $p<0.001$). Hence, the null hypothesis was rejected and the alternative hypothesis was upheld. This shows that good nature of the route would lead to a higher logistics performance of manufacturing firms in the study area. The coefficient of determination further revealed that the nature of routesaccounted for 92.74% of the variance in logistics performance of manufacturing firms in the southern zone of Nigeria.

Table 3: The effect of road traffic management system on logistics performance

Adaptation strategies	**SA**	**A**	**D**	**SD**	**Total**	**Mean**	**Remark**
The use of traffic lights for traffic management enhances logistics performance	216	95	7		318	**3.66**	Accepted
The availability of road signs enhances logistics performance.	124	145	31	18	318	**3.18**	Accepted
The presence of traffic officers/Wardens enhance logistics performance	185	98	21	14	318	**3.43**	Accepted
Well-marked lanes enhance logistics performance	122	162	34	0	318	**3.28**	Accepted
A Route that are free from traffic Congestion enhances logistics performance	241	61	10	6	318	**3.69**	Accepted
Total						**3.45**	

Source: Researchers'Analysis, 2021.

Table 3 result can be revealed that the respondent's perception on effect of road traffic management system on logistics performancein the study area with the highest mean of 3.69 indicating that route that are free from traffic Congestion enhances logistics performance. However, the average mean for the effect of road traffic management system on logistics performancein the study area is 3.45. All the items on Table 3 were accepted with mean above the average mean value include the use of traffic lights for traffic management enhances logistics performance, The availability of road signs enhances logistics performance, The presence of traffic officers/Wardens enhance logistics performance, Well-marked lanes enhance logistics performance, and A Route that are free from traffic Congestion enhances logistics performance. However, factors higher than the criterion of 2.5 where accepted

while those below where rejected.Road traffic management system have a positive effect on logistics performanceof manufacturing industry in the south-south zone of Nigeria with the mean value of 3.45 greater than the criterion mean of 2.50. The Correlation coefficient between the road traffic management system and logistics performance was substantial at (0.980).

Cumulatively, the variables examined in the perception scale significantly indicate a mean score that correlate with the Pearson correlational statistical output that affirm the effectiveness of road traffic management system on logistics performance of manufacturing firms. These findingscorroborate with that of Ayantoyinbo and Gbadegesin (2021); Jones et al. (2009). 86% of interviewed truckers operating with various manufacturing firms argued that the efficient delivery process achieve by them is anchored on their operational experience, training, logistics plans and journey management framework initiated by their firms. Aside this, they won't be meeting up the final mile-stone in the distribution and logistics chain of their parent firm. While encountering difficulties along major road networks, ranging from dangerous potholes,natural disaster like floodings and sit-at-home limiting their operational days, inadequate traffic management system across the study area, and unnecessary delays by security agencies, and community task-forces.

Test of hypothesis two

H_0: There is no significant relationshipbetween road traffic management system and logistics performance of manufacturing firms.
H_1: There is a significant relationshipbetween road traffic management system and logistics performance of manufacturing firms.

Table 4: Correlation coefficient between the road traffic management system and logistics performance of manufacturing firms in the south-south zone of Nigeria.

Correlations			
		Road traffic management	**Logistics performance**
Road traffic management	Pearson Correlation	1	.980**
	Sig. (2-tailed)		.000
	N	318	318
Logistics performance	Pearson Correlation	.980**	1
	Sig. (2-tailed)	.000	
	N	318	318
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Researchers' Analysis, 2021.

Table 4 showed the Correlation coefficient between the road traffic management system and logistics performance of manufacturing firms in the south-south zone of Nigeria. The Correlation coefficient between the road traffic management system and logistics performance was significantat 0.980, hence, the null hypothesis was rejected and the alternative hypothesis was upheld. Invariably,an improved road management system would lead to a higher Logistics performance of manufacturing firms in the study area. Road traffic management system accounted for 96.04% of the variance in logistics performance of manufacturing firms in the south-south zone of Nigeria.

Table 5: The Safety of the Route and its Effect on Logistics Performance

Safety of the route	SA	A	D	SD	Total	Mean	Remark
The presence of road safety officers on the route improves logistics performance.	131	167	6	14	318	**3.31**	Accepted
Bad driving by other motorists does not enhance logistics performance.	185	112	21	0	318	**3.52**	Accepted
Lack of other law enforcement agents may impede logistics performance	141	127	31	19	318	**3.23**	Accepted
Total						**3.35**	

Source: Researchers' Analysis, 2021.

Table 5revealed that safety of transportation route has a significant effect on the logistics performance of manufacturing firms at a cumulative mean score of 3.35. Further scrutiny of the elements utilised in the Likert scale continuum affirm that presence of safety officer will drastically influence the logistics performance in manufacturing firm operations. Also, the absence of poor driving attitude from motorist will significantly influence logistics performance. This finding indicated in this study relevant to the southern zone of Nigeria, considering the diverse nature of insecurity creating fears on motorist. Whereas, every major transportation route in southern zone of Nigeria has multiple security check-points, which is expected to provide the much-needed security atmosphere to safe guide commuter's specially manufacturing firms distributing and transporting various forms of industrial materials. The findings from this objective in agreement with the works of (Lewis 2008).

Studying the safety of the route and its effect on logistics performance of manufacturing firmsin the southern zone of Nigeria,help to identify the burning problems and response to it appropriately. Many possible safety strategies can be suggested or developed based on the findings. The level of safety of the route and its effect on logistics performance of manufacturing firmsdepends on time of exposure, geographical, economic, political, social and cultural backgrounds at the local level therefore it's risk can be minimized or solved by mitigation through the in-depth study of those influencing factors (Klein, et al., 2007).

Testing Hypothesis three

H_0: There is no significant relationship between safety of the route and logistics performance of manufacturing firms

H_1: There is a significant relationship between Safety of the route and logistics performance of manufacturing.

Table 6: Correlation coefficient between Safety of the route and logistics performance of manufacturing firms in the south-south zone of Nigeria.

Correlations			
		Safety of the route	**logistics performance**
Safety of the route	Pearson Correlation	1	.957**
	Sig. (2-tailed)		.000

	N	318	318
logistics performance	Pearson Correlation	.957**	1
	Sig. (2-tailed)	.000	
	N	318	318
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Researcher's Analysis, 2021.

Table 6 showed that the correlation coefficient of Safety of the route and logistics performance of manufacturing firms in the South-south Zone of Nigeria was found to be very highly positive and statistically significant ($r=0.957$, $p<0.001$). Hence, the null hypothesis was rejected and the alternative hypothesis was upheld. This shows that an increase in the safety of the route would lead to a higher logistics performance of manufacturing firms in the south-south zone of Nigeria.Safety of the routesaccounted for 91.58% of the variance in logistics performance of manufacturing firmsin the southern zone of Nigeria.This shows that an increase in the safety of the route would lead to a higher logistics performance of manufacturing firms.

4. Conclusion and Recommendations

This study focused on assessing the perception of respondents in the south-south zone of Nigeria regarding the impact of route characteristics on the logistics performance of manufacturing firms. The findings revealed that respondents' perception was closely associated with the degree of hazards and opportunities presented by the nature of routes, which ultimately affect the logistics performance of manufacturing companies in the region. The study identified that tarred roads and routes with physical dividers have a positive effect on logistics performance, while the number of lanes on the route has the least impact.

Furthermore, the study demonstrated a highly positive and statistically significant relationship between the nature of the route and the logistics performance of manufacturing firms in the South-South Zone of Nigeria. This indicates that the nature of the route plays a significant role in enhancing the logistics performance of manufacturing firms in the region.

Additionally, the study explored the respondents' perception of the effect of road traffic management systems on logistics performance. The findings indicated that routes without traffic congestion were perceived to improve logistics performance. Factors such as the utilization of traffic signals, availability of road signs, presence of traffic officers or wardens, presence of well-marked lanes, and absence of traffic congestion were all perceived to contribute to an improvement in logistics performance. These findings are consistent with previous research that highlighted the importance of an appropriate road traffic management system in achieving high levels of logistics performance.

The study also addressed the route's safety and its impact on the logistics performance of manufacturing firms in Nigeria's South-South Zone. It identified several aspects related to route safety, including the positive influence of road safety officers on logistics performance, the negative impact of poor driving by other motorists, and the potential hindrance to logistics performance in the absence of other law enforcement agents. These findings align with previous research studies emphasizing the importance of road safety measures in enhancing logistics performance.

Overall, this study provides valuable insights into the perception of respondents regarding route characteristics, road traffic management systems, and route safety, and their impact on the logistics performance of manufacturing firms in Nigeria's south-south zone. The findings offer a basis for developing appropriate solutions to address the identified problems and improve logistics performance in the region.

Based on the findings of this study, the following recommendations are made:

i. The studysuggests that government priority in this region should be on improving road transport infrastructural development investment to attaininfrastructures with long live span, which would promote efficiency in transport and logistics performance.Federal and States government should regularly carryout road maintenance and repairs to minimize transport and logistics delays, transportation costs, and inefficiencies.
ii. Implement SMART Road traffic management systems to improve logistics performance, and manage road traffic flow, including the use of sustainable traffic signals, well-marked lanes, road signs, and the presence of non-criminalised traffic officers or wardens.
iii. Relevant road transportation agencies should carryout regular field assessment and monitoring of route characteristics, road conditions, and the effectiveness of traffic management and safety measures. Monitoring the impact of implemented solutions and making necessary adjustments based on ongoing evaluations will contribute to sustained improvements in transport and logistics performance.
iv. The study suggest that road safety measures should be enhanced through strengthening and strict implementation ofroad safety regulations, raising awareness on safe driving, improve road safety officer’s expertise and presence on the major roads.

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