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The Effect of Transport in the Location of the Contemporary Industrial Activities at the 9th Mile Area of Enugu State, Nigeria

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Abstract:

This study investigated the contributions of transport variables in the location decisions of industrial activities at the 9th Mile area in order to identify the available transport variables and determine their individual effects in the location of industry in the area. Fifty (50) industries are available in the area and 32 or 64.0% of them were sampled in this study. The study population comprised the management of the 32 industrial plants and the employees selected at 5 from each of the 32 industrial plants. The choice of 5 employees was informed by the fact that Alex Enterprise has only 7 employees and 5 of them were used during the pilot survey. Thus, 32 members of the industrial management and 160 employees formed the study population. They were purposively selected, and the data used were collected through questionnaire, interview, and field observation. One set of questionnaires was set for the respondents involving both structured and unstructured questionnaire. Data from the various methods were merged and analysed using descriptive statistics, standardized percentages, and bar graph techniques. The findings of this study show that transport availability, accessibility, mode, and cost affected location decisions of industry in the area. The modes of transport in use by industry are road, water, and air with road dominating others because only 4 industrial plants (9.4%) in addition to road use water and air transport. The remaining other 28 industrial plants use only road in movement of both raw material and products. Transport accessibility influenced the decision to locate 30 (93.8%) industrial plants in the area.

Keywords: Industry, influence, location, transport variables

1. Introduction

Transportation is one of the most vital parts of society. People need to move in the society to work, study, go to picnics, and to take a break from daily routine. Thus, movement is inevitable for people since life is determined by movement, and nothing happens until something moves (Agarwal, 2020). Movement is vital for life in the same way as the movement of the earth around the Sun, and as tiny electron revolves round the nucleus. As these things retain the existence of the world, similarly movement of humans is necessary for their survival. People cannot sit still, they must move to eat, earn, learn and discover.

Transportation helps the employed people to reach their work. It also provides jobs for people who manage the information about the transportation. The entire economic, social and political life of a modern country depends upon an efficient system of transport. Transport helps in the assembly of raw materials and distribution of finished goods (Muktar, 2011). It makes it possible to move goods from the place of production to the place where they are to be consumed. In the earlier days, there were only local markets due to the absence of safe means of transport. Now-a-days, trade is not restricted to the boundaries of a nation, but has spread throughout the world because transport has knit together all the nations of the world into the one big world market.

Transport helps each area to make optimum and efficient use of its national resources. Each region can concentrate on production of those goods for which its resources are best suited since their movement to where they are needed is always facilitated by transport system available in the region. Thus, movement of goods and people from one place to another leads to specialization and division of labour which results in minimum wastage of resources and reduction in the cost of production.

Transport has helped the development of large-scale industries. It would not have been possible for these industries to procure raw materials, gather large number of workers and sell the finished goods, without the efficient facilities of transport. Improved means of transport benefit the consumers in many ways. The consumers can enjoy the benefit of use of many goods, which cannot be produced at their place, by transporting such goods from other distant places. The world we live in today would not be possible without the use of transportation and the innovations that have come from it. Mobility, travel and economic activity depend on it (Filip and Popa, 2014).

Most industries and businesses require fast and efficient transportation to deliver, and receive goods and raw materials in order to maintain steady business and generate a profit, and economic growth depends on the availability of reliable transportation which allows trade to reach out to a wider spread of consumers (Philips, 2015). It is on these vital roles of transport in economic activities that this study is anchored in order to determine the contributions of transport on business location decisions and provide an explanation on the role and significance of transport-related factors in influencing these decisions in the study area.

2. The Study Area

The 9th Mile is in Udi Local Government Area of Enugu State (Fig.1) in the south Eastern Nigeria. It is bounded by Ngwo and Enugu Mile in the East, Owa-Imezi (Ezeagu LGA) in the West, Abor and Eke in the North, and Nsude in the South (Fig. 2). It lies between latitudes 6° 24' and 6° 26' N, and longitudes 7° 23' and 7° 25' E (Fig. 2). The area is a nodal environment at the junctions of many roads. Such roads are Enugu to Markurdi expressway, Enugu to Onitsha dual carriageway. Others like Oji-River – Udi- Ngwo- Enugu road, Nsukka – Okpatu- Abor- Enugu road, Nsukka- Enugu road, and Ezeagu- Eke- 9th Mile- Enugu roads are subsidiary roads. It originated from the presence of trees particularly 'Agba' trees called copadsa balsam, *Daniellia oliveri* that clustered in the area, and became a resting and tourist center for passers-by and those from the area. As such it became the central point that linked many parts of the Southern, Eastern, and Northern Nigeria (Ikengwu, 2019) which metamorphosed into Hausa and Non-Hausa settlement. With growth, a road was constructed to link it with Enugu in about 1930s, and because it was nine miles (13.338km) from Enugu, the area was renamed 9th Mile. It comprises Ngwo (Ngwo-Uno and Ameke) and Nsude communities and Owa-Imezi (Ezeagu LGA) of Enugu state. Three classes of soils identified in the area based on morphology, degree of profile development, mineral properties of the underlying rocks, and the slope of the terrain (Onyeonula, 2007) are lithosols (occur on steep slopes where profile development is retarded by erosion); ferrallitic soil (with little humus, rich in free iron, but low mineral reserve to become poor in fertility); and hydromorphic soils (mainly found at the plains of the area, but they are generally nutrient-poor as a result of leaching).

The type of rock available in the area is mainly sandstone (Obeta, 2003) which is a permeable rock stratum (aquifer) that holds and transmits groundwater (Remcay, 2004). Such groundwater forms source of water for industrial and human use in the area because such water sources is always clean. It lies within the wet and dry seasons of short dry season of about four months and rainfall for the rest of the year (Ozonnadi, 2007). The annual total precipitation ranges from 1600 to more than 2000 mm (Onokala and Phil-Eze, 2001). The rainfall depends on the interaction between the warm, dry tropical continental air mass from the North east, and the warm, wet tropical maritime air-mass from the south west (Onyeonula, 2007). These issues and high relief give rise to convectional, orographic, and frontal rainfall in the area (Obeta, 2003). The mean daily maximum temperature is about 27°C, and the mean annual maximum temperature is 33°C, and the annual range of temperature is low because of the effect of relief (Ozonnadi, 2007). The area lies within the tropical rain forest belt of Nigeria, but most of it has been reduced by human activities (Barbour and Oguntoyimbo, 1989) which gives grasses a propagative edge. Up to 70% of the vegetation is grass like elephant *Pennisetum purpureum*, and giant star *Cynodon plectostachyus*, while trees include gmelina *Cynodont barborea*, palm tree *Elacis guineensis*, cashew *Anacardium occidentale*, bread fruit *Artocarpus communis* (Aneke, 2000). The area is accessible by road, and important in economic activities. The settlers undertake a lot of petty jobs like farming, animal rearing (goats, pigs, and poultry), oil palm processing, roadside mechanics, productions, petty trading, transportation agents and own business centers (Ehirim, 2001).



Figure 1: Enugu State Showing the Study Area
Source: Enugu State Ministry of Lands, 2019

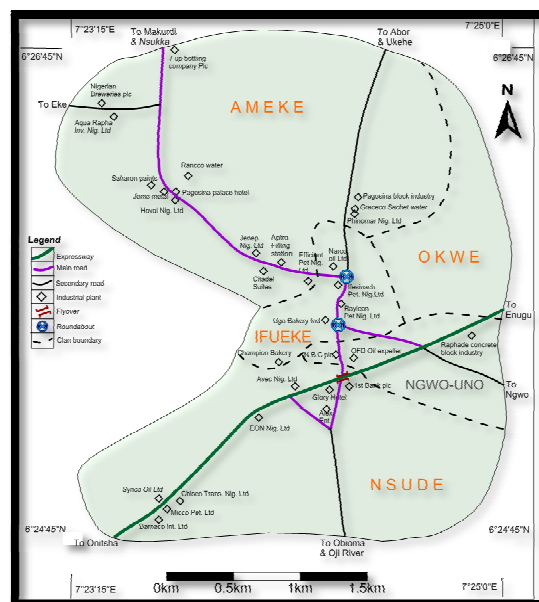


Figure 2: Location of the Study Area, 9th Mile Area
Source: Adopted from Ogbu (2014) and Ehirim (2001)

3. Literature Review

Transport is the act of moving people or goods from one place to another (Hendrickson, 2003). All of the regional shifts in location of industrial plants decisions have been precipitated by a transportation revolution that made new territory accessible, and opened it to new types of industries (Couse, 2006). This is why greater Manchester in Great Britain offered advantages to developers since over 2.5 million people could reach it within a half hour's drive due to circular motorway system and dense road network of the area (Bradford and Kent, 1993). Again, studies in China by Badri (2007), and Daykin (2008) found out that location change could be very simply produced by the construction of routeways, which increase the competitive advantage of places affected by them. In many African countries, the development in transport facilities still affected the locations of industries. Such studies were conducted in Nigeria by Musa and Ndawayo (2011), and Sambo (2010); Cameroon by Khan and Bamou (2006); and Kenya by Mwega and Ngugi (2006).

Thus, in a country's economic development, a precondition to the take-off period is increase in investment notably in transport and communications in which other nations may have economic interest (Mano and Otsuka, 2000). In the opinions of Intel Corporation (2005) transport is required at both the input and output stages of production. Therefore, transport is integral part of the productive process because a commodity is useless until it gets to its point of consumption. Many studies on the influence of transport in location decision dwell on location of production activities at points of low transportation cost in movement of either raw materials or products, and availability of transport facilities. Such studies were carried out in east Africa by Nexson (1973), China by Veeck and Panel (1989), USA by Wong (2007), and Barcelona (Spain) by BFSC (2007). Again, the influence of transport depends on the nature and character (perishable, fragile or cumbersome to package) of raw materials or products. Another factor is the availability of transport facilities. This is a common issue in Colombia (South America), Latin America (Bahr, 1990), USA (Sloagett and Woods, 2003), and Israel (Nefesh, 2006). In Nigeria, studies conducted by Uduaghan (2009), and Musa and Ndawayo (2011) indicated that transport availability is a significant determinant of industrial development. Such facilities according to Cortright (2001a) are presence of relatively dense road network, presence of navigable rivers, and improvements in Information and Communication Technology (ICT).

In the early stages of the development in industrial locations in Britain, the difficulty of transport acted strongly on the locations of industries. By the first half of 19th century, industrial locations were favoured by coastal towns because inland transport was slow and highly expensive. By the second half of 19th century railway appeared and competed favourably with canal to become important consideration in industrial locations. The 20th century brought road transport to the fore especially in USA as a result of greater flexibility. Most industries found road transport more successful. This facilitated industrial locations in USA as found by Mollung (2007). In Nigeria, road transport facilities are the major attractors of industries (Ogbu, 2008; and Musa and Ndawayo, 2011). The trend of this situation changed towards the end of 20th and beginning of 21st centuries because many contributions were on the fact that transport generally is no longer given a strong consideration in industrial locations as in Europe (Krueger, 2006) due to improvement in transport technology which has made it more efficient, easily available and more cost effective. Judy (2002) summed it that in Mexico technological advances in telecommunication and transportation (ICT) have combined to shrink the globe such that producers and consumers worldwide now share a common information system, and markets that once were limited to localities. In South Africa, study by Elquist, Meyer, Evans and Wrubel (1999) obtained similar result. However, in Nigeria and other countries of sub-Saharan Africa, transport play significant role in the location of industry (Uduaghan, 2009; and Musa and Ndawayo, 2011). From these, transport facilities are available almost everywhere and easily obtained particularly in more developed economy. In less developed parts of the world as in most African countries like Nigeria

where transport facilities are inadequate and sometimes scarce spatially, availability of transport remains relevant and many industrialists locate their production activities where transport facilities are easily obtained and at low rates too. Thus, in the contemporary industrial location, transport still affects industrial location as in the developing countries through transport cost of goods, relative time cost and savings, certainty, the need to physically meet customers and suppliers, staff and customer travel costs (Mcquaid et al, 2004).

4. Materials and Methods

There were 50 functional industrial plants in the study area. However, only 32 or 64.0% of them were sampled in this study. The other 18 industrial plants for restrictions on the release of information concerning them refused to fill the questionnaire. The population of this study comprised the management of the 32 industrial plants, and 160 of the studied industrial workers/employees who can read and write (minimum of SSCE or NECO certificate holders) so as to effectively attend to the items in the questionnaire and those who were ready and could express their feelings regarding transport resources of the industrial activities in the area. On the average, 5 employees from each of the 32 industrial plants were used because Alex Enterprise has only seven (7) employees and 5 of them were accessible during the period of pilot testing.

Relevant data were collected using questionnaires, guided interviews, documentary materials, and field observations. Both structured and unstructured questionnaires were designed for every respondent in this study. One set of questionnaires was designed, and copies of the questionnaire were given to experts for validation in terms of their clarity, and appropriateness of the language, expressions, and instructions to the respondents. The guided interview was used where the respondents had problems in filling the questionnaires. By this, guided interview facilitated the data obtained from the questionnaire. Thus, there was no separate data from interview, rather relevant information from it were merged with those of the questionnaire. More direct and reliable information were obtained from the field especially on the available transportation facilities for both raw materials and products, and work force/employees of industrial plants in the study area. In this study, descriptive statistics, standardized percentages, and bar graph were used to identify the degree of influence of transport variables in the locations of the industrial plants in the study area.

5. Results and Discussions

Industrial plants rely heavily on the availability of transportation facilities in their location decisions in the study area. This pertains to the developments in modes, means, and freight rates or transport costs. These variables were important in industrial locations in many other places like USA, Japan, China, Ghana, and East Africa. However, the features of transport revealed in this study that influenced the locations of industrial plants were mainly on the availability and the character of transport modes and means, accessibility as well as the costs of all movements involving especially both raw materials and products. This study found that road transport is the major mode in use by the industrial plants (Table 1) because every plant included it as one of the modes or the only mode of transport available for it. In fact, only 4 or 9.4% of the 32 studied industrial plants did not indicate that road is the only mode of transport available for industrial uses in the area. These industries, Nigerian Bottling Co. Plc found at Ngwo-Uno in the east of the 9th Mile, 7 Up Bottling Co. Plc, Sharon Paints & Chem. Co. Nig. Ltd, and Nigerian Breweries Plc (in the north-west at Ameke) as found in Table 1 and Fig. 3 showed that they use water, air and road modes in the movement of raw materials, foreign and local labour, and products to the markets. Except Sharon Paints & Chem. Co. Nig.Ltd the other 3 are the only available MNCs in the area. The result of this study reveals that the area serves as a road transportation hub since it is central and it is from where movement is easier to the other parts of Nigeria from the south east. Therefore, industrial plants located in the area have the advantages of availability, and easily reached transportation facilities such as roads, and motor vehicles of different kinds ranging from taxi cabs to truck/freight transport that move to and from every direction at every time of the day-both day and night periods.

Table 1 shows that transport costs incurred by the industrial plants are dominated by the movement of other materials other than their raw materials from the source regions to the factories either directly or through the agents that supply them. For instance, Aqua Rapha Investment Nig. Ltd located at Ameke in the north-west, Nigerian Bottling Co. Plc at Ngwo-Uno in the east, 7 Up Bottling Co. Plc, Nigeria Breweries Plc, and Graceco Sachet Water established at Ameke in the north and north-west of the study area incur only a small proportion of transport costs on their raw materials. This is due to the fact that water which is their major raw material is obtained from the boreholes at the factories, while other raw materials and the sachet water bags are supplied by agents who bore their costs of movement. In others (Table 1), the transfer costs involved in the movement of various products are built into the prices of the products, and their locations are randomly spread in the study area. The transfer costs of products to the markets are directly incurred by the number of firms found in Fig. 3. The findings of this study show that transport costs on the movement of both raw materials and products form large proportion of the production costs in only 2 of the industrial plants, namely; 7 Up Bottling Co Plc and Alex Enterprise that represent 6.3% of the 32 industrial plants (Fig. 3) where it is respectively 29.3% and 11.3% of the total costs of production. These plants that are respectively located at Ameke and Nsude are involved in the manufacturing activities. In the other 30 industrial plants (93.7%) (Fig. 3), it is less than 7.0% except in Raylcon Petroleum Nig. Ltd at Ifueke in the center in which its proportion is 7.4% of the total costs of production. Therefore, transportation cost of raw material or product is low and contributed in the location of industries at the 9th Mile. Thus, availability of roads and vehicles, and low cost of movement were the transportation facilities that were considered in the location of the industrial plants. In factor orderings (Table 2), access to transportation facilities ranked 1st among the 23 variables that influenced the decisions to locate industries in the study area.

S/N	Plant	Mode of Transport	Transportation Costs (₦)				Percentage (%)	
			Raw Materials	Products	Total Trans. Cost	Other Costs of Production	Transp. Cost	Other Costs of Prod.
1	Nigerian Bottling Co. Plc	Road,water, air,	X⊙	Δ	-	-	-	100.0
2	O.F.D. Oil Expeller	Road	X	Δ	-	-	-	100.0
3	7up Bottling Co. Plc.	Road,water, air	X⊙	284m	248m	968.7m	29.3	70.7
4	Pagosina Block Industry	Road	30,600.0	Δ	36,000	2,148,240	1.4	98.6
5	Rancco Water	Road	⊙	Δ	-	2,498,000	-	100.0
6	Jomo Metals Nig. Ltd	Road	5,600.0	Δ	5,600.0	1,416,000.00	0.4	99.6
7	Aqua Rapha Invt. Nig. Ltd	Road	⊙	25,000.0	25,000.0	6,374,000.0	0.4	99.6
8	Aptro Filling Station	Road	200,000.0	Δ	200,000.0	9,867,280	2.0	98.0
9	Ugo Bakery Industry	Road	37,500.0	32,000.0	69,500.0	1,857,540.0	3.6	96.4
10	Alex Enterprise	Road	8,000.0	Δ	8,000.0	62,650.0	11.3	88.7
11	Synco Oil Ltd	Road	120,000.0	Δ	120,000.0	1,156,000.0	1.0	99.0
12	Avec Nig. Ltd	Road	X	24,000	24,000	3,398,500.0	0.7	99.3
13	Hoval Nig. Ltd	Road	344,000.0	15,000.0	494,000.0	29,616,000.0	1.6	98.4
14	Jenep Nig. Ltd	Road	1,000,000.0	Δ	1,000,000	14,474,420.0	6.5	93.5
15	Barnaco Int. Ltd	Road	5,000,000.0	Δ	500,000.0	7,687,500.0	6.1	93.9
16	Champion Bakery	Road	48,787.5	24,000.0	72,787.5	1,135,100.0	6.0	94.0
17	Narco Oil Nig. Ltd.	Road	250,000.0	Δ	250,000.0	11,383,500.0	2.1	97.9
18	Efficient Petrol Nig. Ltd	Road	320,000	Δ	320,000	21,389,500	1.5	98.5
19	Raphade Conc. Block Ind.	Road	225,680.0	..	225,680.0	8,917,010.0	2.5	97.5
20	Ifesinachi Petroleum Ltd	Road	396,000	Δ	396,000	11,369,200	3.4	96.6
21	Micco Petrol Ltd	Road	396,000	Δ	396,000	11,442,000	3.3	96.7
22	Nigerian Breweries Plc	Road, water, air	X⊙	Δ	-	-	-	100
23	Phinomar Nig. Ltd	Road	8,000.0	Δ	8,000.0	1,596,000.0	0.5	99.5
24	Citadel Suites	Road	4,500.0	Δ	4,500.0	5,450,000.0	0.1	99.9
25	Pagosina Palace Hotel	Road	3,000.0	Δ	3,800.0	69,769.5	5.2	94.8
26	Glory Hotel	Road	5,500.0	Δ	5,500.0	1,932,800.0	0.3	99.7
27	First Bank of Nig Plc	Road	28,000.0	Δ	28,000.0	563,500.0	4.7	95.3
28	Sharon Paints & Chem. Co.	Road, water,air,	X	..	X	6,952,200	-	100
29	Graceco Sachet Water	Road	7,600.0	144,000.0	-	100
30	Chisco Trans Nig Ltd	Road	200,000.0	160,000.0	360,000	19,151,500.0	1.8	98.2
31	E.O.N. Nig. Ltd	Road	180,000.0	158,000.0	338,000.0	16,672,000.0	2.0	98.0
32	Raylcon Petrol Nig. Ltd	Road	900,000.0	Δ	900,000.0	11,270,500.0	7.4	92.6

Table 1: Characteristics of Transport Facilities
Source: Fieldwork, 2019

.. = built into the price of product Δ = borne by customer
x = supplied by agents ⊙ = borehole at the site

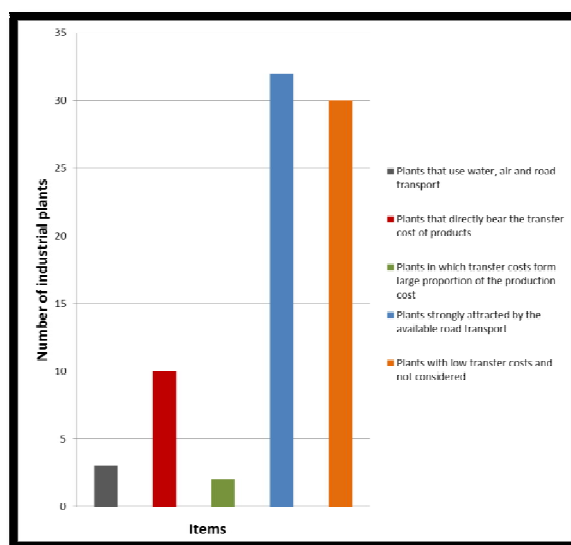


Figure 3: Features and Effects of Transport in the Locations of Industrial Plants at the 9th Mile Area
Source: Fieldwork, 2019

Thirty (30) industrial plants chose it either as 1st (12 industrial plants) or 2nd (18 industrial plants) order factors in their location decisions in the area. It is only in 2 industrial plants namely; Synco Oil Ltd at Nsude and Narco Oil Nig Ltd found at Ifueke that transport is irrelevant (4th order factor in each case) as a factor of industrial location in the study area. These industrial plants provide the services of oil and gas in the area, and do not provide transport services by themselves rather it is obtained on ad-hoc bases at the source of petroleum products they distribute in small units to customers in the area. From studies in other countries, the effect of transport varies.

In many countries independent of the type of economy (agricultural or market economy), it is the availability of transport facilities that are relevant in the location decisions of industrial plants. Such studies were respectively conducted in Latin America, South Eastern Nigeria, China, Japan, and Israel by Bahr (1990), Ogbu (2008), Sloagett and Woods (2003), and Nefesh (2006). In Brazil, Blum (1985) gave examples of such transport facilities as relatively dense road network, presence of navigable rivers, and improvements in information technology. In many other countries transport is no longer a serious factor in industrial locations. This is because modern developments in transport have made it more efficient and more cost effective. The prove of this is found in various studies carried out in Portland (south-east Australia), Mexico, Republic of South Africa, and West Croatia in Europe as respectively explained by Cortright (2001a), Krueger (2006), Judy (2002), and Elmquist et al (1999).

S/N	Factor	Frequency		Total	Percent (%)	Rank
		1 st order	2 nd order			
1	Accessibility to transportation facilities	12	18	30	9.4	1 st
2	Access to market facilities	17	11	28	8.8	2 nd
3	Availability of raw material	16	9	25	7.9	3 rd
4	Availability of energy (national source)	14	1	25	7.9	3 rd
5	Availability of infrastructure like water	13	8	21	6.6	5 th
6	Availability of space for expansion	7	11	18	5.7	6 th
7	Availability of cheap labour	7	10	17	5.3	7 th
8	Availability of financial capital	8	8	16	5.0	8 th
9	Benefits from other firms in the area	5	11	16	5.0	8 th
10	Low tax rate on the available land	5	10	15	4.7	10 th
11	Availability of capital equipment	2	12	14	4.4	11 th
12	Availability of sales promotion agents	4	10	14	4.4	11 th
13	Availability/presence of an industrial estate	4	9	13	4.1	13 th
14	Suitable land surface	4	9	13	4.1	13 th
15	Birth place of the entrepreneur	5	4	9	2.8	15 th
16	Family support of the entrepreneur	2	7	9	2.8	15 th
17	Free land from the entrepreneur	1	8	9	2.8	15 th
18	People's recognition of the entrepreneur	3	5	8	2.5	18 th
19	Government's industrial location policy	1	5	6	1.9	19 th
20	High cost of labour	2	4	6	1.9	19 th
21	Qualified management is available	2	2	4	1.3	21 st
22	Local authority support of the entrepreneur	0	2	2	0.7	22 nd
23	Government's incentives	0	0	0	0.0	23 rd

Table 2: Factor Ordering in the Location of Industry at the 9th Mile Area

Source: Fieldwork, 2019

6. Summary

From the findings of this study, the effect of transport in the location of industry is independent of the type of economy, either an agrarian or market economies. It is the will and caprices of individual entrepreneur that dominates industrial location decisions. The major variable of transport that is relevant in industrial location decisions is transport availability because the variables of character of transport modes and means as well as the costs studied, availability of transport contributed in decisions to locate 30 out of 32 industrial plants in the area. This decision in the influence of transport availability in the location of industry in the area is dominated by 1st order factor involving 12 industrial plants, and 2nd order factor for 18 industrial plants in the study area. Transport mode available for industrial use is dominated by road network with 28 industrial plants that use it as the only transport variable available in the area. However, 4 industrial plants in addition to road transport use water and air transport. Three of the 4 industries are MNCs, while only one, Sharon Paints & Chem. Co. Nig. Ltd is a domestic industry in the area that includes water and air transports in industrial activities in the area.

7. Conclusion

In conclusion, transport contributed in the location of industrial activities at the 9th Mile area especially in its availability, low cost of movement, and easy accessibility. Roads and vehicles of different kinds are the only variables of transport that are obtainable in the area and every industry make effective use of them in the movement of raw materials, products, and workforce. It is only 4 industrial plants that in addition to roads involve air and water transports in the

movement of all kinds. These industrial plants are mainly MNCs that import some of their raw materials. Also, these transport facilities are obtained outside the study area.

The factor of transport contributed either as 1st or 2nd order factors among the factors that affected the location of industry in the area. Among the 32 studied industrial plants, it only in 2 plants, Synco Oil Ltd at Nsude and Narco Oil Nig. Ltd found at Ifueke that transport facilities are irrelevant in their location decisions in the area.

8. Recommendation

From the findings of this study, it is recommended;

- For the continued provision and maintenance of road transport facilities as the only available mode of transport in the area in order to ensure easy and free movement as well as availability.
- Since transport is important in industrial activities in the study area, it is necessary to expand the development of railway transport system into the area. This will contribute to easy movement and reduce demand for road transport. Again, more industries will be attracted into the area especially those industries that use and produce bulky and heavy raw materials and products.

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