ASSESSMENT OF ROAD DEVELOPMENT IN ABAK LOCAL GOVERNMENT AREA, NIGERIA

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Abstract

The poor quality of infrastructure in terms of network density, connectivity and accessibility levels and general conditions of road affect not only the rural economy but also triggers internal migration to urban areas. This study aim at assessing road development in Abak local government taking into consideration road connectivity and accessibility levels and the general conditions of existing roads using data obtained from field and map analysis.The study area was stratified into five (5) clans using stratified random sample. The Gamma and Shimble index techniques were used to analyze the data. Three hundred and ninety eight (398) copies of questionnaire were collected out of the 400 copies distributed. The result indicated that the study area has a total of 152.4km length of roads. 36km are paved federal roads, 84km unpaved state roads, and 1.69 km paved local roads and 30.7km unpaved local roads. The current status of road development coupled with poor conditions of road infrastructure is devasting and counter-productive to economic development of the study area. The roads in the area have been identified as deplorable. Thus, it is recommended that more roads should be opened and paved and properly maintained so as to achieve adequate level of accessibility and connectivity in the study area.

Key words: *Road, Development, Connectivity, Accessibility.*

Introduction

There has been concern over the years for the spatial organization of development which boils down to the gradual and progressive change in the technology of transportation. This change in technology is manifested in the modifications in modes of transportation as well as in the construction of transportation routes. (Egbu and Kalu, 2006). Also significant assessment of the role of transportation in the developed nations has been taking place and has brought an acceptable view that, transportation is simply a mechanism, a catalytic agent in economic development.

Road transportation is an essential part of human activity, and in many ways form the basis of all socio economic and political interactions. Indeed, no two locations will interact effectively without viable means of movement. In many developing countries, inadequate transport facilities are often the norm rather than the exception. Thus, a good transport system is essential to support economic growth and socio-economic development (Duruzoechi, 1999)

Moreover, it is recognized that the development of road network play a major role in generating economic development. Equally, there has been an acceptance that without effective transportation system, agricultural and mineral potentials, which provide critical revenue, cannot be tapped. Thus further expansion of spatial economy is hindered. Hence insufficient or non-existence of transportation system thwarts the progress of positive transformation and integration of an area (Okoko, 2006). Development in itself is a strategy designed to improve the economic and social conditions of a specific group of people who reside within a definite geographical territory (World Bank, 1996).

Such strategy involves extending development to those who seek livelihood in the countryside. Hence, development may be viewed as the extension of benefits to the poorest among those who live in undeveloped environment. Thus road development is an instrument which brings development to the people.

A proper assessment of the road development in Abak local government area is

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essential to reveal whatever may be the imbalance in road development. Road development is very important for political, economic, social and military purposes. It is also capital intensive. As at 1995 Price, it was estimated that the nation's road network had an asset nominal replacement value of 1.250 billion (Oni, 2001). Although there is over 200,000km of all categories of roads, not all settlements are adequately served; Abak local government area is not an exception. It has a total length of 36km paved federal roads, 84km unpaved state roads, 1.69km paved local roads, 30.74km unpaved local roads; making it a total of 152.4km (Umoren, 2008).

In recent times many roads have been constructed in Abak local government area to facilitate agricultural and commercial activities, but a critical assessment of the roads constructed reveals that most of them are in poor condition and not motorable, thus it hinders accessibility and development. The inadequate connectivity has created a physical environment that lacks mobility options and pedestrian friendly features. Road connectivity suggests a system of streets with multiple routes and connections serving the same origins and destinations. Connectivity not only relates to the number of intersections along a segment of streets but how an entire area is connected by the transportation system. A well designed highly-connected road network helps reduce the volume of traffic and traffic delays on major streets (arterials and major collectors) and ultimately improves livability in communities by providing parallel routes and alternative routes choices (Akpoghomeh, 2003). A well planned connected network of collector roadways that allows a transit system to operates more efficiently is much needed in the study area. This is because without access to job, health, education and other amenities, the quality of life suffers and without access to resources and markets, growth stagnates and poverty reduction cannot be sustained. Since accessibility is the bottom-line of road development, the World Bank far back in 1970 spent 13-16% of its total investment expenditure on transport investment with a marked bias towards the construction of rural roads (Akpoghomeh, 2003). Therefore, it is against this background that the provision of roads and transportation facilities would be of fundamental importance to the development of the study area. This study is aim of assessing road development in the study area.

Methodology

Both the primary and secondary sources of data were deployed to provide useful information for this study. The primary sources of data included questionnaire administration to respondents, field survey, personal observation which entails assessment of road quality.

A field survey which involved the use of the map of the road network of the study area to determine the connectivity and accessibility of nodes was carried out. The study area was stratified into five clans which are Abak, Afahaobong, Otoro, Midim and Ediene clans using the stratified random sampling. This is for the purpose of reliability and in order to avoid bias in the research work, the major streets in the study area that are accessible were chosen for the administration of the questionnaire and this was done with the help of the simple random sampling with a skipping range of ten (10). Furthermore the questionnaires were administered to the road users (people living along the roads). The questionnaire was administered to the heads of household selected from the major streets, totaling 400.

The Gamma Index (λ) and the Shimble Index were used to analyze the data collected. The Gamma Index (λ) describes in numerical terms, the connectivity of a network. It is the ratio of the number of arcs in a network to the maximum possible in that network. The maximum number of edges/arcs possible may be computed from the number of vertices or nodes in the system. The denominator in the expression reflects the fact that the addition of a single vortex necessarily increases the number of possible edges/arcs by three e.g three arcs are required to join three vertices but six arcs may be drawn when a fourth vertex is added.

The gamma index is represented by the formula:

$$\lambda = \frac{\text{No of arcs}}{3(\text{No. of nodes}-2)}$$

where e = number of edges

v = number of vertices

It could also be expressed in percentage form as:

$$\lambda = \frac{9}{3(n-2) \times 100}$$

The Shimble Index

In determining the accessibility of the nodes in the network of the area, both the shortest path matrix and the shimble index were employed. First the construction of shortest path matrix from the topological graph derived from the road network map of the study area was carried out (Hagget and Chorley, 1974).

Secondly the accessibility index for each node was computed using the formula:

$$Ai = \sum_{j-i}^{n}$$

where; Ai = the accessibility index for node 1;

Aij = the shortest path distance from I to j and

$\sum_{j-i}^{n}$ = summation of distances to all nodes.

The shimble index was derived from the shortest path matrix and it indicates the number of arcs needed to connect any node with all other nodes in the network by the shortest path. The shimble index is superior to the konig number as a measure of accessibility (Okoko, 2006).

Results and Discussion

The analysis of road development in terms of road connectivity in the study area indicated about 73% level of connectivity which is high, thus the area has a high connectivity level. This result is not an expression for the quality of roads in the study area.

From table 2 to ascertain the most accessible node, the nodes with the least shimble index is ranked first (1st), the next to it being fairly accessible is ranked second (2nd) and lastly the nodes with the highest shimble index being the least accessible is ranked third (3rd). This order of accessibility implies that the smaller the magnitude of the index the more accessible the individual node to the network. From the foregoing analysis, three possible divisions of nodal accessibility have been established as:

Most accessible nodes
Fairly accessible nodes
Lease accessible nodes

The shimble index was derived from the shortest path matrix and it indicates the number of arcs needed to connect any node with all other nodes in the network by shortest path. The ranking of the index is to show the result of the analysis in order to enable the researcher to indicate the sampled areas according to their degree of accessibility. The importance of nodal accessibility is to shape and measure the accessibility and therefore rank each node on a scale of accessibility. Thus in this research accessibility gives a new dimension of structural analysis of transportation and spatial organization of the area concerned. The observed pattern of accessibility index of nodes in the study indicated three categories of the accessibility index of nodes. This result was arrived at by carrying out the analysis employing the shortest path matrix and the ranking techniques. The categories of the accessibility index includes; 36-39 (most accessible), 42-45 (fairly accessible) and 46-55 (least accessible).

The implication of the accessibility index findings in the study area indicate that out of the 19 sampled nodes; only seven are most accessible which are: Ikot Udo, Abak Ikot Ekpene, Obio Ndot, Abak Etim Ekpo Road, Afahaobong, Ikot Obiofuk, Ikot Obong. Six sampled nodes fall within the range of fairly accessible which are Ikot Okoro road, Ikot Imo, Utu Abak, Afaha Essang, Eriam, Ibong, finally the remaining six are termed least accessible, these are: Midim, Abak, Ediene, Nto Obo, Abak Etinan Road and Ibagwa.

This is an indication of the fact that, the neglect of road development in the study area over the years has affected the level of accessibility in the area. However the conditions of road infrastructure is poor as most of the paved road networks has deteriorated requiring rehabilitation and reconstruction while some resurfacing to prevent further decline in quality. The conditions of unpaved roads were even worse. Unpaved roads have many disadvantages as not all of them can be used in all seasons. Besides maintenance cost are high and they have the propensity to reduce the economic life of automobiles plying them. Unpaved roads also contribute to high cost of transport fares as they are generally deficient for effective movement and thus, require rehabilitation to improve and aid mobility.

Conclusion and Recommendations

Transport network aids developments and facilitates traffic flow. In order that economic activities can take place, people, goods and materials must move from place to place. Roads are essential for economic development of an area, for speedy transportation of commodities and quick movement a good road network is essential. This research shows that a great percentage of the roads which would have attracted more economic development to the area are still not paved, which are earth roads and seasonally graded roads. Hence it reveals that the roads are in deplorable state.

Consequently considering the importance of road infrastructure in the socio-economic development of the people, major road rehabilitation, maintenance and upgrading efforts are required in the study area. This may require significant increase in road funding commitment by the government at all levels particularly at the local government.

The existing maintenance strategies and practices may also be upgraded to aid effective and efficient movement and accessibility. An improvement in road quality reduces travel time and reduces vehicle running and maintenance costs which in turn lowers the actual cost of marketing produce and reduces the costs of delivering inputs. Hence, there is an urgent need to improve the existing network connectivity and density levels of roadin the study area.

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Table 1 Accessibility Matrix Table

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**Shimble index**
1	0	1	2	1	1	2	1	2	1	2	3	2	2	3	2	3	2	2	3	37
2	1	0	3	1	1	2	2	2	2	1	2	1	2	3	2	3	3	3	2	36
3	2	3	0	2	3	1	1	2	1	4	5	4	3	4	2	3	2	2	4	48
4	1	1	2	0	2	4	2	3	2	1	2	2	3	3	1	4	3	3	3	42
5	1	1	3	2	0	3	2	1	2	2	3	1	1	2	3	2	3	2	2	36
6	2	2	1	1	3	0	1	3	2	2	4	4	4	4	1	4	3	3	5	49
7	1	2	1	2	2	1	0	3	2	3	4	3	3	4	2	4	3	3	4	47
8	2	2	2	3	1	3	3	0	1	3	4	2	2	3	4	2	2	1	3	43
9	1	2	1	2	2	2	2	1	0	4	4	3	2	3	3	2	1	1	3	39
10	2	1	4	1	2	2	3	3	4	0	1	1	2	2	2	3	4	3	2	42
11	3	2	5	2	3	3	4	4	4	1	0	2	2	1	3	2	3	2	1	48
12	2	1	4	2	1	3	3	2	3	1	2	0	1	2	3	2	3	2	1	37
13	2	2	3	3	1	4	3	2	2	2	2	1	0	1	4	1	2	1	1	37
14	3	3	4	3	2	4	4	3	3	2	1	2	1	0	4	1	2	2	1	45
15	2	2	2	1	3	1	2	4	3	2	3	3	4	4	0	5	4	4	4	55
16	3	3	3	4	2	4	4	2	2	3	2	2	1	1	5	0	1	1	2	45
17	2	3	2	3	3	3	3	2	1	4	3	3	2	2	4	1	0	1	3	45
18	2	3	2	3	2	3	3	1	1	3	3	2	1	2	4	1	1	0	2	39
19	3	2	4	3	2	5	4	3	3	2	1	1	1	1	4	2	3	2	0	46

Table 2: Level of Accessibility of Nodes in the Study Area

Rank	**Nodes**	**Shimble Index**	**Level of accessibility**
1	Ikot Udo	36	Most Accessible
2	Abak Ikot Ekpene	36	"
3	Obio Ndot	37	"
4	Abak Etim Ekpo Road	37	"
5	Afahaobong	37	"
6	Ikot Obiofuk	39	"
7	Ikot Obong	39	"
8	Ikot Okoro Road	42	Fairly Accessible
9	Ikot Imo	42	"
10	Utu Abak	43	"
11	Afaha Essang	45	"
12	Eriam	45	"
13	Ibong	45	"
14	Midim	46	Least Accessible
15	Abak	47	"
16	Ediene	48	"
17	Nto Obo	48	"
18	Abak Etinan Road	49	"
19	Ibagwa	55	"

Table 3 Level of Road Quality in Abak L.G.A.

Indices		**RSC**		**RSV**		**MP**		**BW**		**FS**		**PC**			**RSA**		
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	
Clans	**Sampled roads/ Weights**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**3**	**1**	**2**	**Total**
Abak	Abak-Ikot Ekpene		X		X		X				X			X	X		
	Abak-Etim Ekpo		X		X		X	X			X			X	X		
	Abak-Etinan		X	X			X				X		X			X	
	Abak-Utu Abak		X	X			X			X			X			X	
	Abak-Ikot Okoro		X	X			X				X		X			X	57
Otoro	Abak-Ibong		X	X		X				X		X	X			X	
	Abak-Nko Otoro		X	X		X				X		X	X			X	20
Afaha Obong	Abak-Eriam		X	X		X				X		X	X			X	
	Abak-Afaha Essang		X	X		X				X		X	X			X	10
Ediene	Abak – Ediene		X	X		X				X		X	X			X	10
Midim	Abak-Midim		X	X		X				X		X	X			X	10

Key

RSC	=	Road Surface Condition	A	=	Untarred
RVC	=	Road Vehicle Capacity	B	=	Tarred
MP	=	Motorability Period	C	=	One lane
BW	=	Bridge Width	D	=	Two lanes
FS	=	Flood Status	E	=	Seasonal
PC	=	Physical Condition	F	=	All year round
RSA	=	Road Sign Availability	G	=	One lane
H	=	Two lanes	L	=	Has pot holes
I	=	Liable to flooding	M	=	In Good condition
J	=	Not liable to flooding	N	=	Available
K	=	Tarred surface removed	O	=	Not available

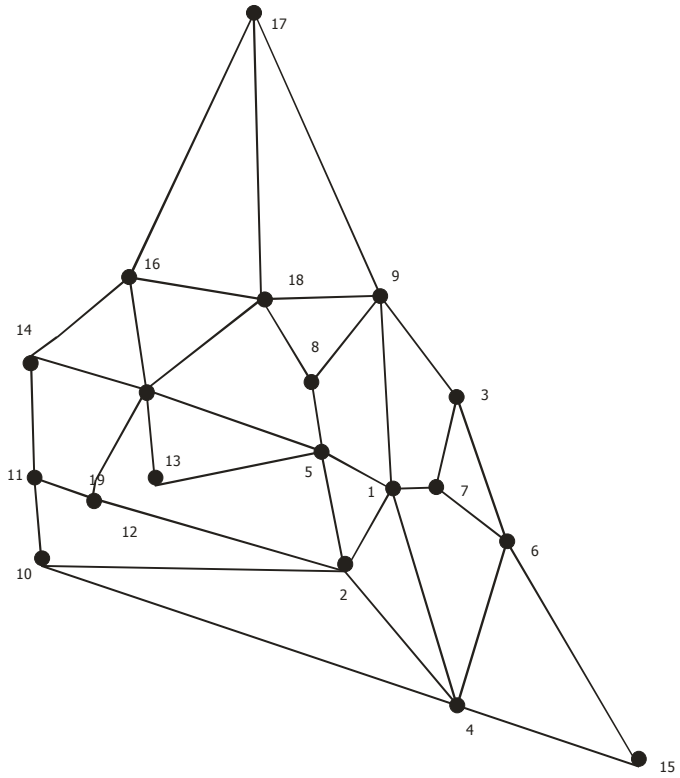

Fig. 1: Connectivity of Individual Nodes on the Road Network

Key

1. Obio Ndot
2. Ikot Udo
3. Ediene
4. Ikot Okoro Rd
5. Abak – Ikot Ekpene Rd
6. Abak – Etinan Rd
7. Abak
8. Utu – Abak
9. Ikot Obiofuk
10. Ikot Imo
11. Nto Obo
12. Abak – Etim Ekpo Rd
13. Afahaobong
14. Afaha Essang
15. Ibagwa
16. Eriam
17. Ibong
18. Ikot Obong
19. Midim