

DEVELOPMENT OF ROAD INFRASTRUCTURE AS A TOOL OF TRANSFORMING IBIONO IBOM LOCAL GOVERNMENT AREA

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(Received 25, March 2009; Revision Accepted 18, September 2009)

ABSTRACT

The need for road infrastructure arises from the fact that there is a greater need for accessibility and smooth movement of abundant agricultural products especially from the rural areas to the markets in urban centres. The improvement of transportation network in the rural area in this regard becomes imperative. This study was conducted to reveal the importance of development of road infrastructure as a panacea for socio-economic advancement in the rural areas. The study area was stratified into three zones i.e Ibiono Central, Ibiono Northern and Ibiono Southern. The Gamma index was used to determine the level of connectivity of each zone in relation to the distribution of socio-economic activity or services in the area. In analysis of the road network connectivity the gamma Index was used. The results indicate a low connectivity, index of 0.26 for zone A, 0.40 for zone B and 0.31 for zone C, in each of the three zones. This implies that there is poor accessibility, poor connectivity, which result in low level of socio-economic activity in the area. The analysis of the socio-economic development variables was carried out based on quality point assigned to the variables. Finally the correlation analysis was employed to determine the relationship between road infrastructure and socio-economic development. The correlation coefficient of 0.87 indicates a strong, positive relationship between road infrastructure and socio-economic activity. From the findings it is recommended that a major road that links all the zones should be constructed while, other roads should be expanded and tarred; new roads should be developed to improve accessibility. Greater community participation in road development and rehabilitation should be encouraged and a comprehensive transportation plan should be put in place at the local government level. It is hoped that this detailed research work will serve as a basis for the improvement and development of road infrastructure in rural areas which is a catalyst to rural transformation.

KEY WORDS: Road, Infrastructure, Paved, Unpaved, Socio-Economic Development

INTRODUCTION

The need for rural roads and its resultant effect on the rural communities' economy cannot be overstressed. This is because an extensive, adequate and efficient rural feeder road network serves as one of the channels for the collection and movement of goods and services, movement of people and dissemination of information. It helps in the exchange of rural productivity as well as strengthening the socio-economic, cultural

and political fabrics and processes of the rural communities. In other words rural roads provision forms an intrinsic part of rural development strategies, serving as a mechanism and catalyst for rural transformation through the reinforcement of rural development efforts (UNCHS, 1985, UNEP, 1986). Indeed, the improvement of transportation, including rural roads, is said to form the most valuable aspect of rural development (Hodder, 1971; William, 1978). There are also negative consequences of rural

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roads provision which may, among others, manifest in the form of out migration of able bodied people to more economically buoyant areas, disruption of ecological balance of some ecosystems through road construction and overexploitation of some primary resources such as forest products and mineral resources. However, the advantages of rural roads provision more often than not outweigh its non-provision. Against this backdrop, one readily noticeable shortcoming of the over 90,000 rural communities in Nigeria is either the inadequate provision of physical infrastructure such as roads, electricity, water, marketing facilities and so on, or their outright neglect (4th National Development Plan p. 78). This situation is made more pathetic and worrisome because about 70 percent of the Nigerian populace, who are mainly farmers, reside in these rural communities (Fadayomi, 1988). Thus, the inadequacy of motorable roads compounds the problem of transferring agricultural produce from farm gates to the market. This unpleasant situation, no doubt adversely affects rural economy and productivity because it can slow down or stall rural development and transformation.

RESEARCH PROBLEM

In developing countries, including Nigeria, the development of road infrastructure in the rural environment is not taken seriously. This is because it is either taken for granted or it is difficult to quantify its direct and indirect effects. Over the years the Akwa Ibom State government has placed great emphasis on the construction, reconstruction and rehabilitation of Federal and state roads and some intra-urban and inter-urban roads to the utter neglect of the rural roads. Rural road network must be seen as an integral part of the entire road transport framework. In other words, rural roads deserve no less attention than any other class of road, since they constitute a major factor in rural growth and development. In the rural environment the physical condition of most of the existing earth or laterite roads, especially during the rainy season is quite bewildering. During the wet season the roads become almost impassable. The poor state of the roads, apart from having undesirable effects on passengers, goods and traffic flow, also results in substantial loss of perishable agricultural produce, high cost of moving agricultural produce and other products and exorbitant cost of vehicle maintenance. All these culminate in high cost of transport, marketing

inefficiency and high cost of foodstuffs and other products derived from rural areas (Ogunsanya, 1987). This study seeks to describe the nature of road infrastructure, the connectivity and the impact of the availability of such infrastructure on the distribution of socio-economic activities in the study area.

THE STUDY AREA

Akwa Ibom State is one of the thirty-six states in Nigeria and Ibiono Ibom is one of its thirty-one Local Government Areas (LGA). Akwa Ibom State is located between longitudes 07°31' and 08°30' East of the Greenwich Meridian and latitudes 04°31' and 08°31' North of the equator. It is located in the South-South geopolitical zone of Nigeria and is bounded in the North by Abia and Cross River State, in the East by Cross River State, in the South by the Atlantic Ocean and in the West by Rivers State. Ibiono Ibom Local Government lies between longitudes 07°45' and 08°00' East of the Greenwich Meridian and latitudes 04°15' and 08°22' North of the equator. It is bounded by Cross River State in the North, Itu Local Government Area in the East, Ikono in the West and Uyo in the South. Ibiono Ibom Local Government Area is chosen for this study because the local government area is entirely rural. It has a total of 208 villages and it ranks among the largest local government areas in the county. The area has a total of 273km of roads, out of which 11km only constitute paved road, while 185km constitute unpaved state road and 77km local roads. There is the absence of a good road infrastructure network except for the Ikot Ekpene-Itu-Calabar Highway and the narrow Uyo – Ikot Ekpene road.

METHODOLOGY

The methodology provides a procedural outline used for the conduct of this research work. This study is analytical in nature, and statistical techniques were used to analyse both qualitative and quantitative data collected. The fieldwork constituted the primary sources of data collection in this research. This involved oral interviews, distribution of questionnaire, field enumeration of road infrastructure, social amenities and observation in the field. The development indices which include: markets, health centres, schools etc and their quality point were sampled and measured in the designated zones in the study area. For the purpose of questionnaire administration, a sample size of approximately 400 persons derived from the

2006 total population of 188,605 persons (NPC, 2006) was adopted. The sample size of 400 persons was obtained through the application of Taro Yamane's sample size selection formula for a finite population (Uzoagulu, 1998).

$$n = \frac{N}{1 + N(e)^2} \dots\dots\dots 1$$

Where n = sample size
 N = finite population of the study area
 e = level of significance (0.05)
 l = constant

The sampling technique employed for the study was the stratified random method which was used in dividing the study area into zones, A, B, and C. Zone, A represented Ibiono central comprising Oko-Ita the local Government headquarters and the adjoining villages. Zone B represented Ibiono Northern comprising Ido and other adjoining villages while Zone C represent Ibiono Southern which comprises of Ikot Adaidem and other adjoining villages. The three zones were further divided into sub-units for easy sampling.

The development indices and quality points were sample and measured in the designated zones of the area by ranking of the socio-economic development indices on the basis of their importance in the study area. To determine the relationship between transport infrastructure and level of socio-economic development, the Gamma index was applied to determine network connectivity, using the formula: $\frac{e}{3}(V-2) \dots\dots\dots 2$

Where e = number of edges (line)
 V = number of vertices (node)
 2 = constant

The Gamma index was used to determine the extent of connectivity of road infrastructure in the three zones of the study area. This was later correlated with socio-economic variables using Pearson's Product Movement correlation statistics to establish the level of relationship.

LITERATURE REVIEW

The pattern and the degree of development of transport network in any area is a factor of crucial significance influencing political, economic and social progress and these must be considered in every stage of national and regional development planning for as Mumby

(1971) said "there is no escape from transport" since whether it be in western city or oriental village, the daily rhythm of life is closely geared to it. The precise role of transport in simulating greater economic and social development has been a target of research for sometime. There is a general agreement that transport is vital to development, although there is no consensus with respect to its impact under differing economic and social environment. Consequently, many development programmes now underscore the importance of co-ordinated change where transport is improved along with other elements of infrastructure. In addition emphasis is placed on the more efficient utilization of existing transport system. Despite these caveats, the transport system plays an important role in shaping the future of many nations. Regional transportation studies are important because transport linkages between and within different regions, particularly by road, are important means of connecting settlements, as well as, providing access for people, services and facilities.

The knowledge on adequacy or otherwise of transport system is also important in enhancing or inhibiting effective realization of various regional development policies, especially those requiring decentralization of activities, involving movement of people and goods. Wide spread growth of the region may be promoted or otherwise, and to some extent, regional inequalities in development can be addressed when there is adequate linkages among the regions, as good transport system may be impetus to even development and growth. Inadequacy or absence of transport facilities may undermine the productive process. Ahmed et al (1976), cited in Button (1993) aptly remarked that inadequacy of transport facilities is one of the bottlenecks to socio-economic development and national integration in many developing countries. This has further made the introduction of other basic social infrastructure such as education and medical services very difficult. In recent times the heightened interest in transportation studies have been partly due to the tremendous impact of transportation infrastructure on regional and rural economy (Hoyle, 1980). Transport infrastructure has been viewed as perhaps the prime mover in the analysis of spatial structure and functions. It has been argued for instance that where good quality roads exist, it allows government and private companies the access into the remote areas for the establishment of social amenities.

Consequently, areas with good state of transport infrastructure tend to benefit more from the provision of social amenities than their counterparts with bad road conditions (Obot and Okpiliya, 2002). Taking these facts into consideration, transport infrastructure should be accorded priority in the catalogue of development projects by the administrative machinery of any country meant to transform the living conditions of the rural people. Transportation development is necessary due to spatial inequalities, which in turn necessitates the need for spatial interaction. Accessibility is a measure of the spatial relationship and it is therefore an essential part of the development process. Spatial connection is frequently related and reflected in the character of transportation facilities as well as in the flow of goods and services. (Umoren, Atser, and Ekong, 2004). In a modern society, a functional and efficient transport system has become imperative for socio-economic growth and development. The absence or inadequacy of these infrastructure will result to a retarded development.

PRESENTATION AND FINDINGS

It is pertinent to note that the government of Nigeria has so far paid insufficient attention to the provision of adequate transport infrastructure in the rural areas as a means of stimulating rural development, not to talk of Akwa Ibom State government which is more concerned with urban-road development.

Ibiono Ibom local government is not economically viable because of its present financial situation which it relies entirely on federal allocation to carry out its responsibilities and to take charge of the responsibility of the construction and maintenance of existing roads in the area. In addition the council lacks the personnel and equipment to carry out such capital project. The poor state of roads in the study area is a constraint facing development. Aside from the two highways that traverse the local government area, other roads are not motorable. The present situation of roads in the study area has resulted in the usage of commercial motorcycles for the movement of goods and services.

ANALYSIS OF SOCIO-ECONOMIC DEVELOPMENT

In analysing the socio-economic development in the study area, ten most popular socio-economic services/activities were identified in each of the three zones with their quality points. The quality points were derived from the ranking of the socio-economic services/activities based on development indices and according to its importance in the study area. The development indices were summed up to arrived at the total development indices for each of the three zones in the study area.

Table 1: Distribution of socio-economic activity along the road infrastructure network among the three zones by quality points.

Socio-economic activities	Quality point	Zones A		Zones B		Zones C	
		No of activity	Socio-economic output	No of activity	Socio-economic output	No of activity	Socio-economic output
Market	10	5	50	2	20	3	30
Health centre/clinic	9	9	81	3	27	5	45
Hotels/guests house/restaurant	8	10	81	5	40	7	56
Primary school	7	20	140	12	84	15	105
Pre-primary/ nursery	6	8	48	4	24	6	36
Mechanic workshops	5	9	45	2	10	5	25
Fuel station	4	5	20	1	4	6	24
Milling/block industry	3	2	6	1	3	4	12
Provision/cosmetic	2	30	60	12	24	22	44
Hair dressing salon/Tailoring services	1	34	34	13	13	22	22
Total		132	564	55	249	95	399

Source: Field Survey (2005)

From Table 1 the distribution of socio-economic services/ activities could be said to be uneven. Zone A recorded the highest socio-economic services/activities of 132 followed by Zone C with 95 and lastly Zone B with 55.

maximum number of edges/arcs possible may be computed from the number of vertices or nodes in the system. This index is defined by the following equation.

$$y = \frac{e}{3(v-2)}$$

ANALYSIS OF ROAD INFRASTRUCTURE NETWORK IN THE STUDY AREA

The Gamma index was employed in the analysis. It describes in numerical terms, the connectivity of a network to the maximum, which may exist between a specified number of vertices to the maximum possible in that network. The

The degree of connectivity is considered to be important in the analysis of transport network and, as such, its inter-relationship between transport network and rural transformation requires that such connectivity be handled in a precise manner.

Table 2: Gamma index for each of the three zones

Zones	Edges (e)	Vertices (v)	Gamma (σ) index
A	28	38	0.26
B	22	20	0.40
C	23	26	0.31

The computation in table 2 indicates that the different zones in the study area do not have much difference in connectivity of road network among the zones. Zone A has a gamma index of 0.26 which indicates the highest connected zone, followed by zone C with 0.31, and Zone B with 0.40.

Table 3: Computation of the relationship between road network and socio-economic activity

Zones	Accessibility gamma Index 9 (x)	Socio-economic activity (y)	xy	x ²	y ²	(x-x)	(y-y)	(x-x)(y-y)	(x-x) ²	(y-y) ²
A	0.26	564	146.64	0.0676	318096	-0.06	160	-9.6	0.0036	25600
B	0.40	249	99.6	0.16	62001	0.08	-155	-154.92	0.0064	24025
C	0.31	399	123.69	0.0961	159201	-0.01	-5	-5.01	0.0001	25
x =	0.32	404	369.93	0.3237	539298			169.53	0.0101	49650

Using the formula

$$r = \frac{N \sum XY - \sum X \cdot \sum Y}{\sqrt{N \sum X^2 - (\sum X)^2} \sqrt{N \sum Y^2 - (\sum Y)^2}}$$

$$r = \frac{3 \times 369.93 - 0.32 \times 404}{\sqrt{(3 \times 0.3237 - (0.32)^2) \times (3 \times 5539298 - (404)^2)}}$$

$$r = \frac{1109.79 - 129.28}{\sqrt{0.9711 - 0.102} \sqrt{1617894 - 163216}}$$

$$r = \frac{980.51}{\sqrt{0.8691} \sqrt{1454678}}$$

$$r = \frac{980.51}{0.93 \times 1206.10}$$

$$r = 0.874151934$$

$$r = 0.87$$

$$r^2 = 0.76$$

INTERPRETATION

The correlation coefficient of 0.87 means that there is a strong, positive relationship between road infrastructure development and socio-economic activity in Ibiono Igom Local Government area. As the road infrastructural development increases, development in socio-economic activity in the area also increases. When the value of 0.87 of the correlation coefficient was squared the coefficient of

$$T = \frac{\sqrt{\frac{n-2}{1-r^2}}}{1-r^2} = \frac{0.87\sqrt{3-2}}{\sqrt{1-0.76}}$$

$$T = 0.87 \sqrt{\frac{1}{1-0.76}}$$

$$T = \frac{0.87}{0.24}$$

$$T = 3.63$$

$$\begin{aligned} \text{The degree of freedom} &= (n-2) \\ &= (6-2) = 4 \\ &= df = 4 \end{aligned}$$

The student t-test table is referred to using the degree of freedom $6-2 = 4$ under 95% or 0.05 giving 5% to error (see table below)

Table 4: Summary of statistical calculation

Calculated value	Critical value	Degree of freedom	Level of confidence	Remarks
3.63	2.78	4	0.05	Rejected

The result indicates that at 4 degrees of freedom (df), with is 4 at 0.05, level of confidence the t calculated is 3.63 while t-critical is 2.78. Since t-calculated (3.63) is greater than t-tabulated (2.78), we therefore reject the null hypothesis (Ho). We can confidently and statistically conclude that there is a significant relationship between road infrastructural development and socio-economic activity in the study area.

RECOMMENDATIONS/CONCLUSION

The study indicates that there is a significant relationship between the development of road infrastructure and socio-economic activity. The problems highlighted in the area include poor road conditions that have hindered a lot of development process. There is absence of access road in most parts of the study area, which leads to poor road-network connectivity

determination obtained shows that over 75.69% of the variation in socio-economic activity is influenced by road infrastructure development. Thus, transport infrastructure is an overwhelming factor for transforming the rural environment. The correlation coefficient of 0.87 was further tested to determine whether the relationship is significant. The test is based on the t-test distribution using the formula.

that hinders transportation and communication flow from one point to another. This situation has resulted in increased distances from raw materials source, market, and the diffusion of innovation in the area. Another major problem identified is high transport costs. This is due to the poor state of the roads, which has given rise to motorcyclists as a major means of transport in the area. Vehicles do not want to ply the roads because of the bad condition of the roads, since this can easily result in the wear and tear of the vehicles, giving rise to high maintenance cost. The basic requirement for enhancing modal accessibility is to improve on the already existing routes as well as providing new routes where there is none. A good example of this is for the state government to construct the Itak-Oko Ita-Use Ikot Amama road. This particular road will open up and transform the local government area because it cuts across all the three zones in the

study area. The local government in collaboration with the state ministry of works and transport should identify and improve the important secondary routes so as to increase mobility and the pace of socio-economic activity.

As a complementary effort, the rural communities should be encouraged to engage in community participation to develop the roads so that the non-motorable roads will be made motorable. New roads should be opened by the communities to alleviate the suffering of the rural masses. A transportation policy should be put in place at the local government level so as to have a balanced transport network with a balanced distribution function. Such policy when put in place should sustain the already existing relationship between transportation network and socio-economic activity development, and at the same time create a favourable transportation for further growth. Remote communities, for instance agro-settlement in Use Ikot Amana and its environs, should be connected by good roads so as to improve access and mobility to these areas. This will bring about improvement in local resources utilization. The development of road infrastructure happens to be a crucial factor which influences the development of a region. A good transportation network has to be considered in every stage of development planning especially now that modern development planning is geared towards the transformation of rural areas. This is an affirmation to Mumby (1971) observation that there is no escape from transport since the daily rhyme of life is clearly geared to movement.

REFERENCES

- Button, K. J., 1993. *Transport Economics* (2nd ed.) Aldershot: Edward Arnold.
- Federal Republic of Nigeria, Fourth National Dev. Plan Project Summary (2): pp 609-613.
- Fadayomi, T. O., 1988. Rural development and irrigation in Nigeria: The impact of the eastern zone of Bauchi state agricultural development project. Ibadan NISER.
- Hodder, B. W., 1971. *Economic development reference to roads and road transport*, Dar-es-salam: University College.
- Hoyle, T. A., 1980. *Interpreting the city: An urban geography*, New York: John Wiley and Sons.
- Mumby, D., 1971. *Transport harmondsworth*: Penguin books.
- National Population Commission, 2006. *National Population Census of Federal Republic of Nigeria: 2006 census final results*, Akwa Ibom State, Abuja: national Population Commission.
- Obot, J. U and Okpiliya, F. I., 2002. The intricate web of relationship: The case of transport infrastructure and rural development in Jos Environs. *Global Journal of Social Sciences* 1 (2): pp 87-92.
- Ogunsanya, A. A., 1987. Food production problems in rural Nigeria. *Habitat International*, II (2): pp 71-75.
- United Nations centre for human Settlement, 1985. *Habitat: Guidelines for planning of rural settlements and infrastructure, road networks* Nariobi.
- United Nations Environmental Programme, 1986. *Environmental guidelines for rural roads*. United Nations Environmental Programme Guidelines 13: 120-130.
- Umoren, V., Atser, J. and Ekong, F., 2004. "Accessibility and socio-economic development in Etinan, Nigeria." *ESUT Journal of Environmental Management*. 2. (1): pp 1-8.
- Uzoagulu, A. E., 1998. *Practical guide to writing researches project reports in tertiary institutions*, Enugu: John Jacob Classic Publishers.
- William, S. K. T., 1978. *Rural development in Nigeria*; Ile Ife; University of Ife Press.