The Impact Of Road Connectivity On Land Use Development In Calabar Metropolis

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ABSTRACT: *The study principally focused on assessment of the impact of roads connectivity on land use development in Calabar metropolis. The study adopted the survey research design because it involved the distribution of questionnaires to collect data from the field. Four hundred (400) copies of questionnaires were administered and 350 were retrieved for analysis. Both primary and secondary sources of data were employed during the study. The primary and secondary sources include; questionnaire administration, oral interview, observation, published and unpublished documents. Data were analyzed using descriptive and inferential statistic methods. One hypothesis was formulated and tested using multiple linear regression analysis. The result (0.824 at p>0.05) revealed that there was no significant relationship between road connectivity and land use development in Calabar metropolis. This invariably means that other unknown factors must have been responsible.Therefore; the study concluded that Government should embark on rehabilitation and construction of new roads to connect with the existing roads. Also more funds should be allocated to the sub-sector for more road construction and possibly widen all the roads that may need additional capacity to meet future demand. This will strengthen Calabar road connectivity requirements.*

I.   INTRODUCTION

The concept of road connectivity has become an issue of interest that has received attention in recent times. Scholars have presented two schools of thought about the impact of road connectivity, particularly in the urban environment. The first holds that road connectivity plays and inevitable role in the development of regions, areas and districts. For instance, Mosher (1968) stated that road is the first infrastructure to be built to support development in areas of all kinds. The second school of thought holds that road connectivity plays a negative role in the human environment as it has continued to stimulate land use conversions (Owei, 2013), heighten the level of urbanization and commercial activities, increases rent (Amao and Ilesanmi, 2013; Nwosu, 2015) as well as facilitated delinquent activities by hoodlums that take advantage of the infrastructure while manipulating their vehicles after deadly operations.

However, most Scholars are unanimous about the fact that road connectivity whether in rural or urban areas has the potentials of encouraging and triggering land use developments in all facets (Ajiboye and Afolayan, 2009; Aderamo and Magaji, 2010; Adedeji, 2011; Okoko, 2011; Yaro, Okon and Bisong, 2014 and Hartoyo, 2014).Olujimi and Bello (2010) asserted that road connectivity has significantly impacted land use development. They vehemently opined that this has necessitated the development of agricultural, commercial, industrial and residential land uses in Nigeria. Eja and Ukwayi (2011) also pointed out that despite the growth in population of the world; land use development tends to be more visible in districts with good road connectivity.

Eja, Inah, Yaro and Inyang, (2011) further established that the best way to close development need gap is to ensure that road infrastructure are put in place and properly connected with one another in the urban centres. They observed that housing development for residential uses were more agglomerated in areas that were more accessible than inaccessible areas. Similar observations were made by Mugabe (1998); Amao (2015); Kolawole, Wusamot, and Arowosegbe (2015).Nwosu (2015), observed that road infrastructure development and its level of connectivity was an important pointer to the development of residential land uses in Akure. He identified that districts that were linked to other parts of the town were receiving more attention for residential developments. Kolawole et al., (2015) identified that districts situated around accessible areas in Abeokuta were highly used for residential development. They argued that where roads and other urban infrastructure agglomerate, there was bound to be increase in the development of residential land use.

Eni (2006) identified that the connection of the suburbs through the provision of road infrastructure can trigger land use development. Eni and Abua, (2014) further established that since 2001 when road connection and road rehabilitation became useful strategies for the resurrection of decaying districts in several Nigeria cities, land use development have grown correspondingly. They revealed that when districts that were neglected were connected through road provision, accessibility will become easier. This will attract developers to the area. Where road infrastructure is adequately provided and efficiently connected, productive and profitable residential and other land uses are usually attracted towards such an area (Harvey, 1993). Adebayo (2006) revealed that road connectivity served as major determinant of land use development.Land value will tend to be at its peak in those areas with easy accessibility. In contrast, the districts of less accessibility arevalued less and less developments are observed. In general, Aderamo (2003) opined that road connectivity constitutes an important element in urban development as roads provide accessibility to the different land uses in urban areas. Thus, the proper functioning of an urban area depends on efficient road network connectivity.

Obviously, road connectivity and rehabilitation of roads will reduce transportation costs (Rietveld and Nijkamp, 1992; Badatya and Gopakumaran, 2004), energy spent on travelling (Hartoyo, 2013), facilitate housing development, ensures a functional economic system in the urban areas through linking places of production with districts of consumption (Yaro, Okon and Bisong, 2014). Researchers have demonstrated high correlation between road connectivity and land use development in urban areas (Oni, 2002; Okoko, 2011; Abur, Ademoyewa and Damkor, 2015). Road infrastructure has also been described as an independent variable through which other activities in the human environment can be stimulated. For instance, the connection of roads to other places within an area can lead to the development of commercial shops, recreational sites, housing units (Omole, 2010), agricultural activities (Adedeji, 2014) and other land uses. Industries and markets also function maximally in the presence of good road infrastructure. Road connectivity by its nature seeks to bring lasting solution to the problem of inaccessibility in areas through providing avenues by which settlements are linked together (Queros and Gautam, 1992).

In Calabar, evidence abounds in the development of land uses in areas where roads are connected to other areas. For instance, since the development of the Goodluck Jonathan bypass, commercial, industrial and residential developments have increased drastically and the number of housing stock have increased correspondingly. Also, since the opening up of the road leading to Tinapa, developments have sprangup along this axis (Eja, Ewa and Ndomah, 2011).Schools and even recently, a private University is proposed along the Tinapa road. From all indications, these land uses are developed and about to be developed because of the opening up of new road.Also, it has been observed that deteriorated, dilapidated and collapsed areas have been resuscitated as new roads are opened and linked to other parts of the town. Despite the above development, empirical studies have not been carried out to examine the physical impact of this road connectivity on land use development with particular reference to the study area. This study therefore seeks to investigate the impact of road connectivity on land use development in Calabar.

II. THE STUDY AREA

Calabar the administrative headquarters of Cross River State is located within the South-South geo-political zone of Nigeria as shown in Figure 1. It lies between Latitude $4°45^{1}30^{11}$ and $5°08^{1}30^{11}$ North of the Equator, and Longitude $8°11^{1}21^{11}$ and $8°30^{1}00^{11}$ East of the Greenwich Meridian (Antigha, Akor, Ayotamuno, Ologbodien and Ogarekpe, 2014). The city is flanked on its eastern and western borders by two large perennial rivers viz: the Great Kwa River and the Calabar River respectively. These are aside from the numerous ephemeral channels which receive water after storm events to drain the area of study. The city lies in a peninsular between the two rivers, 56km up the Calabar River away from the sea (Antigha, et al, 2014). The city is bounded in the north and north-west by Odukpani Local Government Area, in the south by the Atlantic Ocean, in the east by the Great Kwa River, north-east by Akpabuyo Local Government Area and in the west by the Calabar River. The administrative boundary of Calabar covers a total land mass of about 427.05 square kilometres, which terminates in Qua River at the eastern flank, Calabar River at the western and southern flanks, and at the evergreen forest belt of IkotOmin/IkotEkpo dominated by rubber plantation in the northern flank (Ikoh, 2013). It is linked to other parts of the state and country by road, sea and air.

The ancient city of Calabar has a long history and a fascinating heritage. Nearly after a century of contact with European sailors, Calabar gained recognition as an International Sea Port in the 16th century. From 17th to 19th century, Calabar became a major slave trade port in West Africa. Calabar accounted for approximately 30 percent of Africans carted away to the new world (America) as slaves from Africa. This represented the largest exit of slaves from a single point in Africa (Ojikpong, Agbor and Emri, 2016). The study area is inhabited by the Efiks, the Quas and Efuts. The people speak Efik and English fluently.
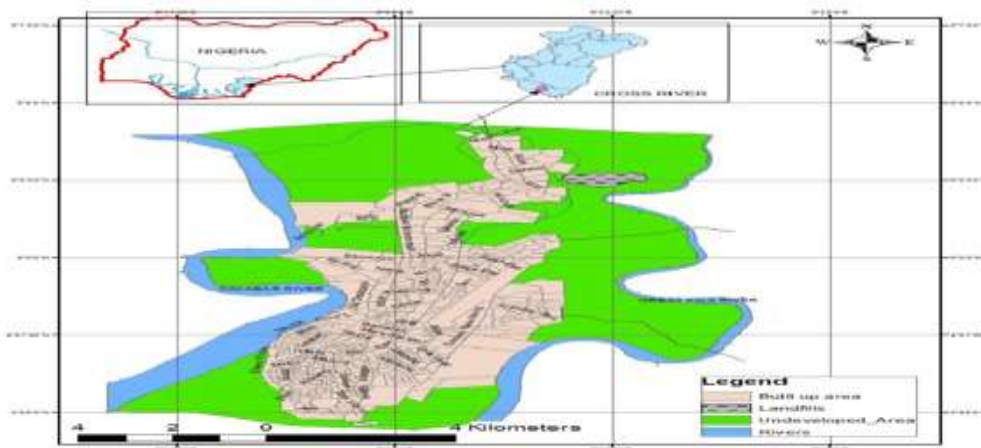
Figure 1: Map of Calabar Metropolis
Source: Cross River Geographic Information Agency (2017)

III. CONCEPTUAL FRAMEWORK/LITERATURE REVIEW

Concept of Road Connectivity

Levinson and Huang, (2012) have developed a positive theory of road connectivity seeking to provide the micro foundations of alternative network typologies as a result of self-interested actors. They argued that by building roads, landowners hope to increase their parcels' accessibility and economic value. That is to say, the construction/reconstruction of roads in particular area would to a large extent have a significant positive impact on accessibility to properties which would in turn provide a safe base towards ensuring the development of land use in such district (Yerra and Levinson, 2005).

This concept is however concerned with the potentials road connectivity has in ensuring the development of land uses as it is clear that no location on earth will be accessed without a travel route and the presence of this travel route particularly in the urban settings will stimulate the development of land uses thus decentralizing the town from congestion and traffic gridlock (Yamins, 2003; Batty, 2006; Gastner and Newman, 2006). Obviously, road network typology becomes increasingly connected as the accessibility value of reaching other parcels increases thus facilitating land development (Strange, 2001), economic activities (Barabasi and Albert, 1999; Shabuu and Adzuu, 2015) and all other land uses.

It was observed that districts within the study area where roads are in good conditions do not only tend to agglomerate economic activities but also trigger the location and development of land uses such as residential, industrial, commercial among the numerous (Eni and Ernest, 2007; Coker, Obo and Ugwu, 2013). Consequently, road connectivity concept plays an inevitable role in determining land use development.

Concept of Accessibility

The ability of any parcel of land to attract development depends on how accessible the land is. Obviously, areas that are easily accessible tend to attract more developments than inaccessible ones. Accessibility refers to the ability of individuals of all ages to reach the diverse array of destinations required to engage in socially rich and economically productive lives. However, the integration of land use and accessibility is one of the most highly discussed issues in urban planning studies (Ho, 2011). The transport scholars stated that the word "access" refers specifically to how convenient people could get to one place or the other (Levinson and Krizek, 2005).

In land use and accessibility interaction, land-use scenario is used as input to the accessibility model for estimating the trips pattern associated with the individuals' needs to perform activities (Ho, 2011). The model is based on a behavioural logic that individuals wish to participate in activities located in different land uses. Two ways of interactions are in this procedure. First, the location pattern of activities induces a trip pattern, as the required cost of performing activities; and second, that location of each activity is dependent on the accessibility/transport system, as it defines the travel cost associated with all activities performed in the future (Martinez, 2008). Land use and accessibility are the result of individual's travel behaviour. The land use describes the pattern of opportunities to perform activities, and that accessibility needs are induced by the need to perform activities.

The concept of accessibility therefore seeks to establish that land uses tend follow accessible travel routes (Ribot and Peluso, 2011). Kolawole, Wusomot and Arowosegbe (2015) also affirmed that accessible areas attract more developments than districts of inaccessibility. This invariably implies that when more accessible roads are developed and connected to other parts of the city, land uses like residential, commercial among others would grow correspondingly.

The Nature of Land Use Development

Attempting a classification of land use development in urban areas has grown to becoming a global wave of concern in recent studies (Gbadgesin and Aluko 2011). Land use can be seen as the series of activities undertaken to produce goods and services (Ndulue, Mbajiogu, Ugwu, Ogwo and Ogbu, 2015). Land use has been described as the major use to which land is put (Owei, 2014) which means, any activity that land is legally zoned to with reference to the planning scheme (Oyesiku, 1997). Consequently, land uses include residential, commercial, industrial, circulation, public, agricultural recreational and open spaces (George, 2006; Rodinelli, 1990; Robert and Sykes, 2000). All these land uses are expected to coexist in harmony for a balance to be achieved in the human environment (NITP, 1998).

It has further been verified in recent studies that land uses show significant difference in different places of the world. Obviously, while the predominant land use in the rural settings maybe agricultural and open spaces (Aworemi, 2011; Adefila and Bulus, 2014), the residential and commercial tops the priority in the urban settings (Ademola, 2010; Idowu, 2013; Ojikpong, Agbor and Emri, 2016). Agus, Tala'olu and Watung (2004) and Hartoyo, (2013) in separate studies observed that the predominant land use in Indonesia is the agricultural land use. They revealed that the connection of roads has tremendously impacted agricultural development and as such, the nature of land uses was gradually beginning to change to commercial and residential.

In Nigeria, it has been identified that residential land use is the largest consumer of urban space (Bourne, 1981; Ayeni, 2001; Shaw, 2004). Jinadu (2005) observed that in Minna, residential land uses consumed the highest percentage of land despite the growing competition from commercial uses. Similar observations were made by Nwachukwu and Ukpabi, (2009) Ademola, (2010). In separate studies Offiong, Offiong and Ekpe, (2014); Ojikpong, Agbor and Emri, (2016) asserted that 49 percent of the land in Calabar accommodated residential developments despite the growing conversions to other uses. Idowu, (2013) affirms that due to urbanization and increasing population growth in Nigeria, residential land uses are required at all times in major Nigerian cities. Ademola, (2010) observed that in Lagos, the demand for residential development was so high that temporary structures for residential accommodation by persons were developed. Similar observations were made by Adepoju and Adepoju (2016). They identified that residential land use accommodated 68% of Ado Ekiti metropolis.

Road Infrastructure Development and Road Connectivity

Recent studies around the world have reported a positive relationship between road infrastructure development and road connectivity. In the work of Dewees, (1976), a positive relationship was established between road infrastructure development and road connectivity. He observed that road infrastructure development always takes its course from already existing road thereby expanding it connectivity. Damm, Lerner-Lam and Young, (1980); Singh (2005) in separate studies further identified that road infrastructure developments were central to road connectivity. However, they opined that the essence of developing road infrastructure was to facilitate road connectivity thus, they concluded that road connectivity was primarily dependent on the development of road infrastructure.

Obviously, road infrastructure is critical to modernization because of its many positive impacts at various levels on social, political and economic development (Oni, 2007). Wolf (1992) established that there was statistically significant relationship between road infrastructure development and road connectivity. He observed that districts with more roads were not only easily accessible but also rapidly connected to other parts of the city thereby making movement easier.Also, Goldberg, (1970); Oyesiku, (2002) also established that road infrastructure development in different cities of the world has not only facilitated the drastic developments in land uses but has further reduced the challenges of road connectivity in cities. Kemi (2011) observed that road infrastructure development in Ghana has facilitated the connection of districts that lacked accessibility to the central business districts in time past. In the same vein, Adeniyi (2011) further revealed that road infrastructure development in Nigeria cities has vehemently triggered the extent to which cities are connected.

IV. METHODOLOGY

The survey research design was adopted in this study. This study made use of two types of data; primary and secondary data. Also secondary and primary sources of data were adopted in this study which include; the National Population Census Report for Calabar, the Ministry of Works Report for Calabar, administration of questionnaires and Oral interview. In order to determine the appropriate sample size which was 400, the Yaro Yamane formula of infinite population was used. The formula is as shown below.

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

Where;n = Sample Size   N = Finite Population

e = Level of Significance (Limit of tolerable error =0.05).

The study is made up of two Local Government Areas (LGAs): Calabar South and Calabar Municipality. For the purpose of this study, 22 political wards were identified in the metropolises (12 in Calabar South and 10 in Calabar Municipality). The 22 political wards were stratified into two using the two LGAs. The systematic sampling technique was thereafter adopted in the selection of 11 wards out of the 22 political wards for questionnaire administration. By this, after an orderly arrangement of the wards, all the even numbers were selected systematically giving a total of 11 wards. This implies that ward 2, ward 4 , ward 6, ward 8, ward 10 and ward 12 were selected from Calabar South, while Big-Qua ward (12), Obutong ward(14), Kasut ward(16), Efio-Ata ward(18) and Ediba(20) ward were selected from Calabar Municipality for data collection. The 11 sampled wards with their projected population were demarcated into 11 sampling units using the boundary roads surrounding each ward. Within each ward, random sampling was conducted on the respondents based on the sample population of each ward. From the 400 copies of questionnaires administered in the study area, 350 were retrieved (see details in Table 1).

Table 1: Distribution of Questionnaires in Calabar Metropolis

S/N	Wards in Calabar Metropolis	Existing Population (1991)	Projected Population (2017)	Ratio	Number of Questionnaires Administered	Number of Questionnaires Retrieved
1	Ward (2)	5,800	7,346	4	35	30
2	Ward (4)	5,200	6,713	1	9	7
3	Ward (6)	5,300	6,586	2	17	16
4	Ward (8)	6,300	7,980	5	43	39
5	Ward (10)	16,800	21,280	6	52	40
6	Ward (12)	2,650	2,729	3	26	20
7	Big-Qua (14)	9,754	10,046	5	43	40
8	Obutong (16)	18,044	18,585	6	53	47
9	Kasut (18)	5,428	5,590	4	35	29
10	Efio-Ata (20)	25,716	26,487	7	61	57
11	Ediba (22)	2,650	2,729	3	26	25
	Total	**10,3642**	**116071**	**46**	**400**	**350**

Sources: a. National Population Census Report, 1999
b. Personal Computation, 2017.
This statistical technique adopted for this study was multiple linear regression analysis.
Themultiple linear regression analysis is a statistical technique used in analyzing the cause and effect relationship between dependent and independent variables. The formula can beexpressed as:$Y = a + \beta x_1 + \beta x_2 + \beta x_3 + \ldots\ldots\ldots\ldots\ldots\ldots xn$
where;
Y= dependent variable.
a = intercept of the equation Y (f) $X_1 \ldots\ldots X_4$
β = multiple regression coefficient or the independent variables $X_1 \ldots\ldots X_4$ illustrating the relationship of each of them with Y (the dependent variable).
X = independent variable
The Y variable is the number of residential land use development in the study area
The X variables are stated as:
X_1 = number of road nodes
X_2 = numbers of roads
X_3 = roads distances
The multiple linear regression technique was used to determine the relationshipbetween roads connectivity and land use development in Calabar metropolis.This was to determine the extent of the cause and effect relationship between road connectivity and land use development in the study area. That is, the magnitude of the effect of a unit change in the independent variable (road connectivity) on the dependentvariable (land use development).

V.   DATA PRESENTATION AND ANALYSIS
Occupational Status of Respondents
The occupational status of respondents presented in Table 2 showed that 22 (6%) respondents were farmers, 42 (12%) respondents were applicants, 101 (29%) were traders, while 185 (53%) respondents were civil/public servants. This implies that most of the respondents that were interviewed were civil/public servants.

Table 2: Occupational Status of Respondents

Occupation	No. of respondents	Percentage
Civil/public servants	185	53
Trading	101	29
Applicants	42	12
Farming	22	6
Total	**350**	**100**

Source: Field Survey, 2017.

Income of Respondents

The income of respondents per month as presented in Table 3 shows that 24 (7%) respondents indicated that their income was below N18, 000;155 (44%) respondents said their monthly income was N18,001 – N36,000; 140 (40%) respondents said their monthly income was N36,001- N54,000, while 31 (9 %) identified that their monthly income to beN54,001 and above. This indicates that most of the respondents that were interviewed fell within the working class.

Table 3: Income of Respondents per Month

Monthly Income (Naira)	No. of respondents	Percentage
Below 18,000	24	7
18,001 - 36,000	155	44
36,001-54,000	140	40
54001 and above	31	9
Total	350	100

Source: Field Survey, 2017.

Land Use Development

Table4shows the total number of new developments arising from the development of new roads construction/rehabilitation in each ward in the study area. Ward 2 (W2) had a total of 35 new residential development, 24 new commercial development, 3 new industrial development and 5 mixed uses; giving a total of 67 new developments. It follows in the same way in other wards as shown in the table. Also, the total number of new residential developments in all the eleven (11) wards is 390, commercial 221, industrial 26 and mixed use 50; making a total of 687 new developments.

.Table 4: Land Use Development

Land Use	Wards/Number of New Developments											Total
	W2	W4	W6	W8	W10	W12	W14	W16	W18	W20	W22	
Residential	35	28	33	29	38	32	39	42	36	31	47	390
Commercial	24	19	22	13	20	17	21	18	23	19	25	221
Industrial	3	2	1	3	4	2	3	1	1	2	4	26
Mixed Use (Residential/ Commercial)	5	3	7	4	5	6	4	3	5	3	5	50
Total	67	52	63	49	67	57	67	46	65	55	81	687

Source: Field Survey, 2017

New Roads Construction (Road Connectivity)

Table 5 shows the total number of new roads construction per ward to effectively connect the older parts of the city for easy accessibility. Five(5) new roads were constructed/rehabilitated in ward 2, ward 12 also had 5 new constructions and so on; with a grand total of 73 new roads construction in the study area.

Table 5: New Roads Construction (Roads Connectivity)

Wards	New Roads Construction/Rehabilitation
2	5
4	7
6	4
8	9
10	6
12	5
14	7
16	9
18	7
20	6
22	8
Total	73

Source: Field Survey, 2017

Length of New Roads in the Wards

Table 6 shows thetotal length of new roads constructed in ward in the study area. Ward 2 had a total of 3.1km,ward 4 (3.5km), ward 6 (3.7km), and so on.From the Table, a total of 31.9 km of new roads were constructed/rehabilitated in the area.

Table 6: Length of Roads in the Various Wards

S/N	Wards in Calabar Metropolis	Length of Roads	Percentage
1	Ward (2)	3.1km	10
2	Ward (4)	3.5km	11
3	Ward (6)	3.7km	12
4	Ward (8)	2.6km	8
5	Ward (10)	2.1km	7
6	Ward (12)	1.7km	5
7	Big-Qua (14)	3.6km	11
8	Obutong (16)	3.1km	10
9	Kasut (18)	2.8km	9
10	Efio-Ata (20)	3km	9
11	Ediba (22)	2.7km	8
	Total	**31.9**	**100**

Source: Field Survey, 2017

Level of Satisfaction of Road Connectivity

The level of satisfaction of road connectivityas presented in Table 7 shows that 90 (26%) respondents were highly satisfied with the level of road connectivity in the area, 134 (38%) respondents were satisfied with the level of road connectivity, 111(32%) respondents' satisfaction towards the level of road connectivity in the area was low, while 15 (4%) respondents were not satisfied with the level of road connectivity in the area. From the Table, a greater percentage of respondents were satisfied with the level of roads connectivity in the study area.

Table 7: Level of Satisfaction

Level of Satisfaction	No. of respondents	Percentage
Highly Satisfied	90	26
Satisfied	134	38
Low Satisfaction	111	32
Not Satisfied	15	4
Total	350	100

Source: Field Survey, 2017.

VI. RESULT OF THE HYPOTHESIS

The result of the tested hypothesis as shown in Tables 8a and bsuggests that there was no significant relationship between land use developmentroad connectivity in Calabar at 0.05 level. This result accepted the null hypothesis since the result shows a significant value of 0.824, which is more than the significant level of 0.05. By this,it implies that though road connectivity has a role to play in land use development from literature; it is not a significant factor or measure of assessing the rate of landuse development in Calabar. This invariably means that other factors like Government policies in terms of land use zoning, public transportation services, public utilities and nearness to office locations, could be identified as factors influencing land use development especially residential land use in Calabar.

Table 8a: Regression Table A

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.217[a]	.047	-.191	11.29411	.047	.198	2	8	.824

a. Predictors: (Constant), Length of Roads, No. of Roads

b. Dependent Variable: Land Use Development

Table 8b: Regression Table B

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	50.454	2	25.227	.198	.824[a]
	Residual	1020.455	8	127.557		
	Total	1070.909	10			

a. Predictors: (Constant), Length of Roads, No. of Roads

b. Dependent Variable: Land Use Development

Factors Affecting Road Construction and Connectivity in Calabar
Some factors were identified as affecting road construction and connectivity in Calabar as revealed through the field study conducted in the study area. There are:
(i) **Topography:** Topography of the area affects largely road construction and roads connectivity in Calabar. The physiographic projection in some parts of the city affect road construction particularly, in neighborhoods such as Nyahasang, IkotEffangha, IkotOmin, IkotNkebre, IkotEkpo and some parts of IkotEneObong in Calabar Municipality. These areas have deep and narrow valley and gorge earth's surface which are worn by running water especially during the rainy season. This makes construction and roads connection difficult.
(ii) **Inadequacy of Funds:** It was also revealed by the Ministry of works that the Cross River State Government is predominantly the funding mechanism for the construction of roads in the state; they formulate policy, regulate, set standards, develop strategic plans and monitor road development projects in the city. Lack of funds by the government to invest heavily on road construction in Calabar greatly influenced the amount of new roads constructed.
(iii) **Quality of Construction Materials**: The quality of construction materials used by contractors while handling roads construction is left to be desired. During interaction, with staff of the Ministry of Works in Calabar, it was revealed that contractors that handled road projects like Hart Street, Adam Duke and William George all in Calabar South used substandard materials. These substandard materials has led to these roads collapsing within the shortest possible time. This has affected the linkages that the above mentioned roads had created within the area.
(iv) **Developers' Interference:** Developers most often interfere with contractors during construction of roads. Developers regularly interfere by not allowing their landed properties to be demolished for roads to be constructed. This act usually tantamount to road projects abandonment in the city.
(v) **Development Pattern:** The development pattern of certain neigbourhoods in Calabar has affected the level of roads construction and connectivity. In other to avoid demolishing of properties due to lack of funds to pay for compensation most of the roads are not developed to connect other streets. This can be noticed in places like Edem Edo, Tete andEdemEdet Streets all in Calabar South.

VII.DICUSSION OF FINDINGS
i).The nature of land use development in Calabar revealed that of all the different land uses, residential land use constitutes the highest new developments with 390. This was closely followed by commercial land use with 221. Residential land use development is the most important urban function probably because this is where urban residents use for shelter.
ii). According to Veldkamp and Lambin (2001), forces that drive land use change range from public policies and the pattern of land use by the public and this can be seen in Calabar in the area of changing from residential land use to commercial land use: Examples; Bassey Duke Street, Mayne Avenue, Edgerley Road, Calabar Road, IBB Way, Etta Agbor Road, Old Odukpani Road, Marian Road etc.
iii). Table 7 shows the level of satisfaction of roads connectivity in the study area. A greater percentage of the respondents were satisfied with the level of roads connectivity with a percentage of 38. This was closely followed by those in the category low satisfaction with a percentage of 32.
iv). From literature, land use development and road connectivity are interdependent. According to Aderamo (2003), road connectivity constitutes an important element in land use development as roads provide accessibility required by different land uses and the proper functioning of such areas depends on efficient road connection. Bello (2009) also observed that creating of new roads or expanding the existing ones increases the attractiveness of land use and promotes new urban facilities.The result of the hypothesis however, proved otherwiseas the level of road connectivity was not significantly related to the amount of land use development in the study area. This implies that other factors not covered by this study may have accounted for that.The result of the hypothesiswas in line with the work of Adewesi and Akinbogun (2010) in their study of

transportation in Akure. They revealed that residential land use development has continued to increase despite the less accessibility noticed in several districts in Akure.

v). Some basic factors were identified as militating against effective road construction and road connectivity in the study. They are topography, inadequate financial allocation for road projects, the quality of road construction materials, private developers' interference and the existing development pattern of the city.

vi). A total number of 73new roads were constructed in all the 11 sampled wards to effectively connect the older parts of the city for easy accessibility. The total length of the new roads constructed was 31.9 kilometres.

VIII.   RECOMMENDATIONS AND CONCLUSION

This study basically focused on assessing the level of road connectivity on land use development with particular reference to Calabar metropolis. The study revealed that road connectivity is not a very significant factor in land use development in Calabar metropolis, though it has a role to play in land use development as observed from literature. From the study, some basic factors were identified as issues militating against effective road connectivity in the study area. These factors include; topography, inadequacy of funds by the government to undertake the construction of new roads, developers' interference during construction of roads and the development pattern of some neighbourhoods in the metropolis.

In view of the above, the following recommendations were made:

i). The Government of Cross River State should as a matter of priority increase her budgetary allocation in the transportation sub-sector especially, on road construction and rehabilitation to meet future demand. This will help to strengthen Calabar roads connectivity requirements and   future land use development.

ii). Government should encourage private stakeholders and the citizens to actively participate in road construction and rehabilitation through provision of incentives or subsidies on road development, particularly within their neigbourhoods.

iii). A review of Calabar master plan should be given the needed attention in order to meet with the challenges facedin effective land use development arising from inadequate road construction and road connectivity in the city.

iv). Contracts on road construction should be awarded to highly qualified Engineering Consultants with effective supervision by the agency responsible and devoid of much political influence.

v). Property developers should be properly guided by the Ministry of Lands and Urban Development, particularly the Town Planning Department on the application of planning regulations and standards to avoid future demolition of their properties for new road construction or rehabilitation.

IX. CONCLUSION

It is quite obvious that road development and road connectivity are paramount in land use development in cities of developed and developing countries. They make ways for planned urban expansion and urban connectivity requirements and linkages; reduces trip length, transportation cost, and travel delay. It is hoped that the recommendations presented above if properly considered will go a long way in addressing the challenges identified as militating against effective road development and connectivity in Calabar Metropolis.

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