

2. MATERIALS AND METHODS

Study Area: is located between Latitude $10^{\circ} 15' 02''\text{N}$ – $10^{\circ} 20'00''\text{N}$ and between longitude $11^{\circ}05'00''\text{E}$ – $11^{\circ}15'05''\text{E}$. It shares common boundary with Akko Local Government Area in south and west, Yamaltu-Deba L.G.A. to the east and Kwami L.G.A. to the north (Figure 1.0). It also occupies a total land area of 52Km^2 . It is the capital of Gombe state with a population of 266,844 [23]. Today the population is projected to be 399,531 persons using 3.2% growth rate Gombe State Office [23]. Gombe is well linked to other regional centres by trunk “A” roads. A single gauge railway line on the Bauchi – Maiduguri route also links the town, in addition to an international airport. Furthermore. The study is divided into different residential quarters which include: GRA, Federal Low Cost, Arawa, State Low Cost, Kumbiya-kumbiya, Pantami, Jekadafari, Tudun Wada, Madaki, Dawaki, Bolari, Yalanguruza and Shamaki etc.

The climate around Gombe city is the same with most part of Sudan Savanna. It enjoys a subtropical climate. It also has two distinctive seasons which are wet and dry seasons. As in other parts of the Nigerian Savanna this precipitation distribution is mainly triggered by a seasonal shift of the Inter -Tropical Convergence Zone (ITCZ). The average annual rainfall is concentrated between May and October with a single maximum in July/August. Much of the rainfall especially in July and August is associated with storms of high intensity. The mean maximum monthly temperature is 34°c occurring in (March – May), the mean minimum monthly temperature is 18°c occurring in December – February [36].

The relief of Gombe developed on complex geologic crystalline bedrock. Although, much of the area is underlain by the ancient crystalline basement complex, sedimentary formation during the late cretaceous period has influenced the topography. Subsequent dissection and stream incision in the area have carved a landscape consisting of flat topped to conical hills, a granitic residuals and pediment landscape. The Kerri- Kerri formation forming a plateau extends into Gombe town marking its northern boundary. The southern edge is marked by a breached and discontinuous escarpment rising in some places to form sandstone ridge over 150m above the surrounding plain. The area is generally surrounded by hilly terrain with steep side on the lower part of an east-facing (2° – 3°), gently undulating slopes. As for the drainage, there are stream flows west to east such as the River Magariya and Kware. These waterways gradually transformed into gullies partly due to rapid demographic pressure on land (Pentagon Design Consultant, 2003). The entire land is drained by the head waters of the river Dadin kowa which is a tributary of the Gongola River [7]. The natural vegetation of the study area is guinea savannah woodland. This can be observed at the boundaries and outskirts of the town. But as a result of rapid population pressure on the land such as urban expansion, cultivation, livestock grazing

etc., the natural vegetation has disappeared resulting in exposure of land to gully erosion phenomenon [7].

Two sources of data were utilized in the course of carrying out this research work. These include: Primary sources; information acquired through reconnaissance survey, questionnaire, personal interviews, and the researcher's observations. Secondary sources; information acquired through the use of textbooks, thesis, projects materials, publications, journals and internet. There are 24 major road corridors that form the road network in Gombe city. The roads are alphabetically arranged and ranked in ascending order. Therefore, the identified roads formed the sample points where the questionnaire were administered to the respondents. A total of 282 copies of questionnaire were distributed and 280 were recovered for the analysis. Direct method of questionnaire administration was used and carried out personally by the author. Information collected on the effects of road transport development on commercial activities were summarized, presented and discussed. Various responses were analyzed using non-inferential statistics. The method employed include the use of percentages, frequency distribution, tables and graphs for the presentation of findings on the effects of road transport development on commercial activities. Three graphic theoretic measures were used in analyzing the road network connectivity: Alpha, Beta and Gamma indices. The road networks in Gombe metropolis during each period were converted into topological graphs. These graphs were then analyzed to determine the alpha, beta and gamma indices. These indices help to determine the connectivity level.

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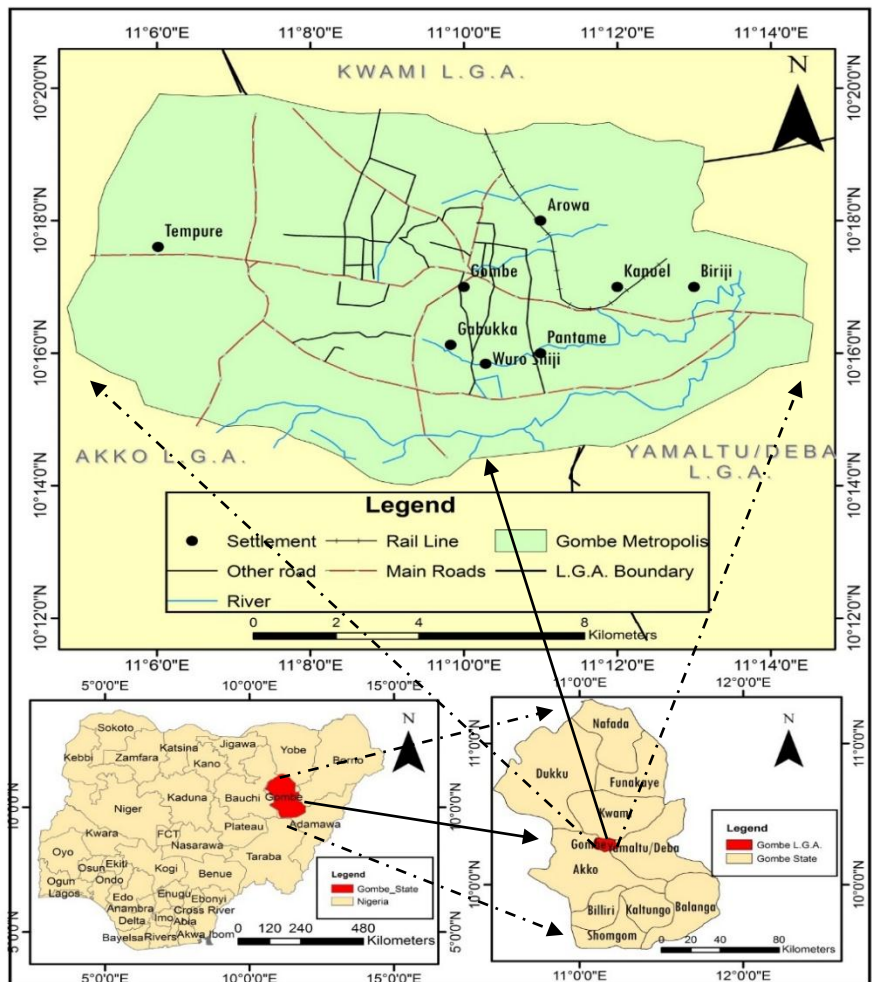


Fig. 1: Map of Gombe City.
Source: Ministry of Land and Survey Gombe State.

3. RESULTS AND DISCUSSION

3.1 Changes in Road Network Development in Gombe City

In order to determine the changes in connectivity over time in Gombe city, Gombe State, three graphic theoretic measures were used in analyzing the network connectivity, which are all based upon the relationship between the number of edges and vertices in a network. They include: **Beta**, **Gamma** and **Alpha** indexes. From figure 1, below it is clear that the number of both edges and vertices continue to increase from 1996 through the 2005 to 2014. The alpha, beta and gamma indices were calculated from the topological maps to show the degree of connectivity in Gombe city.

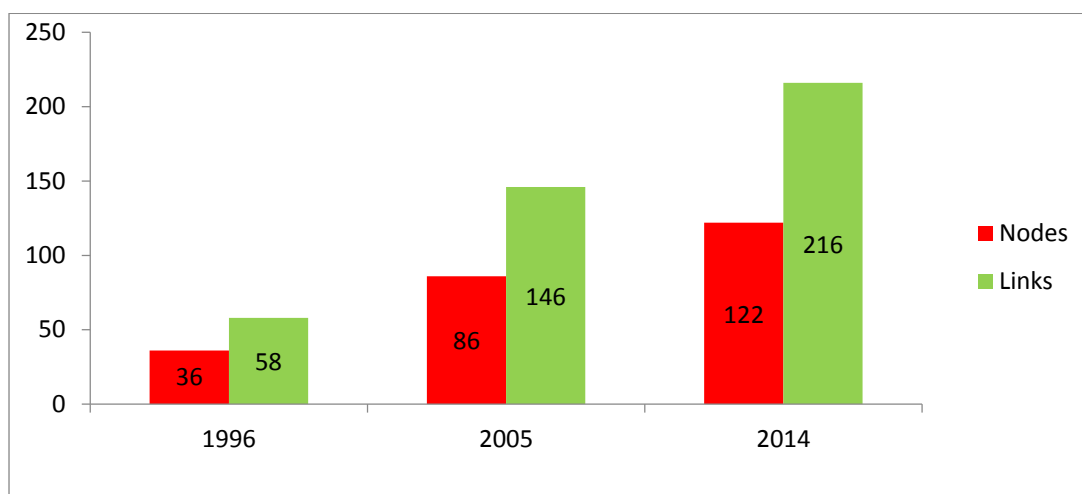


Fig.1: Road Edges and Vertices of Gombe Metropolis
Source: Author's Analysis, May (2015).

The result of the measure of connectivity on table 1, shows the degree of changes in connectivity of road network in Gombe city. The results of the computation of gamma, beta, and alpha indices indicated that there is a significant increase in road connectivity in Gombe metropolis from 1996 through the 2005 to 2014. The beta index revealed that there is increase in connectivity in the area from 1.61 in 1996 to 1.70 in 2005 and 1.80 in 2014. In the case of alpha index, connectivity was 31.3% in 1996 but increased to 35.3% in 2005 and 38.9% in 2014. Lastly, the gamma index further revealed an increase in road connectivity over the last two decades. The result shows that road connectivity witnessed an increase from 56.9% in 1996 to 57.9% and 60.0% in 2005 and 2014 respectively. (See appendix ii in page 105 for details of the computation). In a nutshell, all the three indices calculated have indicated improvement in connectivity in Gombe city. Without doubt therefore, it can

be concluded that a lot has been done in the area in terms of road construction for the period under study.

Table 1: Road Connectivity Indices of Gombe City Over Three Time Period

S/N	Year	Beta	Gamma	Alpha
1	1996	1.61	56.9%	31.3%
2	2005	1.70	57.9%	35.3%
3	2014	1.80	60.0%	38.9%

Source: Author's Computation, May (2015).

3.2 Effects of Road Transport Development on Commercial Activities in Gombe City

Table 2: presents the type of commercial activities that the respondents engage in. It shows that 58% (160) engage in retail services, 11% (32) are in to whole sale services, and 4% (12) of the respondent are in to the distribution of goods and services. Furthermore, 23% (64) engage in professional services (barbing saloon, carpenter, suya joints, GSM repairs etc.), while, only 4% (12) indicated others as the types of commercial activity they practice. This indicates that majority of the respondents engage in retail services and 23% of them participate in professional services. This can be attributed to the kind of commercial activities that people engage in are mostly trading (buying and selling) in nature, commonly by using shops and tables as the flat form to carry out their businesses. Furthermore, the economic environment dictated the nature of the commercial activities to prevail in the study area. This is the more reason why retail services account for more percent than the whole sale services and distributors. Another reason is that Gombe city is a consumption city and not production city. In other words it is a commercial centre where by goods are brought to market for sell.

Table 2: Types of Commercial Activity Engage by the Respondents

Type of Commercial Activity	Frequency	Percentage
Retail Service	160	58
Whole Sale	32	11
Distributor	12	4
Professional Service	64	23
Others	12	4
Total	280	100

Source: Field Survey, 2015.

Fig. 2: presents the distribution of the respondents based on the number of years spent at the location of their business. It shows that 25% (70) of the respondents spent 1-4 years at the location they are running the business, 37% (104) have been in that location for 5-10 years, 16% (46) have been in the location for the past 11-14 years, 14% (40) were there for the past 15-20 years and only 4% (20) have been in the location for over 20 years. This indicate that majority of the respondents have been practicing business at different locations before most of the roads were either constructed or renovated. As such they provided the information needed for the research.

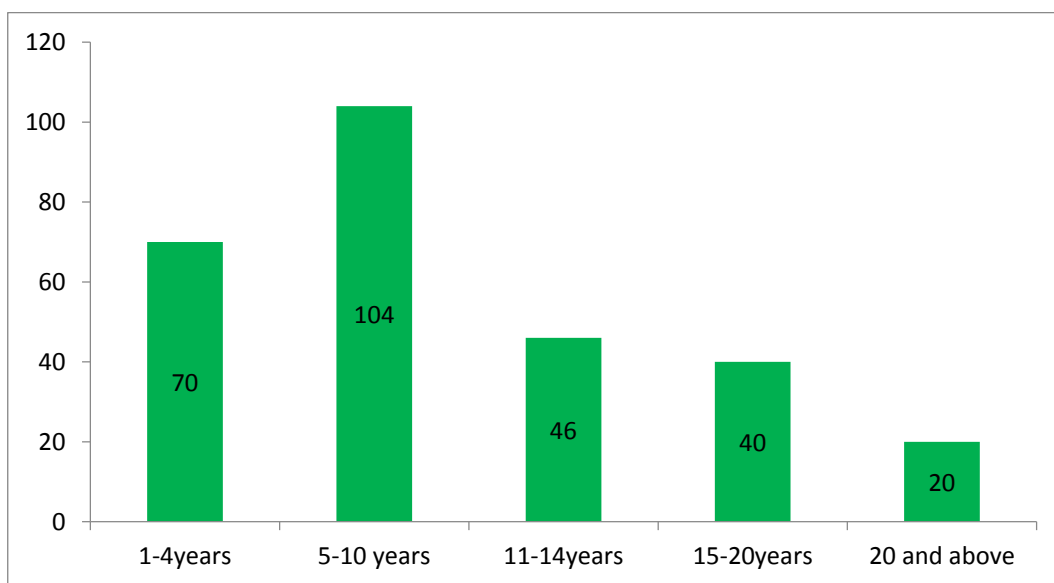


Fig. 2: Distribution of Respondents Based on the Number of Years Spent at their Location
Source: Author’s Analysis, 2015

Table 3: Business Location of the Respondents before the Construction of Road

Business Location	Frequency	Percentage
The Same Location	189	68
Home	28	10
Other Places	63	22
Total	280	100

Source: Author’s Computation, 2015.

Table 3: shows that 68% (189) of the respondents have been practicing the business in the same location long before the state and most of the roads were created, 10% (28) of the respondents were doing the business in the local streets and shops at home before eventually relocating their business to the present location which is by major roads, while 22% (63) of the same respondents have been practicing business at different locations like old market, main market, new market, at round about, at junctions and other streets as indicated on the questionnaire before relocating to the present location. This is mostly due to the fact that people access their business by locating along major road corridors than locating in places that are less accessible and areas or locations where competition is less and profit is maximized.

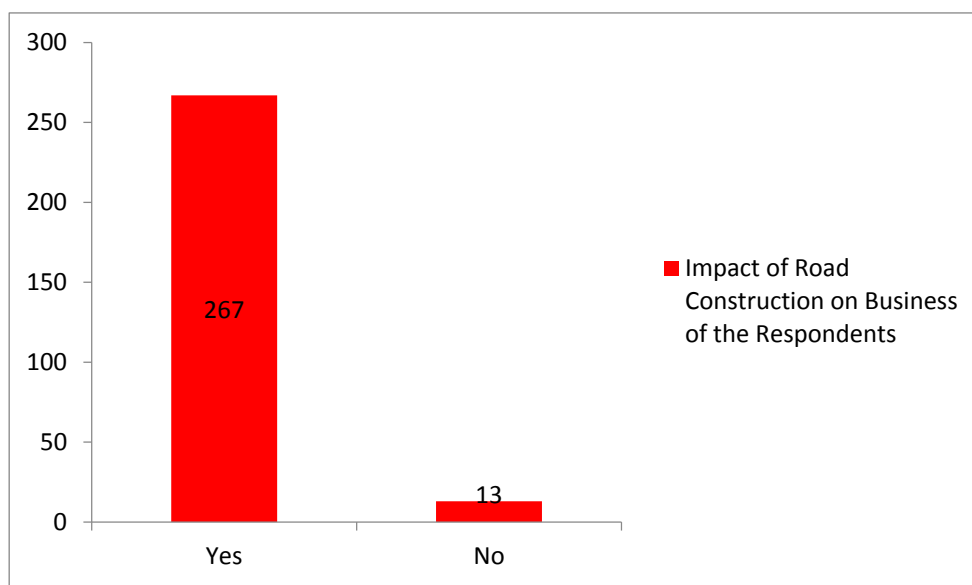


Fig. 3: Impact of Road Construction on Business of the Respondent
Source: Author's Analysis, 2015.

Fig. 3: shows that 95% (267) of the respondents understands and accept the fact that constructing new roads had impacted their businesses, while only 5% (13) says road construction had no impact on their commercial endeavors. This implies that construction of roads affects business positively and contributes to the development of different commercial activities anywhere in the world, particularly in the study area.

Table 4: Type of Impacts of Road Construction on the Business of the Respondents

Types of Impact	Frequency	Percentage
Positive Impact	260	93
Negative Impact	6	2
No Any Impact	14	5
Total	280	100

Source: Field Survey, 2015.

Table 4: shows that 93% (260) of the respondents describe the type of impact road construction has on their business as positive. Some of the benefits include: security, free competition environment, increase in patronage, improved accessibility and availability of parking space. Only 2% (6) says construction of road has negative impacts on their business as decrease in patronage, lack of access to business, destruction of their commercial outfits during road construction and lack of parking space. While 5% (14) of them consider it to have no any impact at all. This implies that construction of roads does not only attract businesses to the road corridors but rather it influences businesses positively. This is because it allows them to have more customers after show casing their products, which reflects to increase or bring about more profit. These are some of the reasons why there is competition in renting and building of commercial outfits along most of the major road corridors in the study area. It implies that road construction bring about increase in the level of patronage which eventually reflects in to increase in profits and expansion of the businesses. While most of those that says No, indicated their reasons as: the business started after the road was constructed, others have feelings that due to construction of roads people boycott to other more accessible arteries. It even goes by the saying; “more roads, less money”.

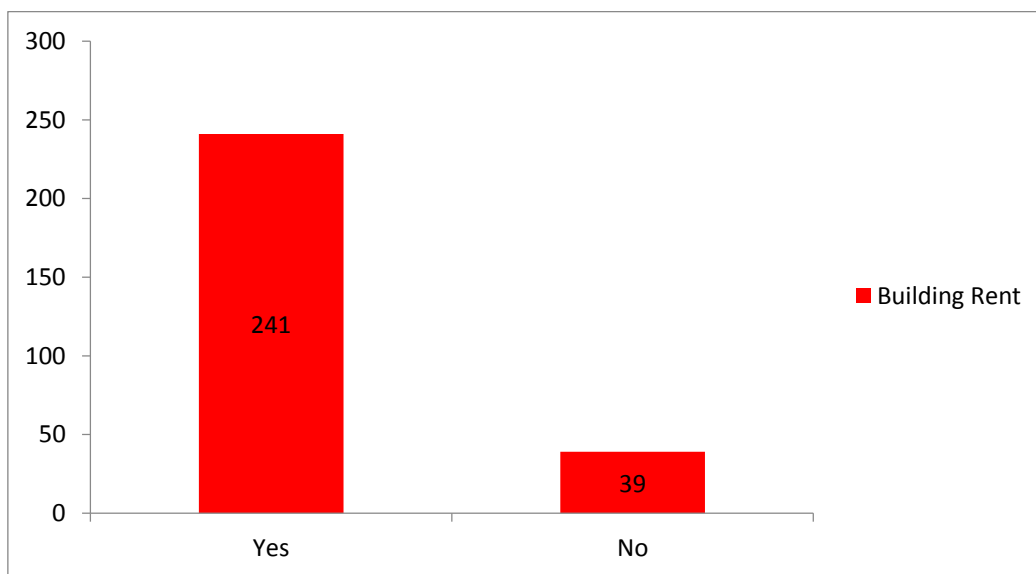


Fig. 4: Rent of Buildings for Commercial Purpose
Source: Author’s Analysis, 2015.

Fig. 4: shows the responses of the people sampled on whether the facilities they are using belong to them or they are renting. It shows that 86% (241) of the respondents rent the facility they are using. While, only 14% (39) own the building or facility they are using for commercial purposes. This is due to the fact that most of the people practicing commercial activities engage in trading (retail services) and professional services as such cannot afford to build shops. That makes them go for renting of the building and other facilities for business and other commercial purposes.

Table 5: Cost of Renting the Building for Business

Cost of Renting	Frequency	Percentage
₦1000 - ₦100,000	131	54
₦101,000 - ₦200,000	80	33
₦201,000 - ₦300,000	20	9
₦301,000 - ₦400,000	6	2
₦401,000 - ₦500,000	2	1
Not Available	2	1
Total	241	100

Source: Field Survey, 2015.

Table 5: shows that 54% (131) of the respondents pay between ₦1000 to ₦100,000 for using the building or

facility, 33% (80) of them pay between ₦101,000 to ₦200,000 for renting, 9% (20) of the respondents pay between ₦201,000 to ₦300,000 for renting, 2% (6) pay more than ₦300,000 to ₦400,000 for the use of the building or facility for commercial purpose. While, only 1% (2) of the total respondent that pay for the rent for the use of the building for commercial function pay between ₦400,000 to over ₦500,000 per year. However, 1% (2) of the respondents declined to disclose how much they pay for the cost of renting. This implies that more than half of the respondents pay between ₦1000 to ₦100,000 yearly for using the building for commercial purpose. The table further revealed that very few people pay for the expensive facilities for their businesses. Some of these include: commercial banks, whole sales, car dealers, suya joints among others. But many of them can afford to go for moderate buildings that the cost is believed to be fair or average.

However, majority of the respondents considered the cost of renting to be as either high or too high. This is of course due to many reasons such as: lack of access to the owners of the buildings which give chance for the middle men to escalate the price, inadequate capital, competition etc. Places like: CBD, commercial areas, major road corridors and other strategic locations such as: close to hospitals, schools, praying grounds, stadiums etc. tend to have high cost of renting. This can be attributed to the value of the lands in which these buildings or facilities are located. However, according to the respondents, road construction remains the major factor that led to the high cost of renting in the study area. This is because in most of the streets where roads are constructed or renovated cost of renting the building for commercial use immediately double or increase to about 100% the following year. Other reasons suggested that high or too high cost of renting is due the nature of the building itself. This in most cases determines how much you pay irrespective of the location. While a considerable number of the respondents reported location of the building as the major cause of the high or too high cost of renting for commercial purposes.

4. CONCLUSION

The study allows the following conclusions to be drawn: The results of the computation of gamma, beta, and alpha indices indicated that there is a significant increase in road connectivity in Gombe city from 1996 through the 2005 to 2014. The study also revealed that road transport development brought about improvement in commercial activities coupled with increase in profit. Access to major roads provides relative advantages consequent upon which commercial users locate to enjoy the advantages. Good road projects clearly contribute to poverty reduction by improving the living conditions of people and by augmenting the opportunities available for trade and employment. Finally, It is therefore, recommended that more roads should be constructed, renovated and expanded particularly in the state capital in order to improve and diversify the commercial nature of Gombe City. Rural roads should be improved to harness the economic potentials in the state at large. The study has tried to analyze one of the indicators of road transport development in the study area, which is connectivity indicator. As such further research can explore the rest of the critical indicators such as: accessibility, road density, etc. Other areas to pay attention to in the future include: effects of road transport cost, travel distance, travel time savings on commercial activities in the study area. This would go a long way in understanding the important nexus that exist between road transport and commercial activities in most of the cities of the developing world.

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