EVALUATION OF RESIDENTIAL NEIGHBOURHOODS COMPLIANCE WITH ZONING OF THE 1973 CALABAR URBAN MASTER PLAN

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Abstract
Evaluation of residential neighbourhood's compliance with zoning of the 1973 Calabar urban master plan. Zoning is an instrument of development control, essentially necessary to prevent or reduce potential conflicts between different land uses. This study is aimed at evaluating the degree of compliance of residential neighbourhoods of Calabar Metropolis with the zoning plan. This was achieved by determining the difference between the built up residential land use areas and the residential areas in the zoning plan as well as investigating the activities of institutions and agencies of government involved in development control. The survey design method was used in carrying out this study by way of map analyses of both the existing map of Calabar Metropolis and the zoning plan of the 1973 Calabar urban master plan. Residential neighbourhoods of both maps were carved out and measured using the linear planimeter. These measurements were done using the map scale and its output in square metres. The map analyses were complimented with empirical verification of features on the landscape using Google Earth Imagery and reconnaissance survey. Map analyses also led to identifying built up residential land use areas (m^2). The measurements obtained from the enclaves of built up residential land use areas in each neighbourhood and the zoning plan were subjected to a paired samples Student's t-Test statistic and the result showed a statistically significant difference between the existing residential development and the zoning plan. Other agencies and institutions of government responsible for development control were made up of quacks that lack professional skills to monitor development and protect the master plan. The study also found their involvement in development control as an aberration and, as such, contributed to the distortion of the master plan. The study, therefore, concluded by recommending for urgent review of the master plan, strengthening the planning institutions by allowing registered professionals to manned the institutions. Government should also give them opportunity to carry out their statutory duties without political interference. There is also need to domesticate the 2004 urban and regional planning law in Cross River State.

Keywords: Calabar Urban Master Plan; Compliance; Evaluation; Linear Planimeter; Map Analyses; Paired Samples Student's t-Test; and Zoning Plan.

1. Introduction

Zoning is the way in which government exercises control over physical development of land and the type of use to which each individual property may be put. Ocran (2015) and Unaegbu (2004) studied zoning in Washington DC and their results highlighted zoning laws as to typically specify the area in which residential, commercial, industrial, recreational, institutional, agricultural and even circulation may take place. They noted that zoning ordinance is the mechanism by which new development is controlled as growth occurs. As such, zoning is classification of land uses that limits what activities can or cannot take place on a parcel of land by establishing a range of development options. They, however, emphasized that the traditional purpose behind zoning is to separate potential conflicts among incompatible land uses. There may be variance in the number of zones designated as part of the zoning ordinance, depending upon the size and complexity of a given city or jurisdiction. Ocran (2015) concluded that the zoning ordinance would include the following categories of use: residential, commercial, industrial, public/institutional, and agricultural. There may

be several subcategories as well as detached or attached residential zones of various sizes or densities or heavy or light industrial uses. Each zone is regulated by a number of conditions in addition to use including density, or physical restrictions such as height, area of coverage, parking requirements, and screening. In addition, as indicated above, there may be zones based upon environmental conditions such as open space, flood plains, and steep slopes.

Appiah (2012) in Kumasi, Ghana, identified zoning as a valuable tool for directing and controlling growth within a community. This definition was confirmed by Cobbinah and Amoako (2014). However, for zoning to be effective there is need for an element of stability or consistency. Political vulnerability and variances of zoning may diminish its potential impact. They also noted that a variance is permitted when an unnecessary hardship would result to the property owner. However, a spot zoning is seen as the situation arising when an amendment is proposed to a zoning ordinance, modifying its application to a particular property. The court's rather strong support in linking zoning to a comprehensive/master plan has diminished some of these concerns over stability since it validates the importance of the larger context and how community objectives have a greater impact than those addressing individual parcels of land. When utilized as a tool for achieving planning goals rather than serving as the plan itself, zoning has proven to have positive merits than demerits (Appiah, 2012).

Frimpong (2017) emphasized on the growing use of restrictive covenants. This, also known as deed restrictions, refers to private land use control mechanisms that supplement or even replace zoning. They are often employed in new housing developments as a means of providing property value protection for adjacent landowners by placing restrictions on the use of property. When a person purchases a piece of property, he or she agrees to certain restrictions in terms of what can be done with that property. The restrictive covenants may provide more stringent requirements above those imposed by the zoning restrictions. For example, covenants might place limitations on the density (example, only single family detached units in a zone allowing attached housing) or they might increase the building set back lines beyond the zoning limits. Covenants may also be included as a means to enhance property value protection requirements. For example, they may specify minimum building square frontage requirements, limitations in terms of acceptable construction materials, or specifications on architectural styles and building height as in Victoria Garden City (VGC), Lagos.

They may also be used to address environmental protection issues, relating to amounts of grading allowed, acceptable septic requirements, and vehicle parking. Legally, they must be diligently overseen to be effectively enforceable. In essence, restrictive covenants require 'self-policing' by the members of the community to whom the deed restrictions apply. Often this function will fall to a design review board as a separate entity or part of the homeowners' association.

In Calabar Metropolis, political interference and insensitivity in urban land use administration where non-professionals were often involved in urban land use administration has affected its zoning of the 1973 Calabar Urban Master Plan. It is in use and readily available in the Town Planning Department of the Ministry of Lands/Urban Renewal and Development of the Cross River State, Nigeria. This master is found to be subjected to abuse and possibly non-complied with in terms of new physical developments (Obongha, 2024).

There is evidence of mixed use developments that contravenes the zoning plan such as cemeteries in Akim Qua Town residential neighbourhood at Etta Agbor layout, in close proximity of University of Calabar, Calabar and Spring Road at Essien Town residential neighbourhood (Obongha, 2024). A similar research by Tudor, Ioja, Hersperger and Patru-Stupariu (2013), shows that cemeteries are usually hiding places for hoodlums and cause people to live in fear. They pointed out that cemeteries are incompatible with residential land uses due to destruction of the aesthetic value of the city, harboring hoodlums and being nuisance as a result of insects and rodents.

Other mixed uses include indiscriminate citing of some gasoline stations within residential neighbourhoods. Examples include E. Okon and Uddy King on Target; Prosperous Oil and Gas on Mount Zion Road and Dozzy Oil at Federal Housing Estate. Their locations in residential neighbourhoods pose threats of widespread fire disasters and abuse of zoning plan (Obongha, 2024). The gasoline stations also contain nuisances such as irritations of the mouth, throat and stomach from breathing gasoline (fuel) smells. Other effects are vomiting, dizziness and headaches (Kelbough, 2002). Although gasoline stations are meant to render services to the residents and as such, are expected to be located within a radius of 800 meters to 1,600 meters away from residences (Obateru, 2014). Some of these gasoline stations defy professional location standards.

There is also the problem of population concentration which affects zoning of the master plan where areas allotted for industrial use now turned to residential and mixed use areas. Height and residential densities within State and Federal Housing Estates are no longer complied with the zoning plan (Obongha, 2024). However, Population increase began in 1987 after the creation of Akwa Ibom State out of the then Cross River State and migrants from Akwa Ibom State chose to remain in Cross River State, albeit, in Calabar. At that point, the population of Calabar began to grow in number and expand spatially (Oka, 2009). In this way, the marshlands and swamps in Anantigha and the green belt areas allotted for urban agriculture along Ikot-Eneobong and Ikot-EffanghaMkpa became densely built up for all manner of uses without control.Cases of numerous occasions of non-compliance with the zoning of the Calabar urban master plan have necessitated this research which is geared toward providing recommendations to guide town planning authorities on their actions. Going through the above problems, it cannot be denied that a study of this nature is needed to create awareness on the negative consequences of non-compliance with the zoning plan.

Aim and objectives

This study is aimed at evaluating the degree of compliance of residential neighbourhoods of Calabar Metropolis with zoning of the 1973 Calabar urban master plan.

To achieve this aim, the following objectives were formulated

(i) to determine the difference between total land area of residential land use as contained in the Calabar urban master plan and built up residential land use areas in excess of the total land area in the zoning plan.

(ii) to examine the activities of the institutions and agencies of government responsible for development control in Calabar Metropolis of Cross River State, Nigeria.

2. The Study Area

The Study Area is Calabar Metropolis and it is located between longitudes $08^0\ 18^1$E and $08^0\ 24^1$E and latitudes $04^0\ 56^1$N and $05^0\ 4^1$N. It is bounded by the Great Kwa River in the east and the

Calabar River in the west. The banks of these two Rivers are extensive swamps which limit the growth of Calabar eastward, westward and southward. These extensive swamps restrict land use development in certain locations, for example, Anantigha, Jebbs, Marina and the coastlines. However, because of limited space, developers in recent times applied the technology of sand filling to reclaim the swamps for residential purposes. The sand filled areas normally end up as flood plains and render such developments vulnerable to flood hazard. Professionally, Obongha, Ojikpong, Emri, and Upuji (2016) pointed out that most of the swamps were zoned for vegetable gardening/urban agriculture and recreation as contained in the Calabar urban master plan but its prescriptions were not followed strictly. Figures 1 – 8 show the location of the Study Area, its neighbourhood zones and portions of the zoning plan, sectorial arrangement and projections in the 1973 Calabar urban master plan.



Figure 1: Study Area Showing Nigeria and Cross River

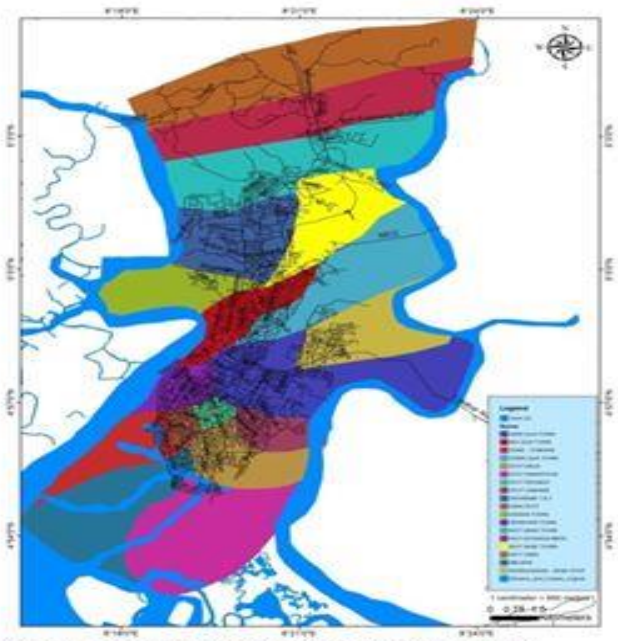


Figure 2: Study Area Showing 18 Residential Neighbourhoods



Figure 3: Study Area Showing Sectors in the Master Plan of 1973



Figure 4: Study Area Showing the Action Plan/Zoning Plan

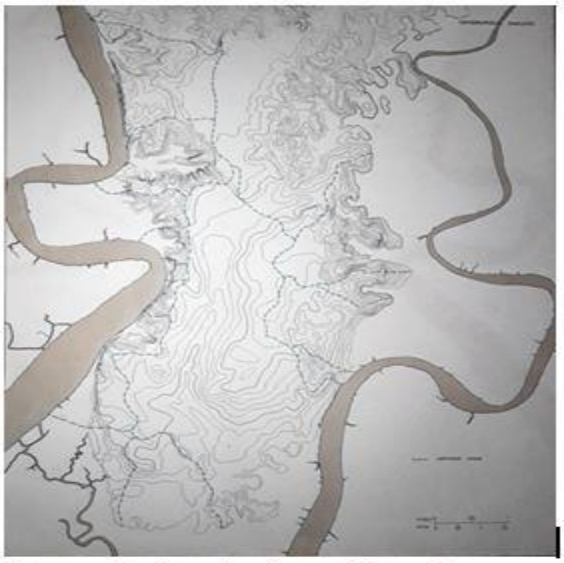


Figure 5: Study Area Showing Contour Crenulations

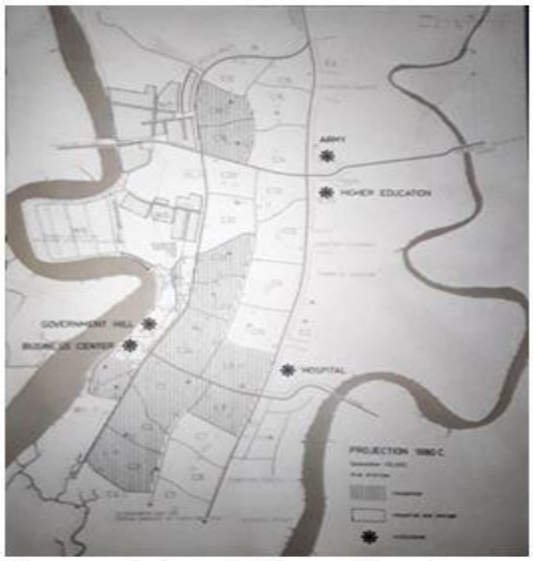


Figure 6: Study Area Showing Projection to 1980



Figure 7: Study Area Showing Projection to Year 2000C from the 1973 Master Plan

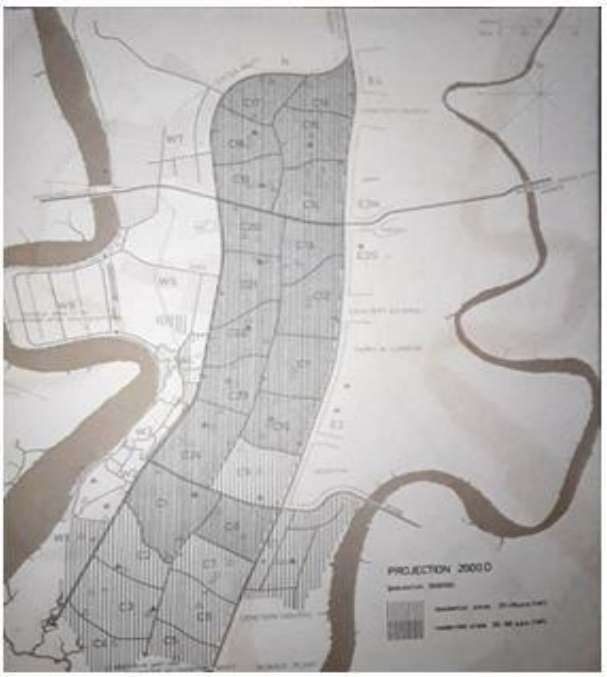


Figure 8: Study Area Showing Projection to Year 2000D from the 1973 Master Plan

4. Materials and Methods

This research employed the survey design method. The survey design method took both qualitative and quantitative approaches using scaled measurements which involved bivariate analysis of residential land use with total residential land use areas contained in the 1973 Calabar urban master plan and the built up

residential land use areas in excess of the master plan in a student's *t*-Test statistic. The analyses were to determine whether there is a difference between total land area of residential neighbourhoods in the Calabar urban master plan and the built up residential land use areas in excess of the total residential land use areas in the Calabar urban master plan. Map analyses were carried out by obtaining an existing land use map of Calabar Metropolis from the Cross River State Geographic Information Agency. From the map, built up residential land use was identified and compared with the zoning of the Calabar urban master plan of 1973. Both the existing land use map and the zoning plan were critically studied and compared for the purpose of identifying similarities and differences in the residential land use.

Map analysis was complimented with empirical verification of features on the landscape using Google Earth Imagery and reconnaissance survey. Map analyses also led to identifying built up residential land use areas in excess of the residential land use areas contained in the 1973 Calabar urban master plan (m^2). These excess built up residential land use areas were measured individually and then summed up to give a measure of excess built up residential land use areas for each neigbourhood. These measurements were thus, taken for all the eighteen residential neighbourhoods of Calabar Metropolis. Similar measurements were also carried out in the zoning plan using the linear planimeter (Obongha, 2024).The linear planimeter is a standard measuring tool/instrument in the field of Urban Planning, Cartography, Geography, Land Surveying, Architecture, and Engineering which is used in determining Euclidean distances and spatial area, demarcating boundaries and parcels of land on a map (Roser, et al., 2011). Its measurements in this study were taken using the map scale and represented in metres.

The measurement obtained from the zoning plan was taken as $t_1$and those from the enclaves of excess built up residential land use areas in all the neighbourhoods were taken as t_2 and thereafter, subjected to a paired sample student's *t*-Test statistic.

The student's *t*-Test is mathematically expressed as:

$$t = \sum \; d\sqrt{n(\sum ed2)} - (\sum d)2n - 1$$

Where $\sum d =$ the sum of the difference.

The assumptions/conditions of the Student's *t*-Test statistic showed that:

(i) Dependent variable must be continuous (that is interval or ratio scale).
(ii) The dependent variable should have related groups or samples (that is dependent observations). This means that the subjects in the first group are also in the second group.
(iii) Data should be normally distributed.
(iv) There should be no outliers in the difference between the two related groups.
(v) When one or more of the assumptions for the paired sample *t*-Test is not met, then the result will be incorrect.

Table 1.0 showed data obtained from measurements during map analyses of the built up residential land use areas in excess of the total residential land use areas in the Calabar urban master plan and that of the zoning of the Calabar urban master plan of 1973. The data were used as variables$t_1$and t_2 for bivariate analyses using a paired sample student's *t*-Test statistic and the result therefore, has been presented in Tables 2.0 and 3.0.

Table 1.0: Map analyses of zoning plan and built up residential land use in excess

S/N	Name of Residential neighbourhood	Total residential land use areas in the master plan (m^2) (t_1)	Built up residential land use areas in excess of the master plan (m^2) (t_2)
1	Akim Qua Town	50,300	15,251
2	Big Qua Town	20,250	3,469
3	Duke/Cobhom Town	21,800	2,802
4	Ediba Qua Town	38,599	8,908
5	EfutAbua	29,600	4,453
6	EfutAnantigha	29,750	12,557
7	EfutEkondo	41,890	8,245
8	EfutUwanse	29,120	6,112
9	Ekorinim 1 and 2	32,550	11,368
10	EsinUfot	22,670	6,131
11	Essien Town	27,900	4,290
12	Henshaw Town	32,678	5.368
13	IkotAnsa	41,800	13,702
14	IkotEffanghaMkpa	22,670	10,050
15	IkotIshie	40,480	4,093

Source: Researchers compilation, 2024.

= Neighbourhood not contained in the 1973 Calabar urban master plan

Activities of the various institutions of government responsible for development control were also investigated. These institutions include development control agency, urban renewal agency, and the town planning department. The personnel of the various institutions were examined and evaluated based on capacity and professionalism. However, this was done qualitatively.

5. Analysis and Result

The student's *t*-Test statistic was used in order to achieve objective one, whether there is a difference between t_1 and t_2.The output of the test statistic in Table 2.0 showed that there is a significant difference between the total land use areas of residential land use as contained in the Calabar urban master plan and built up residential land use areas in excess of the total land areas in the zoning plan. Table 2.0 showed a positive mean and standard deviation results from the student's *t*-Test statistic.

Table 2.0: Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Residential land use in the Master Plan (m^2) ($t1$)	31163.17	18	11915.462	2808.501
	Built up in excess of the zoning plan (m^2) ($t2$)	7609.083	18	3843.1651	905.8427

Source: Researchers data analysis, 2024

The analysis in Table 3.0 showed that the p-value was $0.000 \leq 0.05$ confidence level giving a t-value of 9.46.Therefore, based on confidence interval of 95.0 per cent and p-value of 0.000, there is a statistically significant difference between the total land use areas of residential land use as contained in the Calabar urban master plan and built up residential land use areas in excess of the total land areas in the zoning plan (Table3.0).

Table 3.0: Paired Samples Test

	Paired Differences					**T**	**Df**	**Sig. (2-tailed)**
	Mean	**Std. Deviation**	**Std. Error Mean**	**95% Confidence Interval of the Difference**				
				Lower	**Upper**			
Residential land use in the Master Plan (m^2) (*t*1) Pair 1 Built up in excess of the zoning plan (m^2) (*t*2)	23554.0833	10564.3271	2490.0358	18300.5670	28807.5996	9.459	17	.000

Source: Researchers data analysis, 2024.

The objective one sought to know whether there is a difference between the total land use areas of residential land use as contained in the Calabar urban master plan and built up residential land use areas in excess of the total land areas in the zoning plan. The result statistically proofs that there is a difference between the total land use areas of residential land use as contained in the Calabar urban master plan and built up residential land use areas in excess of the total land areas in the zoning plan. This means that residential land use areas/physical developments within the 18residential neighbourhoods of Calabar Metropolis have exceeded the zoning of the 1973 Calabar urban master plan.

The implication of this result is that there is no compliance with the master plan of Calabar Metropolis. This is due to the age of the master plan. Professionally, a master plan ought to have been reviewed within duration of 25-30 years. However, from 1973 to 2023 is fifty years in which Calabar urban master plan should have been reviewed twice. But this was not done as a result of institutional failures. Another important factor that contributed to the result is population increase. The increase in population from 1987 to date has led to high demand for land for physical/residential development. This led to expansion of physical development to areas originally not zoned to residential use and as such residential development took over

agricultural lands and some industrial estates. However, this marginal difference between residential areas in the master plan and built up residential land use areas have brought about unhealthy mixed use development with potential conflicts between industrial and residential land uses within land areas originally allotted for industries in the master plan.

Objective two was meant to examine the activities of the institutions and agencies of government responsible for development control in Calabar Metropolis of Cross River State, Nigeria. These Institutions/Agencies include: development control agency, urban renewal agency and the town planning department.

Table 4: Personnel of Development Control Agency (Task Force)

Personnel	Qualification	Profession
Task Force Chairman	Civil Engineering	Politician/not registered with COREN
Task Force Secretary	Business Management	Politician
Three other members	Not verifiable	Politicians
Commissioner for lands (Supervisor)	Ph.D Philosophy	Politician

Source: Researcher's compilation, 2024.

Government possesses the sole responsibility of appointing members into the development control agency as seen in Table 4. The chairman of the agency in the last administration was a Civil Engineer by training but not registered professional and by ethics of professionalism he was a quack alongside members of his team as well as their supervisor. This combination of non-qualified officers is a contravention or violation of the urban and regional planning law of 2004.

The result of this combination has been found to be a violation and non-compliance with the master plan as the agency responsible for monitoring development lacks professional technicalities to do so. This however, is a confirmation of and empirical study carried out by Cobbinah and Amoako (2014) that ineffectiveness of zoning is a product of political vulnerability. That is to say, the political class contravenes zoning of a city than any other class in Nigeria. Their observation is highly experienced in Calabar Metropolis where the political class hired political associates into professional offices and the end result has been destruction of restrictive covenants and zoning ordinances.

Table 5: Urban Renewal Agency (Task Force)

Personnel	Qualification	Profession
Task Force Chairman	First Degree	Politician
Task Force Secretary	Same	Politician
Other member	Same	Politicians
Commissioner for lands (Supervisor)	Ph.D Accountancy	Politician

Source: Researcher's compilation, 2024.

The Task Force responsible for urban renewal (Table 5) is also a complete deviation from the norm. It took the pattern of the last administration where registered Town Planners with adequate professional experience are not appointed into the agencies. This neglect has contributed immensely to the observed non-compliance with the master plan resulting to marginal difference between prescriptions of the master plan and new residential developments. As noted by Ocram (2015) that land uses are zoned into different categories and sub-categories. For example, in the residential land use as a category, there are sub-categories such as low, medium, and high densities as well as height control. However, it has become a difficult task to maintain this standard in Calabar Metropolis owing to the destruction of the master plan.

Table 6: Town Planning Department

Personnel	Qualification	Profession
Director of Town Planning	M.Sc. URP	Registered with TOPREC
Deputy Director	M.Sc. URP	Registered with TOPREC
Deputy Director	PGD URP	Registered with TOPREC
Zonal Town planning Officers 1, 2, and 3	PGD URP	Registered with TOPREC
Planning Officers 1 (5) in number	HND &B.Tech URP	Registered with TOPREC
Technical Officers (3)	HND	MNITP

Source: Researcher's compilation, 2024.

Negligence on the part government is another factor for non-compliance. The government failed in its statutory responsibilities of strengthening the institutions responsible for monitoring compliance by way of providing vehicles for patrol and other necessary equipment. Government also neglected the Town Planning Officials who have the technical know-how and professional training of monitoring compliance with zoning in the master plan but rather engaged quacks and created counterpart agencies in 2018, one of which is "Development Control Agency" (Task Force) made up of non-professionals without required skills to venture into the affairs of monitoring physical development and the end result was disastrous (Tables 4 & 5).

Many developments were allowed to take place in areas allotted for other land uses. Heights, densities and space standards of the zoning plan were seriously abused. A good example is the Federal Housing Estate where worship areas are developed without approval, gasoline stations are built in zones not meant for them, reckless and chaotic developments were also permitted. The Town Planning Department has been sidelined over the years with the number of registered officers (Table 6) and other 45 planning consultants in professional practice and academia in Cross River State, none has been sourced for to manned any of these institutions responsible for development control in Calabar Metropolis.

6. Conclusion

This study was basically conducted to guide the government of Cross River State and its institutions involved in physical development control on their actions. The zoning plan of the 1973 Calabar urban master plan has been bastardized resulting to aesthetically unpleasant physical environments, and hence, the difference between the current urban milieu (the residential land use) and the designed zoning plan of the

1973 master plan. Therefore, this study recommends the strengthening of institutions involved in development control such as the Town Planning Department by providing the needed materials, equipment, and allowing them to perform their responsibilities without political interference.

Other institutions/agencies must be made up of professionals who are certified by the Town Planners Registration Council of Nigeria (TOPREC). Government must not duplicate/pluralize the functions of the recognized institutions by way of creating similar agencies with similar functions as it were in 2018. There is need to urgently review the 1973 Calabar Master Plan with the involvement of indigenous Town Planners. Finally government of Cross River State must as a matter of urgency domesticate the 2004 urban and regional planning law. Adherence to these recommendations would solve a great deal of urban planning problems in Calabar Metropolis, Cross River State, Nigeria.

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