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Assessment of The Degree of Conformity of Existing Land Use Patterns of Calabar Metropolis with the 1973 Calabar Urban Master Plan

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ABSTRACT

Land use conformity with the master plan of any urban environment is critical as it encourages spatial segregation of activities leading to environmentally sustainable developments. This study assessed the difference between the existing land use patterns of Calabar Metropolis and the 1973 Calabar urban master plan. This was done by postulating a null hypothesis that there is no significant difference between the existing land use patterns of Calabar Metropolis and the 1973 Calabar urban master plan. The study adopted a survey design method with qualitative and quantitative approaches. Qualitative approach involved a combination of interviews and questionnaire administration and weighted on the Likert Scale while quantitative approach used data obtained from map analysis on X_1 and X_2 variables depicting existing land use patterns and the 1973 Calabar urban Master plan. The One-Way ANOVA was applied in the test statistic and the result showed a significant relationship. This result pointed to the fact that there is no controlled development in Calabar Metropolis because the planning authority has been handicapped without facilities needed to function optimally. The study therefore, recommended for strengthening of the planning authority as well as urgent review of the master plan.

Key Words: ANOVA; Conformity; Controlled development; Existing land use patterns; Likert scale; Map analysis; Master plan.

INTRODUCTION

Land use conformity is simply the degree to which two or more land uses, such as residential, commercial, and recreational for example, coexist as zoned in the master plan without a significant negative impact on each other and the residents (Cengiz, 2013). Land use conformity brings about functional segregation, in that one land use type such as residential has a positive impact on the other, for example, commercial land use as indicated in the zoning ordinance of the master plan. Non-conforming land use on the other hand, could be seen as the use to which a particular land is put, as opposed to the use designed in the zoning ordinance of the current master plan. In the earliest days of zoning all uses were classified very simply by a “hierarchy of uses” into three major districts or zones such as residential, commercial and industrial or manufacturing (Cengiz, 2013). Residential uses included living areas with a few other essential facilities such as churches, schools and depots. Facilities allowed in the residential zones were also permitted in commercial zones. Manufacturing was a catch-all for every kind of use including manufacturing, commerce and housing for the low-income people who could not afford to live elsewhere (Cengiz, 2013; Duany and Tallen, 2002).

Non-conforming land uses also exist in African cities such as Cairo, Johannesburg, Pretoria, Kisii, Nwanza, Dar Salaam, Abuja, Kano, Lagos, Port Harcourt, Umuahia and others. In the city of Cairo, Egypt for example, zoning regulation is enshrined in the master plan with establishment of strong institutions that monitor compliance with the master plan and controlled development. The Tourism Development Authority (TDA) for example, monitors all developments related to tourism while the New Communities Development Authority (NCDA) monitors all residential and institutional developments. Other developments for example, industrial and commercial also have their respective agencies. These agencies are answerable to the Town Planning and Engineering Department who gives planning permits for all development and redevelopment activities. Despite all these agencies

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monitoring and controlling physical developments, non-conforming land uses exist in patches as relics of historical and cultural districts that predated their respective zoning regulations (Ahmed and Abd-Elkawy, 2020).

In Kisii city of Kenya, according to Omollo (2019) Kisii got its master plan in 1972 and by 2005 after thirty-three years, there were serious distortions in the zoning regulation of the 1972 master plan that resulted in injurious and non-conforming land uses. However, currently, these non-conforming land uses coexist between one and the other. In Abuja, Nigeria, for example, non-conforming land uses exist in the Federal Capital Territory (FCT). Studies have shown that the Abuja Master Plan was prepared in 1970 and the central area was designed by a Japanese Architect, Kenzo Tange to accommodate all the land uses including residential, institutional, administrative, commercial, industrial, recreational, and circulation. Non-conformity of land uses was obvious in the late 1990s despite demolition exercises embarked on by the then Minister of the FCT between 1999 and 2007. The Abuja Master Plan of 2008 was also established as a review of the 1970's master plan (Nor, 2017). This review was done basically to curb non-conforming land uses which are still in existence. Reports have shown that the present Minister of the FCT has earmarked and named for demolition several zones of non-conforming land uses in the FCT.

Other Nigerian cities such as Kano, Lagos, Port Harcourt, Owerri, Umuahia, and Enugu have experienced series of demolition exercises by successive governments in order to reduce the impact of non-conforming land uses and distortions of their master plans. Ibrahim and Mai, (2020); Godswill, Nnaemeka, and Ukachukwu, (2017) have shown that institutional decay (especially among institutions and agencies responsible for urban land use administration), lack of political will and administrative deficiencies in enforcing compliance with their respective master plans are some of the factors responsible for persistence of non-conforming land uses in Nigerian cities.

In Calabar Metropolis, some of the insensitivity in urban land use planning has led to some patterns of land use antagonism. Non-conforming land uses seem to exist in all the neighbourhood zones of Calabar Metropolis. For example, within the spectrum of what is generally defined as a particular land use such as a residential zone, is often interspersed with pockets of other uses which are remnants of socio-cultural land use practices, especially in the old unplanned neighbourhoods of Calabar Metropolis. In some of the neighbourhoods of Calabar Metropolis, land use may be chaotic and serious efforts may have to be made to clearly discern the types and sub-types. The difficulty here lies in the fact that the parameters to be used in delineating the sub-types may be spatially invariant and as such, not sufficiently discriminatory as to produce distinctive classes (Obongha, 2024). This happens because institutions responsible for land use planning lacks political will resulting in non-compliance with the existing master plan particularly by those with political power.

From the foregoing, it is obvious that land uses in Calabar Metropolis are inappropriately intermixed with residential zones and without compliance with the Calabar urban master plan of 1973, and as such, have destroyed the aesthetics of the city landscape. Non-conforming land uses are sometimes, potential health hazards. There are several negative effects documented by many studies for converting one land use type to the other as well as destroying the urban milieu (Foreman, Reineking, and Hersperger, 2002). Decisions on land uses can have profound consequences – both positive and negative, subject to the views and values of the affected residents. This study attempts a deep examination of critical issues on land use pattern in a city of a developing country, Calabar Metropolis, Nigeria.

The study is however, aimed at assessing the difference between the existing land use patterns and those contained in the 1973 Calabar urban master plan. This aim was achieved by testing a null hypothesis that there is no significant difference between the existing land use patterns of Calabar Metropolis and the 1973 Calabar urban master plan

The Master Plan

According to Kumar (2017) the master plan is a comprehensive plan that integrates various aspects of planning such as land use, housing, transportation, infrastructure, and development control. The comprehensiveness of the master plan, therefore, embraces all aspects which are necessary to improve the socio-economic characteristics and quality of life of the people. The master plan is multidisciplinary in nature and encompasses

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thoughts and practices from the social sciences, economics, geography, urban planning, environmental sciences, engineering, architecture and surveying. The master plan is a long-term document that maps out development for future, as well as clears out the vision for perspective year of a city. The master plan focuses on rational use of the land and utilized optimally for the various activities that take place in a city. The proposals for a master plan development are usually environmentally sustainable and based on inclusive planning. The master plan concept however, encourages spatial segregation of land uses and clustering of similar land uses.

The master plan includes ideas from all sections of people in the community in its development proposals and focuses on the following principles: (i) affordability (ii) restrictions on ecologically sensitive areas (iii) heritage sites and traditional build up areas and gives special norms for such areas and (iv) balanced growth of the city. The master plan emphasises zoning and prevents concentration of injurious land uses/activities in a particular location. It takes into account appropriate distribution of facilities, infrastructure, networks, housing, and follows neighbourhood concept development. The master plan is an instrument to work out land and infrastructure requirements for various urban and rural areas, and allocate land for various uses to result in harmonious and sustainable distribution of activities so that towns/cities are provided with a form and structure within which they can perform all their economic and social functions efficiently and effectively. The purpose of a master plan is to promote growth, guide and regulate present and future development of towns and cities with a perspective of 20-25 years (Kumar, 2017).

The Hampshire Planning Commission (2021) lists the characteristics of the master plan as follows: (i) physical plan: the plan as a fundamental guide to the physical development of the city; (ii) long ranged activities involving long term planning; (iii) comprehensiveness encompassing all the functions that make a city work, such as transportation, housing, land use, utility systems, and recreation. In addition, the master plan provides (iv) the interrelationships of functions; (v) a guide to decision making for the planning board, the governing board and mayor or manager; (vi) a statement of public policy which translates community values, desires, and visions into land use and development principles that can guide the future growth of the city.

The master plan has been modeled by the researcher from the New Hampshire Planning Commission as shown in Figure 1.0. The model explains various dimensions and elements of the master plan including its impact on urban land use planning and the socio-economic characteristics and improvement of life of the residents of a particular city. Its comprehensiveness also includes population projection and economic activities performed by the residents. It integrates long term and multidisciplinary programmes.

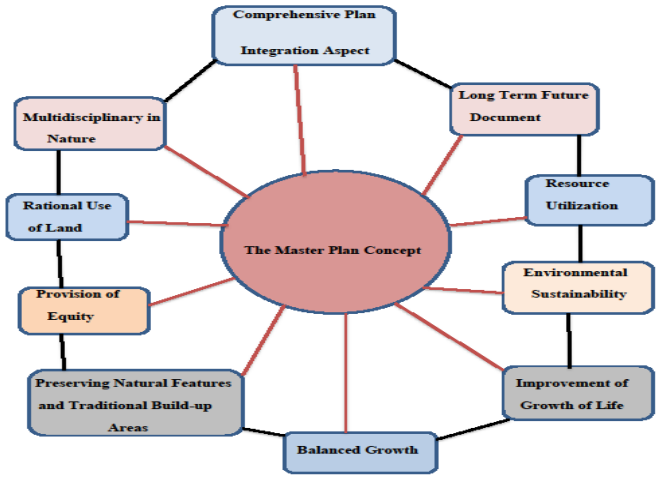

Figure 2.10: Model of the Master Plan Concept
Source: Modeled by the Researcher from New Hampshire Planning Commission (2021)

Figure 1.0: Model of the master plan concept

Source: Modelled from the Hampshire planning commission

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In the application of the master plan for sustainable urban land use planning, Neamtu (2011) conducted a study in Romania using two methods. Firstly, interviews were conducted with 25 Town Planners working for the city council. Secondly, a number of 40 master plans were accessed in order to assess whether they meet the principles and objectives of sustainable development. The results of the study showed that majority of these master plans were prepared without involving the stakeholders from within the community and not also synchronizing with the national or regional plans. There were also elements of the verbal policy plans which seem to be unusual. This is so because they represent a drastic departure from the urban plans and contain very few or no statistical data and maps. Rather, they basically focused on a vision statement and strategic objectives of the city.

Kasala (2015) conducted similar research on the return to master planning in Dar es Salaam, East Africa. The study applied two methods. First, researcher reviewed secondary data which comprises many years of Dar es Salaam strategic/structure plans. Second, the researcher interviewed professionals in the academia, planning institutions, local authorities, and NGOs with a questionnaire. The result of the study showed that several master plans of Dar es Salaam were prepared and were never implemented. Failure to implement the mater plans resulted in the introduction of alternative approach to planning, known as Strategic Urban Development Planning (SUDP). The study concluded that the SUDP was eventually returned to master planning due to misconceptions. The return persisted in the sense that the key stages of SUDP which include introduction, plan formulation, content determination and interpretation into actions were done in the context of laws and procedures of the master plan.

Nallathiga (2016) investigated the role of Master Plans in city development in India, using the methodology of systematic reviews. The concepts and methods of traditional master planning in India owe its origin to British town planning laws. The importance of master plans has primarily been confined to the aspects of land use planning, physical infrastructure, and development control. The study by Nallathiga (2016) highlighted the role of master planning to include a design for the physical, social and economic development of the city, and also to improve the quality of life as well. The master plan performed functions as follows: (i) to guide the development of the city in an orderly manner so as to improve the quality of life of the people, (ii) to organize and coordinate the complex relationships between urban land uses, (iii) to chart a course for growth and change, (iv) to be responsive to change and maintain its validity over time and space, and be subject to continual review, (v) to direct the physical development of the city in relation to its social and economic characteristics based on comprehensive surveys and studies on the present status and the future growth prospects, and (vi) to provide a resource mobilization for the proposed development works.

Uncontrolled developments taking place in Calabar Metropolis have raised several professional concerns as to whether there is an existing master plan which guides development or not. In 1973, the administration of U. J. Esuene saw the need for Calabar urban master plan and engaged TESCO-KOZTI Consulting (Nig.) Ltd., a town planning firm based in Hungary but with office in Calabar, Cross River State, Nigeria. The Calabar urban master plan was to address some key areas such as effective land use planning. It was also to overcome the challenges of development control with emphasis on demographics and socio-economic characteristics of the residents. Other details of the master plan were to include population and land use projections to the year 1998. It was proposed that the master plan would be reviewed after twenty-five years, from 1973 to 1998. However, the proposal of the master plan terminated at the present-day Army Junction (welcome to Calabar) and other new zones such as Ikot Effangha Mkpa, Ikot Eneobong, Ikot Omin and Ikot Ekpo were not captured in the Calabar urban master plan of 1973. In 1998, the Calabar urban master plan was not revised due to frequent changes in administration during the Military era.

In 2000, the then Governor of Cross River State invited a team of indigenous Town Planners to revisit and review the Calabar urban master plan of 1973. A contract was awarded and projections were made to 2020. Some of the important areas to be revised were: the relocation of the Watt Market and the Margaret Ekpo International Airport. The proposal to relocate the Watt Market, for example, brought about tension within Calabar Metropolis to the point that the Efik women came out nude to protest the relocation plan. Their argument was that the location of Watt Market at the present position was ancestral and all of them including their ground parents were born to meet the Watt Market at that present location.

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Unfortunately, the 2000 Calabar urban master plan policy document has been reported missing and could not be found or traced in the Ministry of Lands, nor in its affiliates such as the Departments of Town Planning and Surveys. Now, it is the 1973 policy document that is available in the Town Planning Department of the Ministry of Lands. But this document does not cover the present Calabar Metropolis. In 2012, the then Governor of Cross River State made attempt to review the 1973 and 2000 Calabar urban master plans and renamed it the Greater Calabar Master Plan (to cover all parts of Calabar Metropolis including Ikot Effangha Mkpa, Ikot Omin, Ikot Eneobong, and Ikot Ekpo). The government engaged the Canadian Pacific Consulting Services (CPCS) and made commitment to the tone of 1,200,000,000.00 USD for the project (Obongha & Bassey, 2025). CPCS commenced the plan preparation and made public hearing with several presentations to the Officials of Cross River State Government, professional bodies, and the general public. Regrettably, the administration that took off from May, 2015 failed to follow up with the Greater Calabar Master Plan project despite several push from the Town Planning Professionals and the CPCS. On January 24, 2018 the Governor inaugurated an eight-man task force on development control leaving the Town Planning Professionals idle and redundant. The task force was to handle development control, based on the observed distortion of the master plan which was going on at a very fast rate, and that people were building houses without approved plans. Others were erecting industrial buildings in residential zones, building residential accommodation in flood plains and without respecting the building lines between highways, roads and clearance as stipulated in the Federal Highway Codes (Obongha & Bassey, 2025).

Despite this observation, the 2015-2023 administration brought development control to a halt, land use planning virtually ceased, and many open spaces left as green areas in the 1973 and 2000 master plans were built up. In fact, the administration injected so many counterpart agencies into land use planning, many of which were non-professionals which allowed any form of development at any location, whether conforming or non-conforming. Demolition exercises which used to be conducted by the Directors of Town Planning in the previous administrations could no longer take place in Calabar Metropolis (Obongha & Bassey, 2025). Public/institutional lands such as the University of Cross River State, Calabar Campus experienced over thirty per cent of its land being built up by invaders (Obongha, 2024). The year 2000 Calabar urban master plan recommended for a review after 20 years (that is in 2020) but, was not reviewed despite efforts by the previous administrations to review the master plan and renamed it “Greater Calabar Master Plan” even before the year 2020. The failure of the 2015-2023 administration to follow up with the Greater Calabar Master Plan resulted to haphazard physical development without control in Calabar Metropolis (Obongha, Ukam & Inah, 2024). A critical examination of the Calabar urban master plan as compared to the existing land use patterns of Calabar Metropolis has not been carried out and, therefore, becomes a gap which this study is meant to fill up.

MATERIALS AND METHOD

This research employed the survey design method. The survey design method took both qualitative and quantitative approaches. The qualitative approach involved the use of focus group professional interviews and questionnaire administration for qualitative data collection and description. The quantitative approach involved the use of scaled measurements which considered the following: (i) GIS-based mapping and (ii) bivariate analyses of variables on land uses. The bivariate analyses of land use were done, using a One-Way ANOVA analysis. The analysis was to determine whether there is a difference between the master plan and the existing land uses of Calabar Metropolis. Two methods were employed for data collection, namely: (i) Map analysis of the spatial area (m^2) of land uses zoned in the Calabar urban master plan and the existing land uses and (ii) administration of a structured questionnaire.

Map analysis: an existing land use map of Calabar Metropolis was obtained from the Cross River State Geographic Information Agency. From the map, major land uses were identified and compared with the Calabar urban master plan of 1973. Both the existing land use map and the Calabar urban master plan were critically studied and compared for the purpose of identifying similarities and differences in land uses. Map analysis was complimented with empirical verification of features on the landscape using Google Earth Imagery and reconnaissance survey to establish the functional relationship between the two maps using the linear planimeter (Roser, Leiborici, and Jackson, 2011).

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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/spatial area, demarcating boundaries and parcels of land on a map ((Roser, et al., 2011). The usefulness of the linear planimeter to this study cannot be overemphasized. Its measurements were taken, using the map scale and represented in metres. Likewise, a questionnaire was also used in this study. The questionnaire was designed using responses on a Likert scale to measure land use patterns and compliance with the Calabar urban master plan. It contains questions with options such as Strongly Agreed (5 points), Agreed (4 points), Strongly Disagreed (1 point), Disagreed (2 points) and Undecided (3 points).

The questionnaire was used to collect qualitative data which complimented data from measurements carried out using the linear planimeter. Data obtained from the administration of the questionnaire were not used in testing the hypothesis, rather were used for description of evidence-based information on incongruous land uses in Calabar Metropolis.

The respondents were heads of household. The respondents were sampled from the total households of Calabar Metropolis with a sample size of 494 household heads. The population was 630,628 people. In this study, households were used as the sample frame. An average of six (6.0) people is officially accepted as household size in Nigeria (National Bureau of Statistics, 2021). Therefore, an average household size of six people from the total population of 630,628 people, making a total number of 105,105 households was used for the study**.**

Data Analysis

The Calabar Urban Master Plan and existing land use patterns

Table 1.0 showed data on land use types, location and area of coverage (m^2) as depicted in the Calabar urban master plan of 1973 and the existing land use patterns of Calabar Metropolis of 2023. The variables are the Calabar urban master plan (X_1) and the existing land use patterns of Calabar Metropolis (X_2).

Table 1.0: Area (m^2) of land uses depicted in the Calabar urban master plan and the existing land use patterns of Calabar Metropolis

S/No	Land use Type	Location	Calabar urban master plan area (m^2) (X_1)	Existing land area (m^2) (X_2)
1.	**Residential**			
		Akim Qua Town	**50,300**	**58,990**
		Big Qua Town	**20,250**	**20,800**
		Duke/Cobhom Town	**21,800**	**22,900**
		Ediba Qua Town	**38,599**	**39,900**
		Efut Abua	**29,600**	**30,750**
		Efut Anantigha	**29,750**	**40,300**
		Efut Ekondo	**41,890**	**41,900**
		Efut Uwanse	**29,120**	**30,300**
		Ekorinim 1 and 2	**32,550**	**54,600**
		Esin Ufot	**22,670**	**22,700**

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		Essien Town	**27,900**	**34,150**
		Henshaw Town	**32,678**	**32,700**
		Ikot Ansa	**41,800**	**43,900**
		Ikot Effanga Mkpa	**22,670**	**45,700**
		Ikot Ishie	**40,480**	**46,500**
		Ikot Omin	★	**55,900**
		Mbukpa	**49,300**	**50,200**
		Nyahasang	**29,580**	**42,500**
		Total	**560,937**	**714,690**
2.	**Commercial**			
		Watt Market	**1,256**	**1,600**
		Marian Market	**867**	**1,050**
		Ishie Market	**96**	**107**
		Akim Market	**101**	**110**
		Mbukpa Market	**122**	**189**
		Ikot Omin Market	★	**87**
		Ikot Ansa Market	★	**98**
		Bacoco Market	★	**112**
		Atakpa Market	★	**76**
		Uwanse Market	★	**65**
		Goldie Market	★	**54**
		Abasi Obori Market	★	**88**
		Beach Market	★	**120**
		Anantigha Market	★	**113**
		Edim Otop Market	★	**117**
		Nyahasang Market	★	**77**
		Total	**2,442**	**4,063**
3.	**Industrial**			
		Northern Estate	**3,800**	**501**

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		Southern Estate	**3,500**	**411**
		Jonathan by-pass	★	**517**
		Total	**7,300**	**1,429**
4.	**Institutional**			
		Federal/State Secretariats	**4,784**	**1,104**
		Army lands	**6,590**	**6,100**
		Navy lands	**4,550**	**4,400**
		Police lands	**4,300**	**4,200**
		Fire Service lands	**1,021**	**1,000**
		Prison lands	**1,450**	**1,400**
		Immigration/Customs lands	**2,650**	**2,600**
		Hospitals land	**3,982**	**3,082**
		Higher education land	**28,790**	**22,260**
		Airport land	**3,500**	**3,350**
		Cultural Centre	**900**	**600**
		Water Board land	**1,850**	**877**
		Total	**64,367**	**50,973**
5.	**Cemeteries**			
		Ikot Ansa	**1,200**	**1,200**
		Goldie	**1,090**	**1,090**
		Hawkins	**1,659**	**1,650**
		Etta Agbor Layout	★	**950**
		Essien Town	★	**800**
		Total	**3,949**	**5,690**
6.	**Open Space**			
		Stadium	**800**	**900**
		Ishie	**20**	**15**
		Akim	**14**	**10**

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		Federal Housing Est.	**128**	**103**
		State Housing Estate	**114**	**77**
		Millennium Park	**150**	**150**
		Big Qua	**11**	**10**
		Mbukpa	**13**	**10**
		New airport	**3000**	**3,000**
		Ikot Ansa	**12**	**09**
		Gulf Club	★	**15**
		Henshaw Town	**10**	**08**
		Total	**4,302**	**4,307**
7.	**Wetlands**			
		Anantigha	**37,670**	**12,627**
		Akai Effa	**28,550**	**11,301**
		Idundun	**23,750**	**12,408**
		Bacoco	**22,800**	**12,330**
		Total	**112,770**	**48,666**
	Total		**756,067**	**829,818**

★= Neighbourhood zones and land uses not contained in the 1973 Calabar Urban Master Plan

Source: Researcher's Field Survey, 2025.

With the data set in Table 1.0, the hypothesis formulated was however, tested. The Table 1.0 showed missing data in some neighbourhood zones that were not contained in the master plan as well as some land uses that were not in the master plan. Therefore, for the purpose of valid results, normality test was conducted on the data in Table 1.0 and made use of five data sets in each land use zone such as residential, commercial, industrial, institutional etc. for both existing land use patterns and the Calabar urban master plan for testing hypothesis one with the One-way ANOVA. The One-way ANOVA, for example, is used to estimate how the mean of a variable changes according to the level of an independent variable. One-way ANOVA was used because this study wants to know how an independent variable, in combination, affects a dependent variable. In the hypothesis stated above, the land uses zoned in the 1973 Calabar urban master plan and the existing land uses of Calabar Metropolis in 2023 were compared. ANOVA is mathematically expressed as:

$F = S_1^2/S_2^2$ ……..……..…….... eqn. 1

The assumptions/conditions of the One-way ANOVA showed that:

- The dependent and independent variables should be continuous.

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- The populations (independent variable) from which the samples were obtained must be normally or approximately distributed.
- The variances of the population must be equal and
- The groups must have the same sample size.

If these assumptions are not satisfied, the result that is gotten from the One-way ANOVA may not be valid.

The hypothesis was tested using the One-way analysis of variance (ANOVA). The Calabar urban master plan (X_1) as the independent variable and the existing land use patterns (X_2) as the dependent variable. The Test result is presented on Table 2.0. The Table 2.0 showed that the existing land use patterns of Calabar Metropolis in 2023 and the land uses depicted in the 1973 Calabar urban master plan are statistically different. F values were highly positive at 0.001 level of significance. This is because 0.001 is ≤ 0.05 confidence level at 95.0 per cent confidence interval. Therefore, it has been established that the result showed a statistically significant difference between the existing land use patterns of Calabar Metropolis and the Calabar urban master plan (Table 2.0).

Table 2.0: One-way ANOVA between the Calabar urban master plan and the existing land use patterns

Tests of Between-Subjects Effects

Dependent Variable: landareal

Calabarurbanexistingland	Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Calabar urban master plan area	Corrected Model	4941008008[a]	6	823501334.63	17.490	<.001
	Intercept	3032471937.0	1	3032471937.0	64.404	<.001
	LandusesType	4941008007.8	6	823501334.63	17.490	<.001
	Calabarurbanexistingland	.000	0	.	.	.
	LandusesType * Calabarurbanexistingland	.000	0	.	.	.
	Error	1318380633.2	28	47085022.614		
	Total	9291860578.0	35			
	Corrected Total	6259388641.0	34			
Existing land area	Corrected Model	4738377650[b]	6	789729608.27	20.377	<.001
	Intercept	1835933916.6	1	1835933916.6	47.373	<.001
	LandusesType	4738377649.6	6	789729608.27	20.377	<.001
	Calabarurbanexistingland	.000	0	.	.	.
	LandusesType * Calabarurbanexistingland	.000	0	.	.	.
	Error	1085141258.8	28	38755044.957		
	Total	7659452825.0	35			
	Corrected Total	5823518908.4	34			

a. R Squared = .789 (Adjusted R Squared = .744)
b. R Squared = .814 (Adjusted R Squared = .774)

Source: Researcher's data analysis, 2025.

The levene's test of equality of error variances or the homogeneity of variance was used to test the assumption that variances were equal across groups or samples. From the Table 3.0 P-value of 0.001 ≤ 0.05 confidence level (based on the mean and median which implied that the assumption of equal variance across groups) was significant. The homogeneity assumption of variance was not met which implied the variances were significantly different from each other. Nevertheless, this assumption did not impede the progress to analysis of variance, using the P-value of 0.001 (Table 3.0).

Table 3.0:

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
landareal	Based on Mean	5.999	13	56	<.001
	Based on Median	3.808	13	56	<.001
	Based on Median and with adjusted df	3.808	13	13.651	.010
	Based on trimmed mean	5.626	13	56	<.001

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: landareal
b. Design: Intercept + LandusesType + Calabarurbanexistingland + LandusesType * Calabarurbanexistingland

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The result was also illustrastrated with the ANOVA plot (Figure 2.0). The ANOVA plot showed the estimated marginal means that represent the difference between the existing land use patterns of 2023 and the Calabar urban master plan of 1973. The slope of the plot pointing upward explains the land area (m^2) in which the existing land use patterns have not complied with the prescriptions of the Calabar urban master plan. This difference has also been demonstrated in Figures 3.0 and 4.0.

Table 4.0: Univariate Tests

Dependent Variable: landareal

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	9287198418.5	6	1547866403.1	36.064	<.001	.794
Error	2403521892.0	56	42920033.786			

The F tests the effect of LandusesType. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

Table 5.0: Pairwise Comparisons

Dependent Variabl

(I) LandusesType	(J) LandusesType	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
Residential	commercial	32839.100*	2929.848	<.001	26969.910	38708.290
	Industrial	31208.800*	2929.848	<.001	25339.610	37077.990
	Institutional	29584.000*	2929.848	<.001	23714.810	35453.190
	cementeries	32175.000*	2929.848	<.001	26305.810	38044.190
	openspace	33096.800*	2929.848	<.001	27227.610	38965.990
	wetland	16890.900*	2929.848	<.001	11021.710	22760.090
commercial	Residential	-32839.100*	2929.848	<.001	-38708.290	-26969.910
	Industrial	-1630.300	2929.848	.580	-7499.490	4238.890
	Institutional	-3255.100	2929.848	.271	-9124.290	2614.090
	cementeries	-664.100	2929.848	.822	-6533.290	5205.090
	openspace	257.700	2929.848	.930	-5611.490	6126.890
	wetland	-15948.200*	2929.848	<.001	-21817.390	-10079.010
Industrial	Residential	-31208.800*	2929.848	<.001	-37077.990	-25339.610
	commercial	1630.300	2929.848	.580	-4238.890	7499.490
	Institutional	-1624.800	2929.848	.581	-7493.990	4244.390
	cementeries	966.200	2929.848	.743	-4902.990	6835.390
	openspace	1888.000	2929.848	.522	-3981.190	7757.190
	wetland	-14317.900*	2929.848	<.001	-20187.090	-8448.710
Institutional	Residential	-29584.000*	2929.848	<.001	-35453.190	-23714.810
	commercial	3255.100	2929.848	.271	-2614.090	9124.290
	Industrial	1624.800	2929.848	.581	-4244.390	7493.990
	cementeries	2591.000	2929.848	.380	-3278.190	8460.190
	openspace	3512.800	2929.848	.236	-2356.390	9381.990
	wetland	-12693.100*	2929.848	<.001	-18562.290	-6823.910
cementeries	Residential	-32175.000*	2929.848	<.001	-38044.190	-26305.810
	commercial	664.100	2929.848	.822	-5205.090	6533.290
	Industrial	-966.200	2929.848	.743	-6835.390	4902.990
	Institutional	-2591.000	2929.848	.380	-8460.190	3278.190
	openspace	921.800	2929.848	.754	-4947.390	6790.990
	wetland	-15284.100*	2929.848	<.001	-21153.290	-9414.910
openspace	Residential	-33096.800*	2929.848	<.001	-38965.990	-27227.610
	commercial	-257.700	2929.848	.930	-6126.890	5611.490
	Industrial	-1888.000	2929.848	.522	-7757.190	3981.190
	Institutional	-3512.800	2929.848	.236	-9381.990	2356.390
	cementeries	-921.800	2929.848	.754	-6790.990	4947.390
	wetland	-16205.900*	2929.848	<.001	-22075.090	-10336.710
wetland	Residential	-16890.900*	2929.848	<.001	-22760.090	-11021.710
	commercial	15948.200*	2929.848	<.001	10079.010	21817.390
	Industrial	14317.900*	2929.848	<.001	8448.710	20187.090
	Institutional	12693.100*	2929.848	<.001	6823.910	18562.290
	cementeries	15284.100*	2929.848	<.001	9414.910	21153.290
	openspace	16205.900*	2929.848	<.001	10336.710	22075.090

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

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Table 6.0: Multiple Comparisons

Dependent Variable: landareal

	(I) LandusesType	(J) LandusesType	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Scheffe	Residential	commercial	32839.10*	2929.848	<.001	22036.98	43641.22
		Industrial	31208.80*	2929.848	<.001	20406.68	42010.92
		Institutional	29584.00*	2929.848	<.001	18781.88	40386.12
		cementeries	32175.00*	2929.848	<.001	21372.88	42977.12
		openspace	33096.80*	2929.848	<.001	22294.68	43898.92
		wetland	16890.90*	2929.848	<.001	6088.78	27693.02
	commercial	Residential	-32839.10*	2929.848	<.001	-43641.22	-22036.98
		Industrial	-1630.30	2929.848	.999	-12432.42	9171.82
		Institutional	-3255.10	2929.848	.974	-14057.22	7547.02
		cementeries	-664.10	2929.848	1.000	-11466.22	10138.02
		openspace	257.70	2929.848	1.000	-10544.42	11059.82
		wetland	-15948.20*	2929.848	<.001	-26750.32	-5146.08
	Industrial	Residential	-31208.80*	2929.848	<.001	-42010.92	-20406.68
		commercial	1630.30	2929.848	.999	-9171.82	12432.42
		Institutional	-1624.80	2929.848	.999	-12426.92	9177.32
		cementeries	966.20	2929.848	1.000	-9835.92	11768.32
		openspace	1888.00	2929.848	.999	-8914.12	12690.12
		wetland	-14317.90*	2929.848	.002	-25120.02	-3515.78
	Institutional	Residential	-29584.00*	2929.848	<.001	-40386.12	-18781.88
		commercial	3255.10	2929.848	.974	-7547.02	14057.22
		Industrial	1624.80	2929.848	.999	-9177.32	12426.92
		cementeries	2591.00	2929.848	.992	-8211.12	13393.12
		openspace	3512.80	2929.848	.962	-7289.32	14314.92
		wetland	-12693.10*	2929.848	.010	-23495.22	-1890.98
	cementeries	Residential	-32175.00*	2929.848	<.001	-42977.12	-21372.88
		commercial	664.10	2929.848	1.000	-10138.02	11466.22
		Industrial	-966.20	2929.848	1.000	-11768.32	9835.92
		Institutional	-2591.00	2929.848	.992	-13393.12	8211.12
		openspace	921.80	2929.848	1.000	-9880.32	11723.92
		wetland	-15284.10*	2929.848	<.001	-26086.22	-4481.98
	openspace	Residential	-33096.80*	2929.848	<.001	-43898.92	-22294.68
		commercial	-257.70	2929.848	1.000	-11059.82	10544.42
		Industrial	-1888.00	2929.848	.999	-12690.12	8914.12
		Institutional	-3512.80	2929.848	.962	-14314.92	7289.32
		cementeries	-921.80	2929.848	1.000	-11723.92	9880.32
		wetland	-16205.90*	2929.848	<.001	-27008.02	-5403.78
	wetland	Residential	-16890.90*	2929.848	<.001	-27693.02	-6088.78
		commercial	15948.20*	2929.848	<.001	5146.08	26750.32
		Industrial	14317.90*	2929.848	.002	3515.78	25120.02
		Institutional	12693.10*	2929.848	.010	1890.98	23495.22
		cementeries	15284.10*	2929.848	<.001	4481.98	26086.22
		openspace	16205.90*	2929.848	<.001	5403.78	27008.02

Based on observed means.
The error term is Mean Square(Error) = 42920033.786.

*. The mean difference is significant at the .05 level.

Scheffe post hoc test of multiple comparison in the above table shows there is significant difference between residential and commercial, institutional, cemeteries, open space and wetland in the first row ($p < 0.01$)

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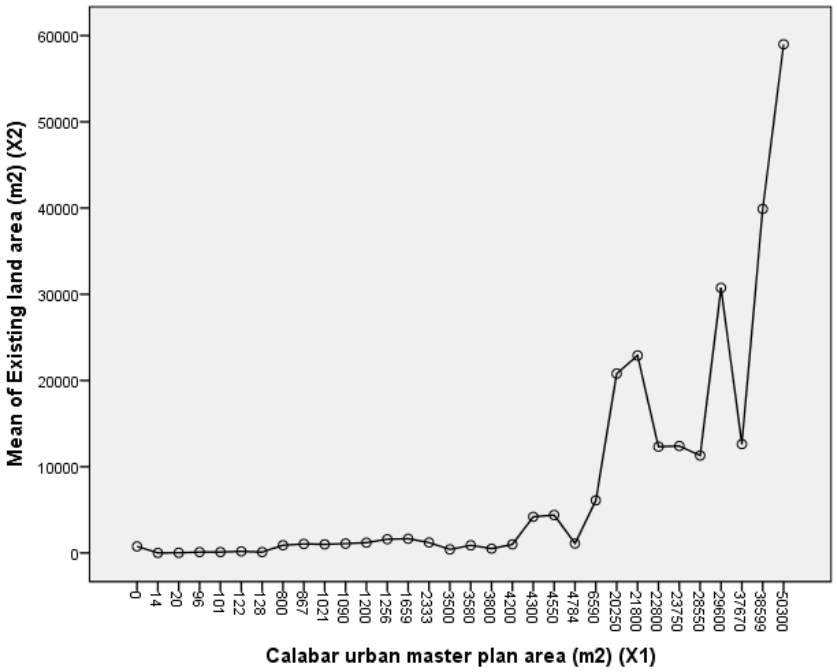

Figure 2.0: ANOVA Plot showing estimated marginal difference between the master plan and the existing land use patterns of Calabar Metropolis

Source: Researcher's data analysis, 2025.

The analysis in Figure 3.0 was derived from Table 1.0. It is a graphical representation of the land use zones depicted in the Calabar urban master plan and the existing land uses. Figure 5.0 showed the land area used up by the existing land use patterns of Calabar Metropolis and the direction of extension towards the wetlands.

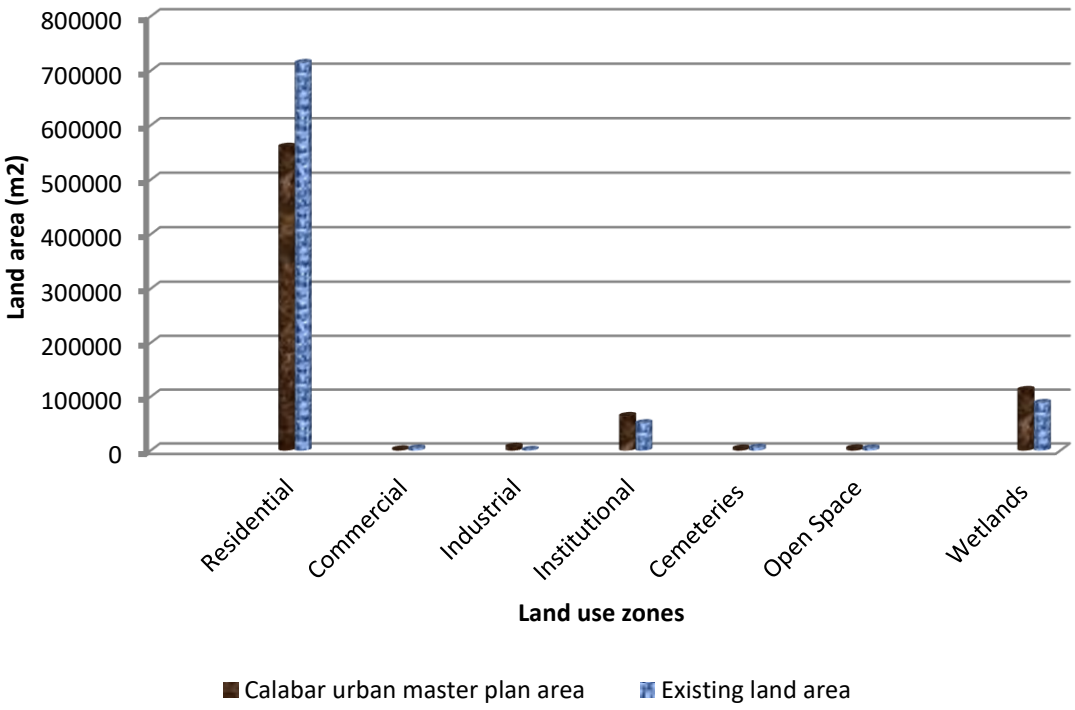

Figure 3.0: Bar graph derived from Table 1.0 showing the land area of the master plan and the existing land use zones.

Source: Researcher's compilation, 2025.

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Responses on compliance with the Master Plan/existing land use patterns

Table 7.0 showed responses on the Likert scale in compliance/non-compliance with the Calabar urban master plan. The Table 4.0 showed responses on land use development with a corresponding five (5) options on the Likert scale which explained the degree of acceptability of the observed urban land use development in compliance with the Calabar urban master plan. The five (5) options on the Likert scale include the following: strongly agree (5 points); that is if the respondents strongly agreed with applicability of the observed land use development as not in total compliance with the master plan. Agree (4 points); that is if the respondents merely agreed with the applicability of the observed land use development as not in compliance with the master plan. Strongly disagree (1 point); that is if the respondents were not totally in agreement with the observed land use development as not in compliance with the master plan. Disagree (2 points); if the respondents were not in agreement with the observed land use development due to non-compliance with the master plan and undecided (3 points); if respondents were those without any meaningful judgement on the observed land use development or had no idea with the master plan.

The Likert scale measured whether flood plains in Calabar Metropolis have been developed for residential housing and other land uses. About 152 respondents strongly agreed, 136 respondents agreed, 89 respondents strongly disagreed, 106 respondents disagreed, and 11 respondents were undecided making a total of 494 responses. Respondents who strongly agreed to all questions on the Likert scale make up (25.30 per cent), those that agreed (24.53 per cent), strongly disagreed (17.54 per cent), disagreed and undecided were (20.70 per cent) and (11.90 per cent) respectively. However, the average percentage mean response on the Likert scale is 32.12 per cent.

The Likert scale is mathematically expressed as:

$R_{11} = \sum W/AN \ (0 \leq R_{11} \geq 1)$ …… eqn. 2

Where: R_{11} = Relative importance index

$\sum$ = summation

W = weight given to each factor by the respondents (1-5)

A = highest weight (in this study 5)

N = sample size (in this study 494)

However, R_{11} falls within the range of zero to one (0-1) making it possible to compare opinions. Therefore, the benchmark for deciding the significant score is 0.05 as such values ≥ 0.05 are considered not significant while values ≤ 0.05 are significant. Responses on the Likert scale are considered as qualitative in this study and were not tested further.

Table 7.0: Responses on the Likert Scale concerning compliance/non-compliance with the Calabar urban master plan

Responses on land use development	**Scoring Method**						
	Strongly Agree	**Agree**	**Strongly Disagree**	**Disagree**	**Undecided**	**Total**	**Mean**
Flood plains are being developed for residential/other uses	152 (760)	136 (544)	89 (89)	106 (212)	11 (33)	494 (1638)	327.6

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Wetlands sand-filled for settlements	42 (210)	45 (180)	157 (157)	152 (304)	98 (294)	494 (1145)	229
Locations of some open markets are not conforming such as Atakpa, 8 Miles and Abasi Obori/Goldie	174 (870)	168 (656)	24 (24)	32 (64)	96 (288)	494 (1878)	375.2
Some cemeteries not in compliance with the master plan	158 (790)	137 (548)	96 (96)	88 (176)	15 (45)	494 (1691)	338.2
Many public institutions are adjacent injurious land uses such as University of Calabar/Airport	44 (220)	53 (212)	106 (106)	182 (364)	109 (327)	494 (1229)	245.8
Residential areas interspersed with industries	175 (875)	141 (564)	59 (59)	64 (128)	55 (165)	494 (1791)	358.2
Recreational land uses are inadequate and interspersed with educational uses such as stadium and state library	151 (755)	183 (732)	36 (36)	57 (114)	67 (201)	494 (1838)	367.6
Reserved open spaces are built-up by the affluent example, State housing	217 (1085)	193 (772)	49 (49)	33 (66)	2 (6)	494 (1978)	395.6
Non-conforming land uses are frequent in Calabar Metropolis	95 (475)	126 (504)	105 (105)	143 (286)	25 (75)	494 (1445)	289
Public land uses are often encroached by residential/industrial example, UNICROSS and Water Board	99 (495)	96 (384)	111 (111)	89 (178)	99 (297)	494 (1465)	293
Many cultural areas have been destroyed such as Cultural centre complex	69 (345)	57 (228)	121 (121)	178 (356)	69 (207)	494 (1257)	251.4
Total	**1,376**	**1,335**	**953**	**1,124**	**646**	**5,434**	**3212.4**
Percentage	**25.30**	**24.53**	**17.54**	**20.70**	**11.90**	**100**	**32.12**

Source: Researcher's compilation from Field Survey, 2025.

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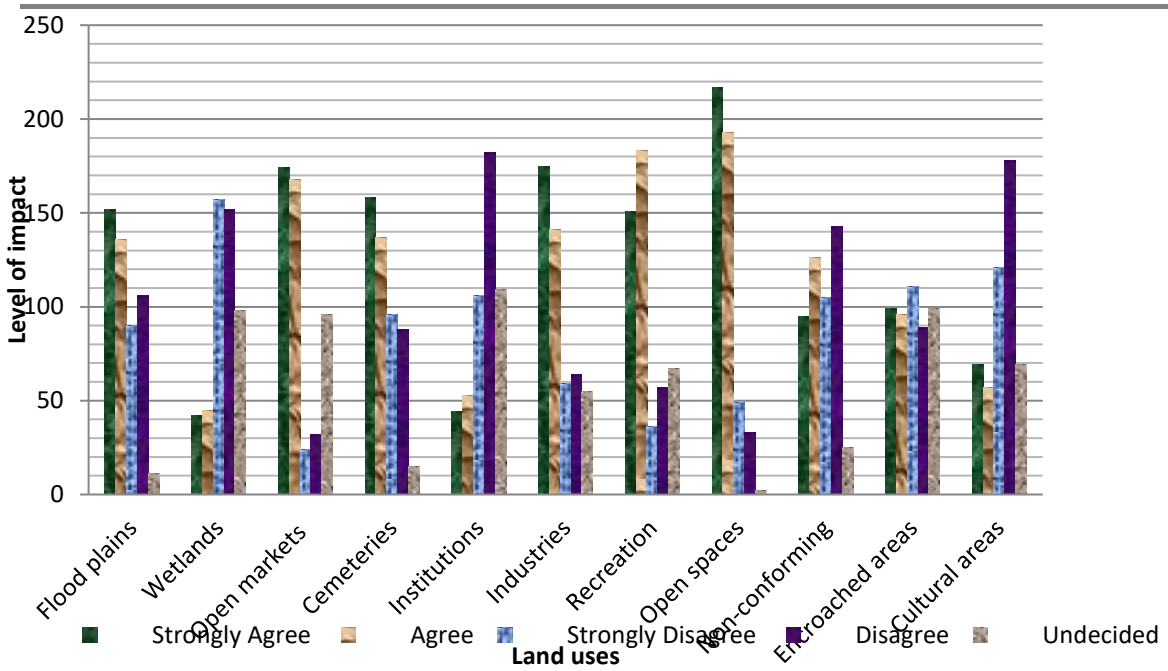

Figure 5.0: Bar graph derived from Table 7.0 showing responses on compliance with the Calabar urban master plan in the Likert Scale

Source: Researcher's compilation, 2025.

The Table 7.0 was used to generate Figure 5.0, a bar graph which showed that 1,376 (25.30 per cent) represents responses on strongly agreed to all the observed land use developments not in compliance with the master plan. 1,335 (24.53 per cent) responses agreed to all the observed land use developments not in compliance with the master plan. 953 (17.54 per cent) responses strongly disagreed and 1,124 (20.70 per cent) responses disagreed to all the observed land use developments not in compliance with the master plan. 646 (11.90 per cent) responses were undecided. The questions were all tailored towards illegality and non-compliance with the Calabar urban master plan. All land use developments are represented in different bars (Figure 5.0).

DISCUSSION

The null hypothesis, which sought to know whether there is a significant difference between the land area zoned for residential use, commercial use, industrial use, institutional use, open spaces, cemeteries and wetlands in the Calabar urban master plan and the currently existing land area (Table 1.0). The result, therefore, accepted the alternative hypothesis (Hi) which states that there is a significant difference between the existing land use patterns of Calabar Metropolis and the Calabar urban master plan. This means that land allocated to some uses in the Calabar urban master plan were found to be different from the currently built-up land uses (physical development) of Calabar Metropolis. The One-way ANOVA (Tables 2.0 and 3.0) was the test statistic used in this analysis. It showed a statistically significant relationship and goodness of fit in the data sets, with p-value of 0.001 level of significance $\leq$ 0.05 level of confidence. This result was also proven by producing different statistical plots, such as the estimated marginal difference plot (Figure 2.0), bar graph (Figure 3.0) and existing spatial patterns of Calabar Metropolis in a map (Figure 4.0). They were meant to show the difference between land area of the master plan and the land area of the existing land use patterns of Calabar Metropolis.

The Likert scale (Table 7.0) was also used qualitatively to compliment the result from the test statistic. Responses on the Likert scale measured whether there is compliance with the master plan from current land use development in Calabar Metropolis. These responses indicated that the master plan has been altered (Figure 5.0). The professionals were also interviewed separately and their responses confirmed a significant variation in the level of current physical developments from the prescription of the master plan.

The implication of this result is that there is no controlled development in Calabar Metropolis. The prescription of the master plan has not been followed strictly, and there are no strong institutions to monitor/control

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development. The Town Planning Department has been sidelined over the years from controlled development and in urban land use administration. For example, many land uses contravened the master plan. These land uses include the following: cemeteries at Etta Agbor layout, and Spring Road; conversion of open spaces in the State Housing Estate to residential plots; building of gasoline stations in a high-class residential zone (such as the Federal Housing Estate); and conversion of wetland zones meant for urban agriculture to residential and other developments.

In order to determine the degree of conformity of existing land use patterns of Calabar Metropolis with the Calabar urban master plan empirical verifications were also sought. The results pointed to the fact that current developments in Calabar Metropolis violated the prescriptions of the master plan. However, Nallathiga (2016) pointed out that the role of the master plan is to control both physical and economic developments; direct land uses and improves the quality of lives of the residents. This study, therefore, showed a deviation from these roles performed by the master plan as a result of unguarded developments. The observation of Hersperger, et al., (2015) that land uses contravening the master plan have resulted to conflicts and development of nuisances, criminalities, and aesthetic disappearance. These incidents were seen in the result of this study where land uses developed in contravention with the master plan have produced several nuisances that are aesthetically unpleasant to the residents of Calabar Metropolis.

A study by Tudor, et al., (2013) found that cemeteries are non-conforming with residential zones. In the Calabar urban master plan, three cemeteries were zoned at Ikot Ansa (north), Goldie (central), and Hawkins (south) but this study also found two cemeteries existing at Etta Agbor layout and Spring Road, Essien Town zone. Therefore, these two cemeteries found are regarded as non-conforming land uses. The result, therefore, a confirmation of the segregation component of the ecological theory which emphasized the need for separation of antagonistic land uses and the association of conforming land uses (Park, 1950).

CONCLUSION

- There is need to strengthen institutions responsible for land use administration and development control. This would help to reduce the rate of contravention with the Calabar urban master plan.
- There is need for urgent review of the 1973 Calabar urban master plan.
- The Planning Authority should be empowered to monitor development and redevelopment in order to ensure that land uses are developed and distributed according to the design in the master plan.

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