RESEARCH ARTICLE

LAND USE AND LAND VALUES IN CALABAR METROPOLIS

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ARTICLE INFO	ABSTRACT
	The government of Cross River State acquired about 280 hectares of land between 1973 and 1983. The land was surveyed and laid into a total of 274 plots distributed to applicants for residential, commercial, industrial users. Other uses include office and warehouse development. These allocations were analyzed using rental values, premium charges and development charges as prescribed by the CRS of Nigeria Gazette No. 6, Vol. 36 of 8th March, 2003. The aim of the analysis was to test a number of propositions usually supported by land economist that the structure of land values vary spatially in a city in accordance with site use potentials, and to investigate whether or not there is a significant relationship between land values and several commonly assumed characteristics of land use. The result obtained confirm that spatial variations in land values bear a close relationship to the land use configuration of the city, that as the pattern of land values change in time, land use patterns also change; and that land values generally influenced the intensity of land use in a city. The study also confirmed the view expressed in several texts that land resources can usually earn a higher return when used for commercial or industrial purposes than for any other type of use (Barlow, 1958). The paper concluded that it is not sufficient to view land use and land values in a city only from the perspective of general economic theory, that there are social as well as other factors that influence land use and land values.

INTRODUCTION

Land is a scarce resource of great consequence to man. Every nation in the world is defined, in the first instance, in terms of its political boundaries and in terms of its control and claim over its geographical boundaries and land resources. Its people occupy and use their God-given natural and man-made resources freely. But the distribution of people and these resources on the earth's surface is not homogenous. There are certain benefits and advantages associated with particular locations which make them attract more people and higher value than other places within the same country and geographical area. Thus, land situated in some locations is more valuable in terms of attracting higher values than others. Furthermore, the services which land provides affect the cost of land and the usefulness of the land is intimately related to its value. We need land for living, building houses, raising families, and indeed for our very existence. We also need land and its resources for leisure, as places of work, to do business and for various institutions of man. Government, religious bodies as well as other social organizations need land for private or individual ends; such as for offices, warehouses and in short to provide basic amenities of life.

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Every phase and at every stage of human existence, man requires the consumption of land real estate resources in one form or the other for various services that land can provide. Bayoh, Irvin and Haab (2002) hold that the role which public services play and quality of life in the central city drives locational choices. This is contingent with Tiebout's (1956) notion that households have preferences over local public goods that vary across locational jurisdictions. He argues that amenities, as well as distance and land costs, influence household location choices. In fact, the uneven distribution of private and public amenities across local jurisdiction is viewed as the main determinant of uneven growth patterns in cities (Deller, Tsai, Marcoullier, and English, 2001). Land is priceless. It is so valuable that ordinarily no price can be placed on it. But land is also fixed in location and supply in the face of competing claims and demand for it. Therefore, whenever buyers and sellers come together in a common place to agree on the price of land, a set of economic principles govern the process and transaction that ensue. However, the three elements of location, scarcity and choice of land are basic and fundamental in the economic sense because they determine the value of land. Nevertheless, while location requirements, for instance, take the form of guiding principles and standard for the placement of land use and land values, a whole range of physical, economic and social considerations including the supply of land is controlled by scarcity and

choice. A schedule of various amounts that will be made available or offered for the use of various parcels of land, in terms of location and choice customarily have been identified roughly as factors that determine the price of land. The value that man places on time, the fixity of land as a factor of production and the degree to which man is willing to make a specified journey to work will all depend upon a number of variables. It is these variables acting together that are the major determinants of land use and land values. Their correct estimation in size, quality and quantity are the main problems addressed in this paper.

The Study area

All the ten sites are located in Calabar Metropolis and they are the subject matter of the study. Calabar is the capital of Cross River State. The geographical position of Calabar is latitude 4^0 58^1 North, longitude 8^0 17^1 East. The city lies on a peninsula between Calabar River and Great Kwa River, 35 miles up to the Calabar River, on the nearest buildable land to the sea. The settlement of Calabar is on the eastern bank of the Calabar River. Its growth to the south is limited by the mangrove swamps. Calabar is an interfluvial settlement built on a high land between two adjacent river valleys. The highest points surrounding the city are 180-200 feet above sea level. The relief is gentile, but as some parts, the terrain falls steeply towards Calabar River. With the Cross River, the Calabar District is completely cut off from the rest of Nigeria. As a state capital, the primary functions of Calabar are administrative and cultural. Calabar is a tourist destination with a stadium complex containing a swimming pool, a gymnasium and a motel, plus other facilities. In these premises, mass meetings, political and cultural events can be arranged both outdoors and indoors. The aim of the study is to demonstrate that the pattern of land use, the intensity of land use and land values bear a strong interrelationship in Calabar city. It is hoped to demonstrate that the pattern of land use in a city bear a strong interrelationship with the intensity of land use and land use values.

The research problem

The structure of land use in the urban area of Calabar has considerable influence on the way in which individuals seek to use land for various purposes, in various locations; and at various densities. Value itself is a value of many meanings (Ifediora, 1993). Urban land is considered to have value because of its potential to produce income (Downs, 1975). This value is based on what the investor is willing to pay for the land according to an assumed plan for the use of the land and its resources (Wendt, 1957). The economic value of land approaches the selling price under conditions of perfect competition in the market (Harvey, 1981). It may deviate from price, and often does, especially since value is identified with specific purposes, such as insurable value, mortgage value or value for tax purposes, value for compulsory acquisition and compensation, estate settlement, for quick sale, and for many other reasons. Besides, some locations are more highly priced for residential uses than other sites perhaps because of the greater convenience of shops, schools, centers for employment and recreational facilities. Corner plots too may command a

higher value for certain type of users, e.g. shopping or retail use because of greater convenience to a stream of pedestrian traffic.

Thus, to the land economist, land is pressed into use by the existence of a value as established by the alternatives of land development, and the use of a particular piece of land is finally determined by the market forces of demand and supply. The price paid for land is accordingly based on what alternatives will yield the highest and best price. This is how individual plots of land obtain a value and their price in the market cannot be separated from the composite prices of similar plots and uses, and how their market values are established. It is, therefore, important to review the structure of land values in Calabar as a whole and to examine the relationship between land values and land use comprehensively. Land value patterns change in time with land use managements, and how land values influence the intensity of land use is also an essential issue to be considered. In short, the complex relations between the intensity of land use, the pattern or structure of land values in Calabar metropolis and the interrelationship among them need to be examined and given adequate attention.

Aim and objectives of the paper

The aim of the paper is to examine the relationship that exists between land values annual rents and the land use pattern in Calabar given the structure of land values in the metropolis. To guide the study, the following research questions are formulated:

- What is the structure of land values and land use in Calabar metropolis?
- In what way has this structure influenced the relationship between land values and land use in the city?
- What is the impact of land values on the intensity of land use and vice versa?

Ordinarily, land values and land use configuration in a given society assume a certain profile where commercial and industrial uses dominate in terms of user and value. This case is also examined.

Conceptual framework and literature review

Land use and land values

How individual parcels of land acquire value and how they are priced in the land market cannot be separated from the aggregate view of all parcels and how their value is determined. When no assumption is expressed regarding a parcel of land, the presumption is that the parcel or piece of land will be used for the purpose that commands the highest possible net return. This return can be social or economic. This calls for the concept of land-use capacity which refers to the ability of a given piece or parcel of land to produce a net return over and above its production cost. This concept sometimes used by land economists to distinguish between the comparative abilities of land resources to produce returns that are different from other units. The term use capacity is sometimes employed to describe a criterion of quality, all other

factors being assumed as constant. For example, when we compare the productivity of farmland, we identify use capacity with difference in fertility of land (Barlow, 1958). When we compare the advantages of sites to be used for shopping, we identify location near a market with more distant ones.

Thus, we identify the use-capacity of the site for shopping with accessibility of transportation cost. In examples involving urban location differences, use-capacity is identified with the relative amount of time, effort and distance required to transport persons, produce or things from one site to a shopping site such as downtown shopping centre or district. In this way, the concept of use-capacity is identified with the twin concept of highest and best of land. Land economists view land in terms of economic theory, with the use of individual land units being determined in the urban land market. The organizing concept is the classical equilibrium theory which states that urban land is considered to have value because of its potential to produce future income. Thus, land is a commodity traded in the land market subject to the forces of demand and supply. Price then becomes a function of the cost making land productive, in terms of providing valuable services, and a function of net income or return realizable from the development of land (Wendt, 1957). The value of land or indeed any project, at all, is measured by the contribution of that project to the net return of the property subject to the concept of highest and best use (Beaton and Robertson, 1977). The value of land approaches the selling price of land under conditions of perfect competition in the market. This means that the market value of land depends upon the type of area in which it is located in the overall pattern of land uses and with respect to other sites within that particular area.

To the land economist, each parcel of land occupies a unique physical relationship with every other parcel. In every community, town or metropolitan area, there exists a variety of land use and each land use has a complex spatial relationship with the social and economic relationship that determines the value of other parcels. The urban land market attaches a special value which determines the amount of bids for that site which is the centre of the combination. To the land economist, land is pressed into uses by the existence of a value, and the use of any particular parcel is finally determined by the operation of market forces. However, certain locations are more highly valued for certain uses than others. For example, land use for residential purpose may be more highly valued because it is a corner plot or because of its greater convenience to shops, schools, centres of employment, and recreational facilities. Such locations command a higher price than others in similar use. Also as an urban area grows, the position of greatest accessibility and complementarity tends to grow laterally and vertically. Thus, as one moves away from the position of greater accessibility and complementarity, land values fall, reflecting the disadvantages of these positions.

Thus, some firms will find that their earning capacity, (e.g. shops selling food) can be increased by using a position which commands accessibility and complementarity. The demand for these locations will cause their values to be higher than in the surrounding area. Accordingly, the pattern of land use is another way of looking at the pattern of land uses. A similar pattern emerges in the areas, therefore, there is correlation between the pattern of land values and the pattern of land uses and the intensity of land utilization. For example: The provision of more accommodation on a given site, will up to a given point, increase the amount available for purchase the site. The more intensive the use of the site, the greater the amount of money needed to purchase it. But the correlation between land values and the intensity of land use is not always a positive one. It is also necessarily to examine, various theories on how the structure of land use in our cities come by and the relationship between land use and land values. Generally speaking, factors which influence this relationship are taken into account also min the marketplace in accordance with land economics theory. With this general economic views on the distribution of land use and land values in mind, it useful to consider the various conceptual views so far expressed in the explanation of these patterns and their changes over time. This leads naturally to an examination of various theories of land use and land values.

Theories of land use and land values

In 1924, the concentric zone theory was developed by Ernest Burgess. Burgess illustrated the process of urban growth using a series of concentric cycles expanding radially from the central business district (CBD). His work was based on residential differentiation and neighbourhood districts in Chicago. Burgess concluded that the growth of Chicago is pattern around a process of invasion and succession of five urban zones and expansion of different areas in the city. These include the zone of transition and the zone of workmen's homes. The other two include the zone of better residences and the commuter's zone. Burgess tied land use to socioeconomic status which he noted, varies directly with the distance from the city core. He suggested that the pressure on innercity housing, typically by migrant groups of low socioeconomic status prompts neighbourhood change.

These groups move to adjacent residential areas, therein, pushing out current residents to the next zone. In turn, this incites a ripping trend of outward movement with the highest status group at the furthest distance from the centre. In his study of New Haven, USA, Davie (1937) in Sule (2006), a professor of Yale University, criticized Burgess' work which he held did not apply to New Haven. Prof. Argued that most urban areas exhibit a pattern which shows the CBD with areas of commercial land use extending out of the radial streets from the CBD and concentrating at strategic points elsewhere. Davie's pattern shows industrial land use located near lines of transportation, low grade housing near industrial and transportation areas and the zone of second and first-class housing in other places. As a theoretical explanation, the positioning of the major functional areas of land use in a city and how they change over time has considerable appeal. While it is a useful and pictorial way of describing broad and general tendencies at work in the patterning of urban land use, it is an over simplification in many respects. More recent work relating to the theory seeks theoretical explanation of land use pattern which take into account irregularities that tend to develop in use patterns.

Space organization concepts

The sector theory and the multiple nuclei theory are space organization concepts. The sector theory by Homer Hoyt (1939) in particular is basically a refinement of the axial development which focused attention on particular land uses. Hoyt's well-known study of residential areas in the USA provided new insights into the pattern of land uses which led to the explanation of residential land uses in terms of wedge-shaped sectors radial to the city's centre along established lines of transportation. Basically, the theory holds the different income groups of a city tend to be found in district areas desirable in terms of sectors of a cycle centred in the CBD. The high-rent (or high price) residential areas can be identified in particular sectors and there is a gradation of rentals downward from high rental areas in all directions. Intermediate rental areas or those ranking next to the highest rental areas, adjoin the high-rent area on one or more sides, and tend to be located in the same sectors as the high-rental areas. Low-rental areas occupy other entire sectors of the city from the centre to the periphery (Hoyt, 1939).

Welmer and Hoyt summarized their views on the city structure by providing a more detailed explanation of residential pattern of land use and dealt in more details with the dynamics of growth process than the concentric zone formulation. Because the theory has a profound effect in stimulating awareness of the need for a theory of urban land use to which other fields can subscribe, it received a lot of criticisms. The multiple nuclei theory was first put forward by D. McKenzier in 1933. It is built around the observation that there are a series of nuclei in patterning urban land uses instead of one single core area. Harris and Ullman later (1945) observed that a times this distinct centres persist as centres of growth and the metropolitan areas as urbanization proceeds. They noted that the number and functions of these nuclei areas vary from one metropolitan area to another even where the CBD serves as the main nuclei. As geographers, Edward Ullman and Chauncy Harris suggested a third model of city structure. Their argument is that the growth of a city is not around one single centre. This in effect means that different land uses tend to grow around different centres; that each nuclei forms a CBD which is in dependent in growth and may have grown through processes which are entirely different from the other. The implications of this theory to urban land use planning are:

- Urban land use activities are specialized and so required specialized sites. For example, retail trade requires a central location that would be accessible to the residents, quite different from manufacturing business which requires a large space that is accessible to transport facilities.
- To gain economics of scale, some activities cluster together in the urban area, such activities are located in the same district to foster efficient functioning and effective utilization of common services for mutual benefits. For example, auto dealers and auto repair shops are complementary land uses which should locate in the same district.
- Equally, some unrelated land uses are mutually antagonistic or incompatible with one another and should be separated. For example, an airport should not be located near residential areas or a heavy manufacturing land use should not be located in a low-density or high-income residential district. They should be separated.

To generate enough income to pay for high rents, some land uses are forced to locate at sites with low rents. It is perhaps for this reason that large space users and wholesale manufacturing agencies do not locate at the CBD, unlike intensive space users such as shopping centres. Thus, the multiple nuclei theory attempts to incorporate almost all land uses in an urban area in the model. In fact, it suggested that some residential and industrial land uses should be located at the fringe of the city. It recognized the fact that urban growth in a town revolves around the main CBD, but the satellite CBDs emerge to serve land uses far away from the main CBD. In considering the pattern of growth of residential districts in Lagos in 1961 and Ibadan in 1962, Mabogunje introduced the concept of growth by fission and growth by spatial expansion. He concluded that the multiple nuclei concept was applicable to both cities as a growth process.

Sada (1968) examined the role of political factors in the urban geography of Lagos. He found that there was need to separate the administrative function from the commercial function of Lagos while Frishman studied the spatial growth and residential location pattern of Kano city. Most recent studies like that of Okpala (1981) examined residential mobility in Nigerian cities and Onokerhoraye (1984) investigated the historical and geographical pattern of Benin. On the whole, however, it was only studies like those of Olaore (1981) and Omirin (1997) that concentrated on land use and land values in Nigerian urban towns. Thus, there is a paucity of literature on the topic. This study is therefore an attempt to bridge this gap. The overall objective is to advance suggestion on how to improve access to affordable residential, commercial and industrial land in major urban areas of Nigeria. So far discussed are the economic determinants of land use reflecting the views of land economists in particular. Another series of influence affecting the location and arrangement of land use in a city, are views with social origin. These views are less understood and frequently confused with the economic determinants already discussed. Research in this area of urban development has not yet progressed sufficiently so that it is impossible to make a satisfactory differentiation between social and economic determinants of land use. For this reason, there is a strong predisposition to equate social influences with economic motivations of people and groups. But both influences are constantly in interaction and complexly interrelated in making differentiation and measurement of separate effects extremely difficult. However, social scientists are increasingly directing attention to the role that social values and ideals play in the determination of land use pattern in cities.

The views of sociologists

The sociologist views the city partly in the context of urban ecology with its concern for the physical, spatial, and material aspects of urban life, and partly in the context of social structures in the city with its concerns fir human values, behaviour, and interactions as reflected in such social institutions as the family, the church, government, business,

and so on. Socially rooted factors of land use this can be explained in terms of "ecological process" with their physical context and "organizational process" with their social structural context. While in the classical traditions of the field, sociologists have tended to view these aspects of city life in separate compartments, in most recent approaches, the study of the city, and ecological processes are more closely associated with the social behaviour of people and groups and related considerations of human values and social action processes (Oyesiku, 2010).

Social factors

There is now a fully rounded perspective which takes into account social as well as economic factors influencing land use patterns in our cities. This is what the sociologist identifies as the socially rooted process exerting an influence on the location and arrangement of urban land uses. First, we consider urban ecology or basic ecological processes affecting land use in the city; and second, social behaviour of people and groups that influence land development and land use patterns in cities. Urban ecology (basic ecological processes) is a term the sociologist has adapted from the biological sciences to describe the physical change process in the city. In the natural science usage, ecology is concerned with the interactions of living things and their environment. In this natural science concept, there is a strong emphasis upon processes by which living things adapt to their environment, and so it is not surprising to find urban ecologists centering their attention on processes by which man adapts to his urban environment. As might be expected, economic forces figure prominently in explanations of these ecological processes. However, since our primary concern here is with man' social behaviour, the discussion at this point will concern itself primarily with socially rooted rather than the economic forces extant in these processes. Gorden Erickson (1954), in his "Urban Behaviour" has outlined the sequence of change which occur within a particular locale as: (i) Concentration and dispersion of services and population (ii) Centralization and decentralization of populations (iii) Segregation of populations into various distinctive areas (iv) Dominance and the gradient of receding dominance in the successively more peripheral subareas of the community, and (v) Invasion of areas by groups, giving rise to succession of one group by another.

The behaviour of individuals

The behaviour of individuals or groups can influence urban land use patterns. The cycle of group or individual behaviour that determine a land use plan arises from experiencing of needs and wants, goals are then defined, alternative course of action are planned, decisions are taken to implement the land use plan. For example, in an urban renewal plan, the values with economic and/ or social ends/ are defined in view of the need to change the pattern of land use. These needs and wants crystallized into a resolution, for instance, the philanthropist may simply decide that the slums must go and be replaced by safe and sanitary housing. In pursuit of this goal, the various alternatives for planning the area are established. A plan is selected and set in motion to achieve the goal of redevelopment, rehabilitation or preservation of relevant areas

in line with the urban renewal policy. This change may produce new values which will set in motion a new series of actions that may further influence the pattern of land use in the area.

Firey's study

Firey's work in Boston involves an empirical investigation and the development of a theoretical framework to identify the role of socially rooted values in the evolution of land use patterns. He set out to test two general propositions: that socially rooted values exert a causative influence on urban land use patterns. Studying locational trends in Boston's Beacon Hill, Central Area, and North End, USA, he concludes that space may not be only a productive agent, but also a symbol of social values, and that people and groups choose locations not only in relation to market considerations but also in response to social values. In Beacon Hill study, for instance, he identifies three kinds of influences which values exert on land use – what he terms "relative", the "recuperative" and the "resistive" and concludes based on his tests, that values are in indeed self-sufficient ecological forces and they have a causative influence upon land use (Firey, 1968).

With respect to North End, a distinctive Italian Community in Boston, Firey noted that social values were not a result of fetishism where space is a conscious object of veneration but rather a result of processes of social organization where to residence in the area to persons of Italian origin is a means of becoming identified with Italian community and its distinctive values relating to occupation, family, choice of friends, group membership and so on (Firey, 1968). Thus, the North End is a symbol of social solidarity and residence there is a token of identification with Italian groups and with Italian values in spite of the deteriorating and congested conditions which prevail there. Social values thus have an influence upon land use. The second purpose of Firey's Boston study was to discover whether locational processes can be wholly separated from cultural context. Firey concluded from his study of the retail centre of Boston and South End that "rational" determinants of land use are contingent upon a particular value system which are culture-oriented and that the cultural component is central to locational processes; since the cultural component is central to locational processes; studies which in the past invest physical space with non-cultural giveness are not complete.

That failure to recognize the cultural component in spatial adaptation is a major omission in existing formal theories which seek to explain land use (Firey, 1968). Firey concluded his study by suggesting the use of "principle of proportionality" as a means of giving recognition to the role of values in the allocation of space to functional uses in the city. We have discussed the views of the economists that the urban land use configuration can be explained in terms of the economic motivations of individuals and firms functioning in the urban land market. It was also seen that to the sociologist, urban land has a direct relationship to social processes and can be explained as the product of individual and group behaviour in responses to purely social as well as economic values.

Table 1. Schedule of land use and land values in Calabar metropolis

	Residential (X_1)	Commercial (X_2)	Industrial (X_3)	Office (X_4)	Warehouse (X_5)	Annual Rental Value (Y)
1	2.9685	0.9508	0	0.1750	0	47,059.84
2	2.9898	6.3853	1.8550	5.4950	0.814	365,607.2
3	0.6938	1.3550	0	1.9639	0	83,361.76
4	2.1970	0	0	1.3714	0	47,508.64
5	0.5913	0	18.6150	0	0	450,826.08
6	0	2.7868	0.3206	1.7900	0	116,039.68
7	0.2206	18.8289	6.2431	4.7261	0	709,104.32
8	0	6.2305	2.6940	0	1.4561	246,684.16
9	1.1122	8.9522	1.7844	0.9123	5.2127	407,489.92
10	27.0792	11.8437	19.7145	8.3037	18.8010	1,581,872.64
11	9.0012	12.1652	21.1809	2.7666	11.8716	1,204,959.04
12	0.522	3.1160	5.5630	4.2759	0.5657	337,338.8
13	0	2.2958	2.1374	0	5.6231	238,756.24
Total	47.392	75.405	80.106	31.779	44.343	5,836,760.32

Source: Author's field work

Table 2. 2(J):Schedule of plot allocation in Calabar metropolis

S/N	Residential	Commercial	Industrial	Office	Warehouse	Total no. of plots Allocation
		2(a) Police Headquarters layout, Calabar				
1	10	0	0	1	0	11
2	10	0	0	2	0	12
3	1	0	0	0	0	1
4						0
5						0
6						0
7	1	0	0	0	0	1
8						0
9						0
10	2	0	0	0	0	2
11	1	1	0	0	0	2
Total	25	1	0	3	0	29
		2(b) New Ikang Road layout, Calabar				
1	1	1	0	2		4
2	5	0	0	3		8
3	0	0	0	1		1
Total	6	1		6		13
		2(c) Barracks Road layout, Calabar				
1	7	1	0	0	0	8
Total	7	1	-	-	-	8
		2(d) Eyo Etta layout, Calabar				
1	0	1	0	0	0	1
2	0	4	0	0	0	4
3	0	1	1	1	0	3
4	0	3	0	0	0	3
Total	0	9	1	1	0	11
		2(e) Doctors Quarters layout, Calabar				
1	4	0	4	0	0	8
2	5	0	2	0	0	7
Total	9		6			15
		2(f) Tank Road Layout, calabar				
1	2	1	0	0	0	3
		2(g) Old Ikang layout, Calabar				
1	0	2	0	4	0	6
		2(h) Marian Road layout, Calabar				
1	1	0	0	1	0	2
2	0	0	0	4	0	4
3	0	0	0	3	0	3
4	0	0	1	0	0	1
Total	1	0	1	8	0	10
		2(i) North Industrial layout, Calabar				
1	0	8	3	3	1	15
2	0	6	3	4	1	14
3	0	8	2	1	4	15
4	1	14	5	5	9	34
5	0	12	17	2	2	33
6	0	7	3	4	0	14
7	0	4	3	0	2	9
Total	1	59	36	19	19	134
	2(j) South Industrial layout,(Ikot Inim),Calabar					
1	0	0	2	0	0	2
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	1	0	0	1
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	4	0	0	0	0	4
9	10	0	2	3	1	16
10	8	7	0	1	2	18
11	0	0	0	0	1	1
12	0	1	2	0	0	3
Total	22	8	7	4	4	45

Grand total 274 plots

These two views are complementary in the sense that they are complexly related to each other. To conclude this study section, land use must be seen in the context of public interest and public policy as relates to policy and public interest in land matters embrace public actions that seek to assure livability and sound development of the city subject to the usual controls imposed by city planners (Abrams, 1953).

Relationship among land use determinants

Basic to the full understanding of the matrix of factors which shape the pattern of land use in an urban area is the need for an inclusive theoretical frame of reference which includes economic, social and political factors (Abiodun, 1985). Until this kind of foundation theory is used to provide guidelines for applied analysis of city planning, land use planning must somehow function as an open-ended process that seeks empirically, the balance that is needed among the above factors. Various concepts of land use planning must be arrayed side by side, and some of the interrelationships involved must be hypothesized. Such an organisation of concepts on the very least should be helpful as a checklist to insure that all factors considered in the technical studies undertaken on the land use planning process. For example, according to the behavioural concept, land goes into use as a consequence of a myriad individual and group actions. Motivated by values, ideals and resultant articulated attitudes held by the various organized and unorganized segments of the urban population, these actions follow a behavioural sequence that culminates in land use changes (Nutt *et al*, 1996; Iselin and Lemer, 1993).

This concept appears to supply the common link in three ways of viewing the origins of land use patterns. It has earlier been indicated that land use is a consequence of the socio-economic behaviour of the urbanite in the urban land market. Secondly, land use is explicitly being seen as been influenced by the urbanite's behaviour in response to such culture-bound phenomena as customs, traditions and beliefs. Finally, the health, safety, convenience, economy and amenity controls employed the common public interest of the urbanite can be viewed as the result of behaviour consciously calculated to influence land use. Each of the approaches, action taken in the urban land market, action taken to preserve customs, traditions and beliefs, and action taken in the interest of living conditions embrace factors which are economic, social and public determinants of the land use pattern of an urban area. Such factors constitute a matrix of factors shaping the pattern of land use in urban areas. The purpose of this section is to show that the separate explanations earlier discussed have little practical meaning unless viewed as one interrelated whole.

Methodology

The study was based on all the sites acquired and allocated to applicants between 1973 and 1983. The sites embraced a total of about 280 hectares of land divided into about 274 plots. Both the allocation according to individual land uses and the corresponding rental values, premium charges and development levies paid are as summarized in table 1; while table 2 shows the number of plots laid out and allocated in each layout in accordance with the type of land use. All the ten sites acquired constitute the sample area.

Data collection

Secondary data was collected on the basis of the number of hectares of land allocated to each user each year. This constitutes the observation, numbered one to thirteen. Each user is an independent variable while the dependent variable is the corresponding annual rental value of the total land allocated based on the number of hectares allocated to each applicant in accordance with the user category.

Analysis and presentation of data

Data was analyzed and presented according to research questions and the objectives of the study.

The five land uses constitute the independent variables (X_1, X_2, X_3 ....X_n) and the corresponding rental values constitute the dependent variable(Y). On the average, land used for industrial purposes earns a higher return followed by land allocated for commercial uses. This confirms the usual assumptions of land economists.

RESULT AND DISCUSSION

The analysis of the data collected from the ten sites was done using the multiple regression model. The aim is to determine the interrelationship between the five land uses and land values. The land uses are the five independent variables. Table 3 shows the correlation matrix of the 5 land use variables. Annual rent has significant relationship with the 5 land uses with the ranking shown in Table 4.

Table 3. Correlation matrix

Land use	1.000	RA	CA	IDA	OA	WA
Residential(RA)	0.437	1.000				
Commercial(CA)	0.804	.373	1.000			
Industrial (IDA)	0.907	.343	.660	1.000		
Office(OA)	0.598	.579	.699	.477	1.000	
Warehouse(WA)	0.672	545	.661	.653	.389	1.000

Source: Author's Field work

Table 4. Ranking of the correlations in the matrix

S.No.	Independent variables	Correlations	Rankings
1	Residential land use vs. Annual Rent	0.437	5
2	Commercial Land Use vs. Annual Rent	0.804	2
3	Industrial Land Use vs. Annual Rent	0.907	1
4	Office Land Use vs. Annual Rent	0.598	4
5	Warehouse Land Use vs. Annual Rent	0.672	3

Source: Author's Field work

In terms of ranking, the industrial land use ranks first with a coefficient of determination of 0.907 in the explanation or determination of annual rent.

Testing the hypothesis

Ho: There is no significant relationship between land values (annual rents) and land use in Calabar metropolis.
Hi: There is a significant relationship between land values (annual rents) and land use in Calabar metropolis.

The Ho is tested using ANOVA (Table 5: Model Summary).

Table 5. Model summary

Model	R	R square	Adjusted R square	Std. Error of the Estimate	Change statistics				
					R Square Change	F. change	df1	df2	Sig. F. Change
1	.952	o.906	.847	1.635	.906	15.431	5	8	.001

Source: Author's Field work.
a. predictors: (Constant), WS, OA, RA, ID,CA
b. Dependent Variables: Annual Rent

Table 6. Analysis of variance (ANOVA)^b of annual rent and the five land uses in Calabar Metropolis

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	206.127	5	41.225	15.431	.001
Residual	21.37.3	8	2.672		
Total	227.500	13			

Source: Author's Field work
   a. Predictors: (constant), WA, OA, RA, ID, CA
   b. Dependent Variables: Annual Rent

Table 7. The coefficients

Model	Unstandardized coefficients		Standardized coefficient	t-value	Sig.
	B	Std. Error	Beta		
1 (constant)	.552	.991	.128	.552	.593
RA	.138	.176	.393	.784	.456
CA	.404	.218	.679	1.855	.101
ID	.784	.171	-.041	4.302	.003
OA	-.044	.209	-.085	-.211	.838
WA	-.122	.274		-.444	.669

Source: Author's Field Data

Table 8. Regression result (estimates) between annual rent and land use

Code	Variables	Unstandardized Regression coefficient	Standardized Beta coefficient	Sig.
RA	Residential	0.138	0.128	0.456
CA	Commercial	0.404	0.393	0.101
ID	Industrial	0.734	0.679	0.003
AO	Office	-0.044	-0.041	0.838
WA	Warehouse	-0.122	-0.085	0.669

Source: Author's Field Data

The multiple Regression coefficient is (R)=0.952. the multiple Regression coefficient is simply the square root of coefficient of determination $R^{2.}$ The absolute value of R indicates the strength of the relationship between the dependent (annual rental value) and the independent variables in the Regression Model. (Xs and Y), while the sign tells us whether the relationship is direct or inverse. The entire Regression Model R^2 significant with F-Cal. =15.431 and F-Tab at P< 0.05 level and d.f. (5,8)= 3.68.

We reject Ho because the calculated F- value of 15.431 is greater than the Tabulated F-value of 3.68 at P< 0.05 level of confidence and D.F (5, 8). The multiple Regression coefficient R=0.952 implies a very high positive correlation between the dependent and respective independent variables in the study. This outcome implies that the independent variables, residential land use, commercial land use, office land use, industrial land use and warehouse land use collectively contribute very significantly to the overall variation in annual rental value. The implication of this finding is that the higher the R, the higher the rental value and the more intensive the land use (Table 7).

The contributions of the individual factors were also evaluated by examining the standardized Beta coefficient and T-values

reported in Table 7. The decision rule was to reject Ho if, and only if, the calculated t-value either exceeded or was less than the Tabulated value (±2.57). Interestingly, a 2-tailed t- tested yielded t-values of industrial land use of 4.302, office land use (-0.211), warehouse land use (-0.444), respectively. These indicate that the total variability in the dependent variable (annual rent) was chiefly accounted for by these three categories of land uses in the order of magnitude ID, OA, and WA). It is surprising that the contributions of commercial land use (CA) and residential land use (RA) did not turn out significantly. We therefore reject Ho and accept Hi that there is no significant relationship between land use and land values in Calabar metropolis. The Regression Equation (Model prediction) was stated thus:

$Y = a+b_1X_1+b_2X_2+b_3X_3+b_4X_4+b_5X_5+e.$, that is, Annual Rent=0.552(a)+0.138(RA)+0.404(CA)+0.734(IDA)-0.04(OA)-0.122(WA).

The standard error of estimated (e) measures the dispersion of the actual values of Y around those predicted by the model. It is thus a measure of the average amount by which the actual observations vary around the regression plane. It is calculated to be less than one in each case (Table 5) under the relevant column. The lower the dispersion, the smaller the standard error and the more accurate the model is in prediction.

The decision rule was to reject Ho if the tabulated t-value was either greater than +2.57 or less than ±2.57. Interestingly only industrial land produced significant t (4.302) at P<0.05 while other land uses are not so significant. The result presented in Table 8 reveals that industrial land use has the most significant determinant (at 0.05level) of the rental value paid by allotees of plots. The Beta coefficient of 0.679 gives a picture of the importance or influence of this variable in the determination of the rental values passing on the allocation of the plot. Generally speaking, the higher the magnitude of Beta, the more the more influence of the variable. The regression coefficient is also the highest. Finally, the coefficient of multiple determination (R^2) measures the explanatory power of the regression model. It is shown in the model summary R^2 =0.906. This reveals that about 90.6% of the variation in annual rent is explained by the change in land use.

Conclusion

In summary, this study proves empirical evidence that there is a significant relationship between land use and land values in Calabar metropolis and that land values also influence the intensity of land use. As the intensity of land use changes over time, land values also change. The study also confirms the usual proposition that in our society, land resources usually earn higher return when used for commercial and industrial purposes than for any other purpose. However, our concern here is primarily with technical and practical considerations. Accordingly, the foregoing discussion and analysis indicate a need for balanced consideration of economic, social and public interest factors throughout the process of land use planning and land values because of the relationship among them. Thus, it is therefore, recommended that land use planning must not consider land values alone but go beyond this customary tenet and focus more attention on the way in which urban land market factors tend to site and arrange land use and the way in which culture-bound considerations such as customs, tradition and beliefs influence the pattern of land uses.

This kind of broadened approach guides the city planner into a number of uncharted areas which are indeed of more research. For example, how can the planner identify dominant patterns in land market behaviour? Does the shifting pattern of land use provide an adequate index of market behaviour? Future research must come to grips with these questions. Meanwhile, more systematic and conscious attention must be directed to the use of available measures of economic and social factors that impinge on the distribution and arrangement of land uses to insure that the needed balance is achieved. Besides, the need for recognizing the role that attitudes play in helping the land economist in technical studies and in fitting the land development plan to the realities of urban behaviour in imminent. On the whole, it is concluded that allotees of plots in the ten layouts are advised to take note of the high contribution of industrial land in the determination of rental values in Calabar metropolis in making planning decisions.

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