

INTERNATIONAL JOURNAL OF SOCIAL SCIENCES

Volume 4, Number 1, June 2005

EDITOR

IMOH E. UKPONG
University of Uyo, Nigeria

ASSOCIATE EDITORS

Akpan H. Ekpo, *Nigeria*

Graham Chapman, *UK*

Uwem E. Ite, *UK*

Ukana Ikpe, *Nigeria*

Isidore Eyo, *Nigeria*

Akpan U. Akpan, *Nigeria*

*Published in cooperation with the
Faculty of Social Sciences, University of Uyo, Nigeria.*



Land Values and Urban Neighbourhood Classification: A Case Study of Benin-City, Nigeria

S. I. Okoror

*Department of Estate Management
University of Uyo, Uyo, Nigeria*

Accepted 10th June, 2004

ABSTRACT - The uncontrolled growth and exponential expansion of Nigerian cities have generated problems of urban management in terms of urban integration, serviceability, sustainability and governance. Associated with these management problems is the absence of explicit and acceptable mechanism for urban neighbourhood classification. This is done in developed countries where land values are used as indexes of sociospatial segregation and differentiation. Unfortunately, in West African Countries, there is no agreement on the similarities or the interrelationships between land values land use and social class. Therefore, the aim of this paper is to explore the similarities between the structure of land values and urban neighbourhood distribution in a geographical location, its socio-cultural antecedents and its rapid growth and expansion in recent years. Land value data were collected from sixty neighbourhoods using stratified, systematic and multi-stage antecedents and cluster sampling techniques. Principal component analysis extracted two main dimensions, which jointly explained 87.63% of the total variance, and classified Benin City into two on basis of mixed land use only. This implied that though land values could show the urban spatial structure and forms it was inadequate for urban neighbourhood classification as the social morphology of the city was omitted. In addition, commercial and institutional land uses were found to be more diagnostic of urban structure than the residential. This implied that it was partial and inadequate to differentiate urban neighbourhoods with predominantly mixed land use setting with residential land use only.

KEYWORDS: Urban Management, Land Values, Classification, Urban Neighbourhoods, Principal Component Analysis.

INTRODUCTION

The city has been conceptualized as a system by a number of experts. As a biological organism, the city has existence like plants and animals; and a dynamic life cycle of development, maturation and disintegration in spatial structure. As a geo-system, the city contains interrelated and interacting components or subsystems such as the objects, the human activities, the physical infrastructure, the land and the policy. It has been suggested that these components or subsystems required integration and balance. According to Ayeni (1979, pp. 171-173), the five subsystems are the residential area, the work place, the economic activity, the infrastructure and the transportation network. For purposes of physical planning and design, Doxiadis Nig. Ltd. (1981) stressed the five elements of the city system as man, nature, society, shell and network. They all agreed that any modification in any component or relationship entailed a modification in other components and their interrelationships. Finally as a multivariate system, the city is composed of a simple structure with a large number of interacting variables. A system approach to the study of the city has been canvassed in terms of using multivariate statistical technique such as classification, correlation, principal component, factor and cluster analyses which, would help the researcher to generate new hypotheses or to confirm existing ones about the urban system.

However the system nature of the city has not been in much dispute. What constitutes a problem to urban designers, developers and researchers is how to maintain a balanced integration of the components of the city, its serviceability, sustainability and effective governance. While the urban planners have suggested the balancing of population, employment and the transportation network, some theorists have advised that to ensure spatial efficiency in the city, it should be planned in advance before growth becomes overbearing, before it grew rapidly. For instance, Foley (1964) has found that the metropolitan structure consisted of complementary formal and processual aspects or that the spatial structure of the city is associated with some spatial processes.

Therefore a number of gaps exist in West African urban morphology. Firstly, most cities in West Africa grow by accretion. The interrelationships between urban growth and land value processes are inexplicit. Secondly, there is neither an explicit comprehensive, and dynamic urban structure theory, nor the existence of explicit and dynamic theory of urban differentiation to assist in planning action.

Finally the generally agreed intercorrelation between urbanization, urban growth, macro-economic trends and land value processes in the developed countries is inexplicit and disputed in West African countries.

For instance, there are differences in the processes of urbanization between the developed countries and the West African Countries. Whereas industrialization preceded urbanization in the former, urbanization preceded industrialization in the latter. Whereas there is optimum urbanization in the former, there is over-urbanization and dependent urbanization in the latter. In the West African countries, urban population is predominantly rural with low skill, low wages and low demand for land. But in the western countries, industrial workers have greater skills, earn higher wages, have higher disposable incomes and higher demand for land. This implies that there is significant intercorrelation between industrialization, urbanization, urban growth and the structure of land values in the developed countries.

In West African countries, cities are not necessarily the products of industrialization because of huge capital flight, and low purchasing powers of urban population. Hence according to Mabogunje (1968).

“Land value is not at present a serious factor in the determination of land use in many West African towns because there is no serious economic competition for urban land”.

The foregoing gave birth to an aged debate of the “the absence of economic competition for urban land paradigm” in West African urban morphology. This paradigm has been nurtured and disseminated by notable urban geographers like Onokerhoraye (1977a), Sada (1972), Ayeni (1979) and Abumere (1982). According to Onokerhoraye (1977a)

“In Benin as in most Nigerian traditional cities, there is no serious economic competition for urban land as land assignment for residential and other uses are primarily based on social factors rather than economic consideration”

Therefore the RESEARCH PROBLEM of this paper is to provide answer to this question: To what extent does land values provide adequate proxy for identifying and differentiating urban neighbourhoods in traditional African cities? In other words, this paper seeks to explore the similarity between the structure of land values and the spatial distribution of urban neighbourhoods in a traditional African city.

The OBJECTIVES of the study are:

- i. To examine the site rental value profile of the constituent neighbourhoods of Benin City.
- ii. To classify the neighbourhoods into homogenous planning sub regions.

Land values and urban neighbourhood classification

- iii. To investigate the extent the site rental value maps explain the socio-spatial structure of the city.
- iv. To evaluate the planning problems identified in each planning sub region in the city.

The paper hypothesized as follows:

- i. Land use determines land values and land values distributed land uses in the city.
- ii. The closer the similarity of site rental values the greater the homogeneity of the neighbourhoods.
- iii. Whenever there was a land value peak, there was a business centre, and whenever there was a ridge, there was a ribbon development of commercial activities.

JUSTIFICATION FOR THE STUDY

This study is of great theoretical significance. For instance, Clark (1999, p.130) has advised researchers that at the beginning of a new century the focus of spatial analysis geography should be on new methods for understanding spatial structure and choices in space. This study is concerned with exploratory spatial data analysis to investigate spatial patterning, auto-correlations spatial interaction and spatial pricing. It is also concerned with the role of distance as a factor of land use, its intensity and land values in the city. In the morphology of Nigerian city, there is no consensus as the existence of land value or rent decay function. Sada (1972) and Anokerhoraye (1977) did not find it in Lagos and Benin city respectively. In Ibadan, Abumere (1982) found no generalized relationship between rent and residential land use. This he explained depended on the zone of interest, "zone of market forces" the "indigenous zone", the "government or institutional" zone. This study seeks to assist in resolving the existing controversy and to contribute to the development of explicit urban structure theory. To effect sustainable city programme, there is need for explicit urban structure theory to guide planning action.

The problems of urban land and land rent conflicts in economic geography have defied solution. Three questions dominate the literature: why do we have astronomically high land values or rent in some parts of the city and abysmally low ones elsewhere? What is the effect of the inverse relationships between rent and profit? What obstacles face the government in regulating and controlling land ownership and land speculation in Nigerian cities?

Finally this study is of great social and professional relevance. The

efforts of the government to provide remedies to agonizing urban management problems through policy formulation or direct planning action have yielded no successful result. For instance the urban renewal schemes at Surelere, Maroko, Sangisa/Ketu failed because of inaccurate conceptualization of renewal strategies. The establishment of new towns like New Bussa, Agoda, Ajokuta etc failed to relieve the host cities of morphological problems. Site and Services Schemes in Jos, Port Harcourt and Benin failed because of vocational inadequacies and the absence of prior sub regional studies. The EPM Approach has been recommended as the panacea for the failure of previous planning efforts. (Onibokun 1997; Abumere 1998; etc). In the EPM Approach recommended by the World Bank, all stakeholders in urban development and sustainability are expected to participate. The success of this strategy depends on prior urban neighbourhood classification, which is the focus of this paper.

THEORETICAL AND CONCEPTUAL FRAMEWORK

The following theories have been used to provide explanations of urban neighbourhood classification. They are:

1. the classical land use models
2. The micro-economic theories of land values
3. the gravity models and
4. The social Area Analysis and Factorial Ecology

Under the classical land use models by Burgess (1925), Hoyt (1939) and Harris and Ullman (1945) the Ecologists explained urban neighbourhood differentiation on basis of invasion-succession process. Just as certain types of soil are suitable to certain types of plants, so are some parts of the urban areas and neighbourhoods were inhabited by persons most suitable to those areas. Through a process of invasion-succession, which involved survival is the fittest, like types of people, institutions and uses inhabited similar areas. Urban neighbourhoods become classified on basis of similarity in rent paying abilities by people, establishments, institutions and land uses.

Under the microeconomic theories of land values, some neoclassical economists like Von Thunnen (1926) Aloson (1964), Wingo (1961) and Muth (1969) explained urban classification on basis of the land user's ability to benefit from and pay for transportation accessibility and the position rents.

The gravity model was used to explain urban classification on basis of geographic association measured with the distance exponent between interacting land uses, establishments, institutions and persons. Geographic association shows the degree to which an urban establishment is spatially

Land values and urban neighbourhood classification

similar to another establishment. The greater the interaction between two neighbourhoods, the greater is their association, their similarities and the structure of their land values. It is on basis of social distance between people in terms of net income, educational level, nature of occupation, rent of housing consumed and other social status indices that the sociologists also explained the spatial organization of urban residential areas. Thus the closer the social distance between two people, the greater the homogeneity of their neighbourhoods.

The modern method of urban quantitative classification is based on Factorial Ecology using social area analysis data. Factorial Ecology is a multivariate statistical technique applied to social area data without prior hypothesis about the dimensionality of the urban space. It is based on the assumption that social identity can be classified in space as "birds of a feather flock together", hence Goss (1995), p. 150) said

"We know who you are when we know where you live"

4. THE RESEARCH METHODOLOGY

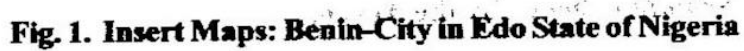
(a) The study Area, Unit of Data Collection and Analysis, and Sampling Techniques.

A more detailed research methodology for this paper could be found in Okoror (2002), a research effort spanning a period of 8 years.

Benin City, the study area, is located within the geographical coordinate of latitudes 6°17' and 6°26' North and longitudes 5°35' and 5°41' East (see fig.1) Benin City was chosen as the study areas of some remarkable reasons. These include its unique geographical location in the oil producing Niger Delta Region, its historical antecedents as a political capital which had enjoyed polarized development; its primacy; its easily identifiable traditional quarter system (or neighbourhoods) and its exponential population explosion due to oil boom from 1977 to 2000.

For purpose of this research, the functional region of Benin-city ranges from 113km² in 1977 to 1103km² in 2000 with urban sprawl covering 50.61km² in 1977 to 210.28km² in 2000. It has a total area radius of 18.74km.

The sampling frame consisted of sixty (60) area units or neighbourhoods, 781,000 people by 1991 population census and 69,234 estimated buildings. In each sampling unit 27 samples of land and building and 81 household heads were sampled. This implied a survey of 1620 land and buildings for valuation, and 4860 households for socioeconomic characteristics of the people. Multi-stage cluster sampling coupled with



Land values and urban neighbourhood classification

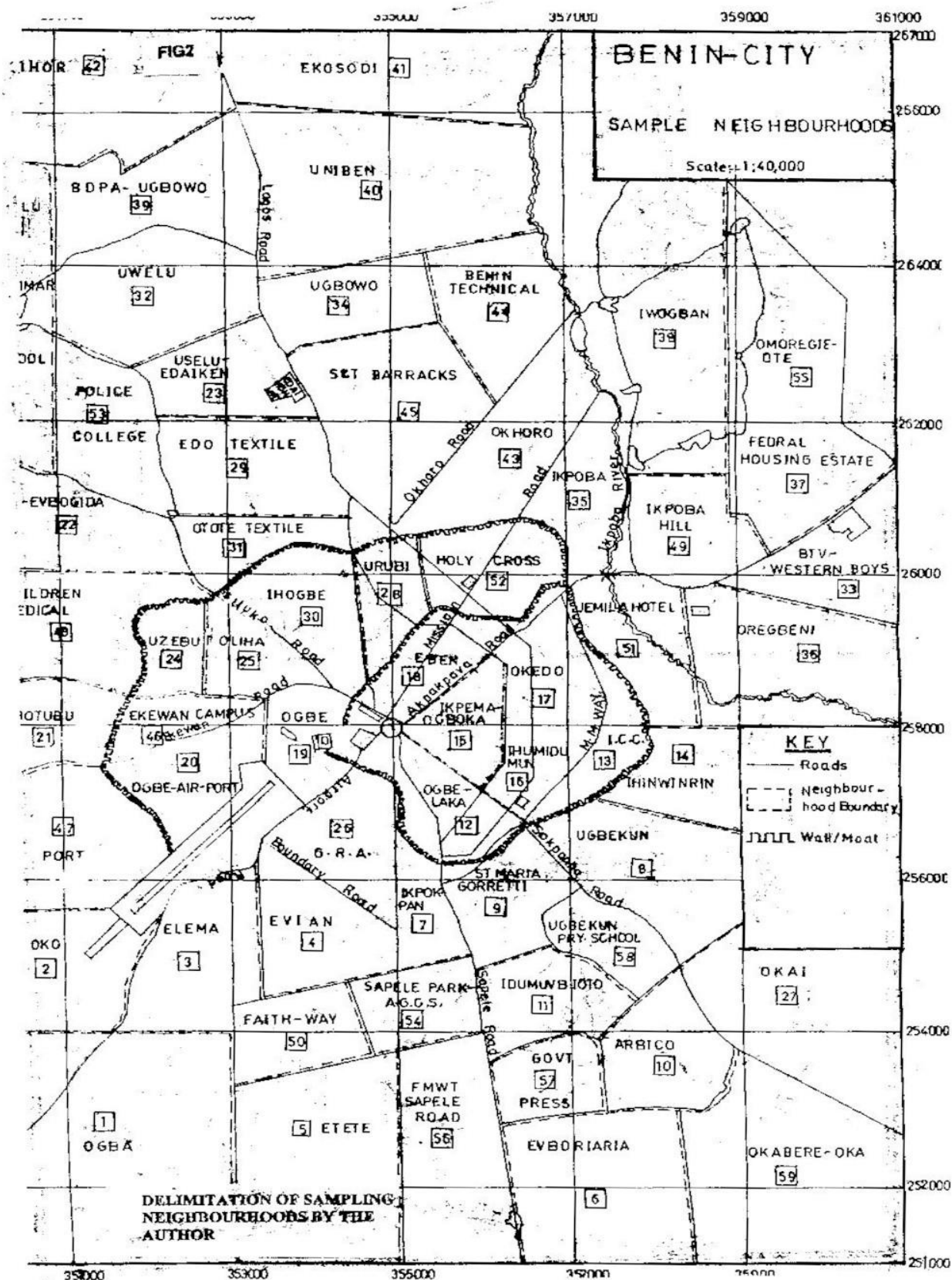


Fig. 2. Delimitation of Sampling Neighbourhoods by the Author

stratified, systematic and simple random sampling were used to ensure adequacy and representativeness of sample data.

Primary data collected included socio-economic, spatial and property characteristics using 40 variables over the 60 neighbourhoods and from 1620 land and building and 4860 household heads. The secondary data collected include the population census report, the street guide maps of Benin City, 1986 and 1992 and other publications.

(b) Variables and Scale of Measurement

For the purpose of this paper the most important variable is the average site rental values whose profile over the sixty (60) neighbourhoods is shown in Appendix 1.

(c) Data Analysis Techniques

The data were analyzed at two levels – preliminary and final. The preliminary data analyses consisted of graphs, table choropleth maps and statistical techniques like the means, standard deviation, coefficient of variation and the matrix of correlation. The Pearson's Product Moment Correlation Coefficient is of the form:

$$r_i = \frac{\frac{1}{n} \sum (x_i - \bar{x}_i)(y_i - \bar{y}_i)}{Sx_i Sy_i}$$

Where

r_i	=	Coefficient of correlation of variable i , $i=1,2,\dots,40$
n	=	60 neighbourhoods
x_i	=	variable x_i
y_i	=	variable y_i
sx_i	=	standard deviation of x_i
sy_i	=	standard deviation of y_i

The major data analyses techniques used include the principle component and cluster Analyses and mapping. The principal component Analysis model is of the form: Mather (1976 p.5).

$$F = XA$$

Land values and urban neighbourhood classification

Where:

- A = (P x P) Matrix of correlation
X = (n x p) Data matrix
F = (n x p) Matrix of Principal component scores.

The principals component analysis helped to orthogonalize the site rental profile and to prevent multi-collinearity which would affect the Euclidean Distance Coefficient (d_{ij}) in the cluster analysis.

The Cluster Analysis model is of the form:

$$d_{ij} = \left\{ \sum (X_i - X_j)^2 + \dots + (X_{ip} - X_{jp})^2 \right\}^{1/2}$$

Where:

- d_{ij} = Euclidean distance coefficient,
it is equal to zero for perfect similarity and infinite for complete dissimilarity.
 X_i = Average site rent or PC score in neighbourhood X
 Y_i = Average site rent or PC score in neighbourhood y
P = 60 neighbourhoods.

The Hierarchical Agglomerative Cluster Analysis used in this paper is based on the idea that each group at level i is part of a large group at level $i + 1$, all groups being subsumed into a universal cluster at level $(n-1)$ (i.e. 59). Thus Appendix I is the Average site value rental profile for the 60 neighbourhoods. And in table 1, 2, 3 and 4 are principal component Analysis tables (explained later) (supra).

ANALYSIS OF FINDINGS AND DELINEATION OF PLANNING REGIONS

(a) The Land Value Map of Benin

Figures 3 and 4 represent site rental value and average annual rental value per dwelling maps of Benin as at 1999/2000. The are a nominal classification represented in graphs. In figure 3 a multi-nodal site value configuration is depicted confirming Harris and Ulman (1945) multi-centric urban milieu. Each peak or node represented a business centre.

The map identified the CBD with the highest land value intersection at Ogbe (19) with a site rent of N1575,000 per ha or sale price of N3,150,000 per plot of 30m x 30m. In this paper, site rent was measured by decapitalising the sale prices of land at various locations using between $3\frac{1}{2}\%$, 4% or 5% rates of interest, depending on locational variation, demand for land, security

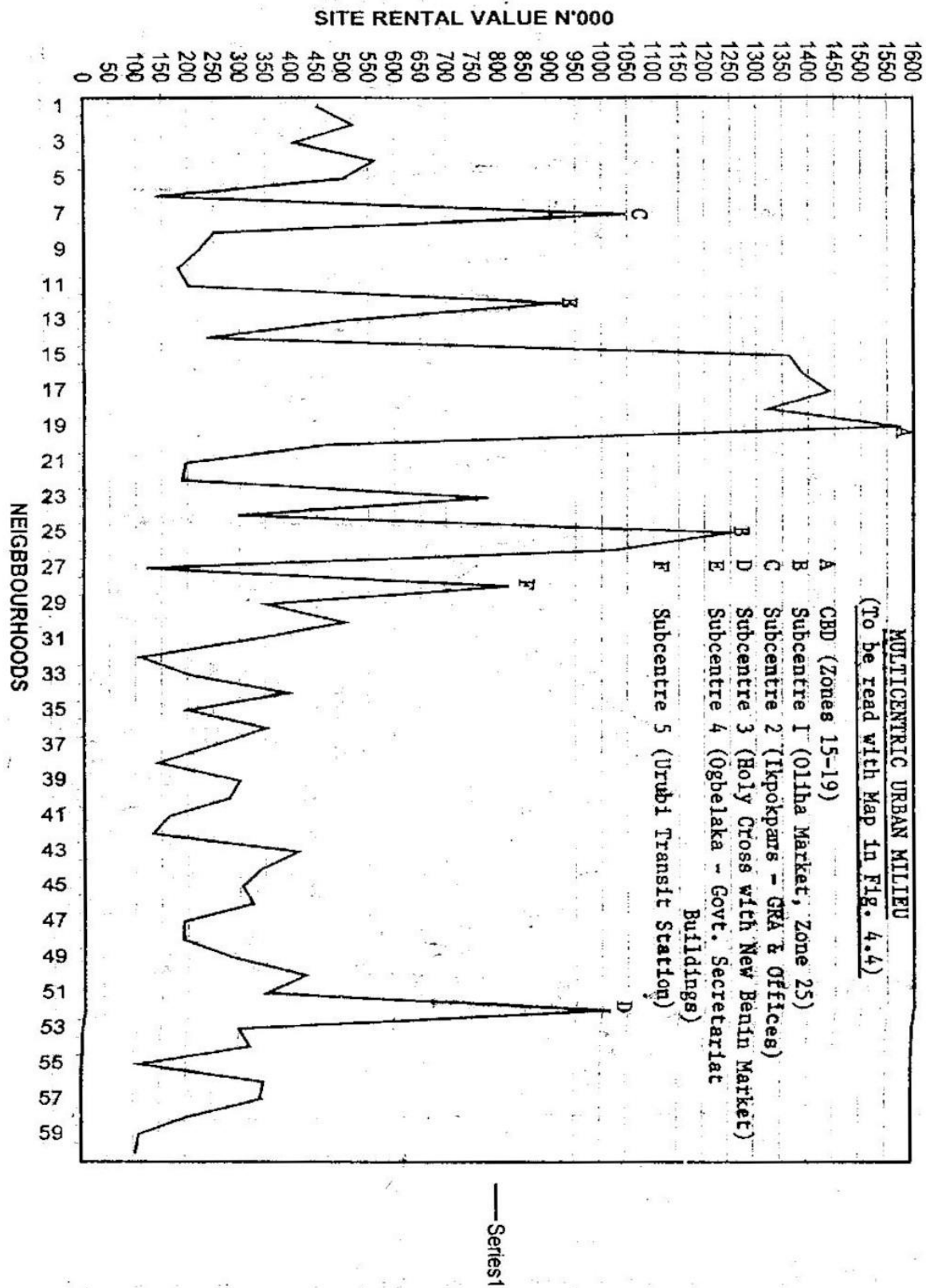


Fig. 3. Graph Showing Mean Site Rental Value Structure in Benin

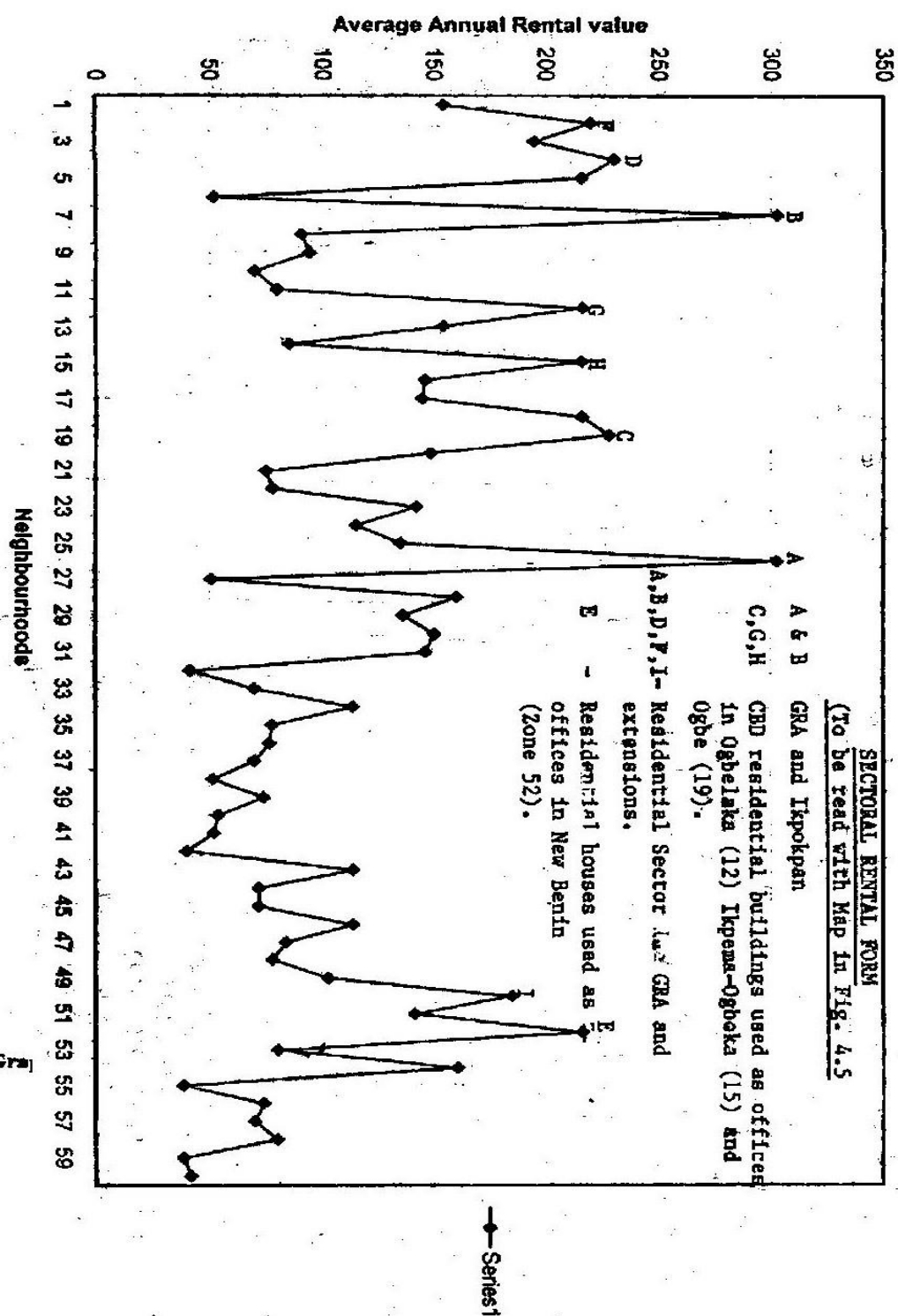


Fig. 4. Gra

Fig. 4. Graph Showing Average Annual Rental Value Per Dwelling in Benin City

of investment and types of existing and/or potential uses. The site rental values are given in hectares containing ten (10) plots of land measuring 30m by 30m. Thus a site rent of N150,000 per ha is equal to a plot of land whose site rental value is N15,000. Its capital value or sale price at 5% interest rate would be N300,000 per plot of 30m by 30. The graph identified neighbourhood, no 15-19 within approximate distance of 2km as the CBD in Benin City. The land value ranged from N2.725m to N4.0m per plot of 30m by 30m. Other sub-centers in the multi-centric milieu are Holy Goss (52) in new Benin with a land value of N1013,880 per ha; Ikpoba (5) with N1,047,100 per ha; Oliha (25) with N1,251,850 per ha; GRA (26) with N1,025,920 per ha etc Another peak is at Urubi (28) with a land value of N20,370 per ha. Urubi is a sub-centre, which Lagos-Onitsha bound transporters used as transit point. Thus Berry (1962)'s average site rental value per ha.

(b) **The Rental Value Maps of Benin**

Figure 5 reflects multi nodal configuration. Like the land value map three centres were identified. They were Ikpokpan (7) with average annual rental value per dwelling of N02, 720; GRA (26) with N302,720 and Holy Goss (52) with N180,660. These are areas of high land values. Residential values were influence by commercial values, showing that there is correlation between site rental and dwelling rental and dwelling rental values.

Okoror (2002) found $r = .7233$ between residential and commercial values in Benin City. This confirmed Li and Brown (1980) that commercial use contributed to the value of a residential use by a beta coefficient of .13506 in suburban Boston. In addition Hoyt (1939)'s sector theory is confirmed in figure 6 in respect of neighbourhood numbers 26, 7, 4 and 50 etc in a common sector.

This implies that the western land use models could be used for studying urban structure in Benin City and that urban classification could be based on them.

(c) **Delineation of Homogeneous site rental neighbourhoods**

In Appendix I is the average site rental value profile of the sixty neighbourhoods for classification purpose. This study used the principal component analysis to generate the hypothesis that site rental value alone could provide adequate proxy for categorizing the city into homogeneous neighbourhoods. To avert multi-collinearity and its adverse effects on the Euclidean distance coefficient, principal component analysis was used to orthogonalize the site rental profile. The results of the analysis are found in table 1, 2, 3, 4 and 5.

Land values and urban neighbourhood classification

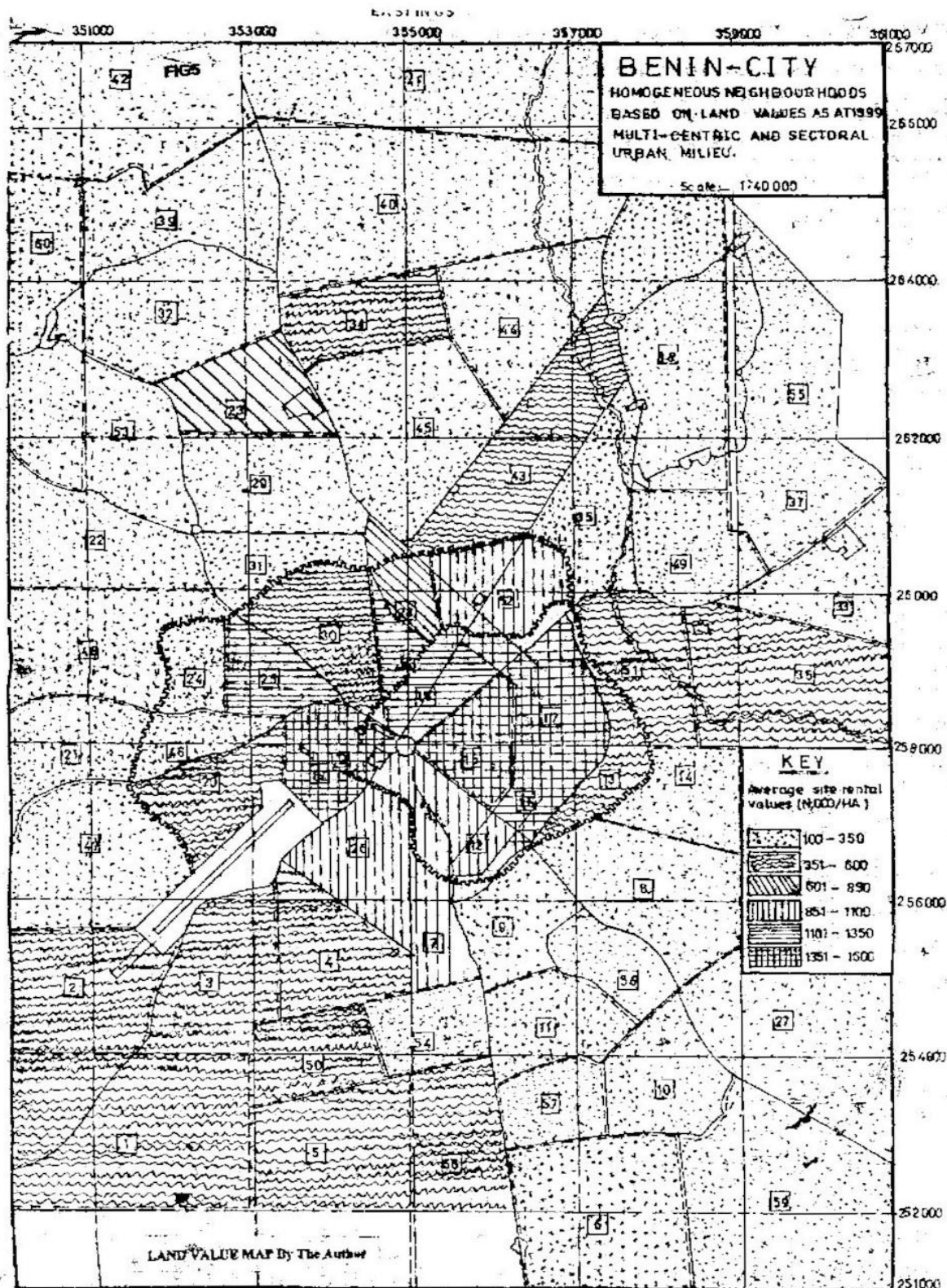


Fig. 5. Land Value Map by the Author (Based on Land Values as at 1999)

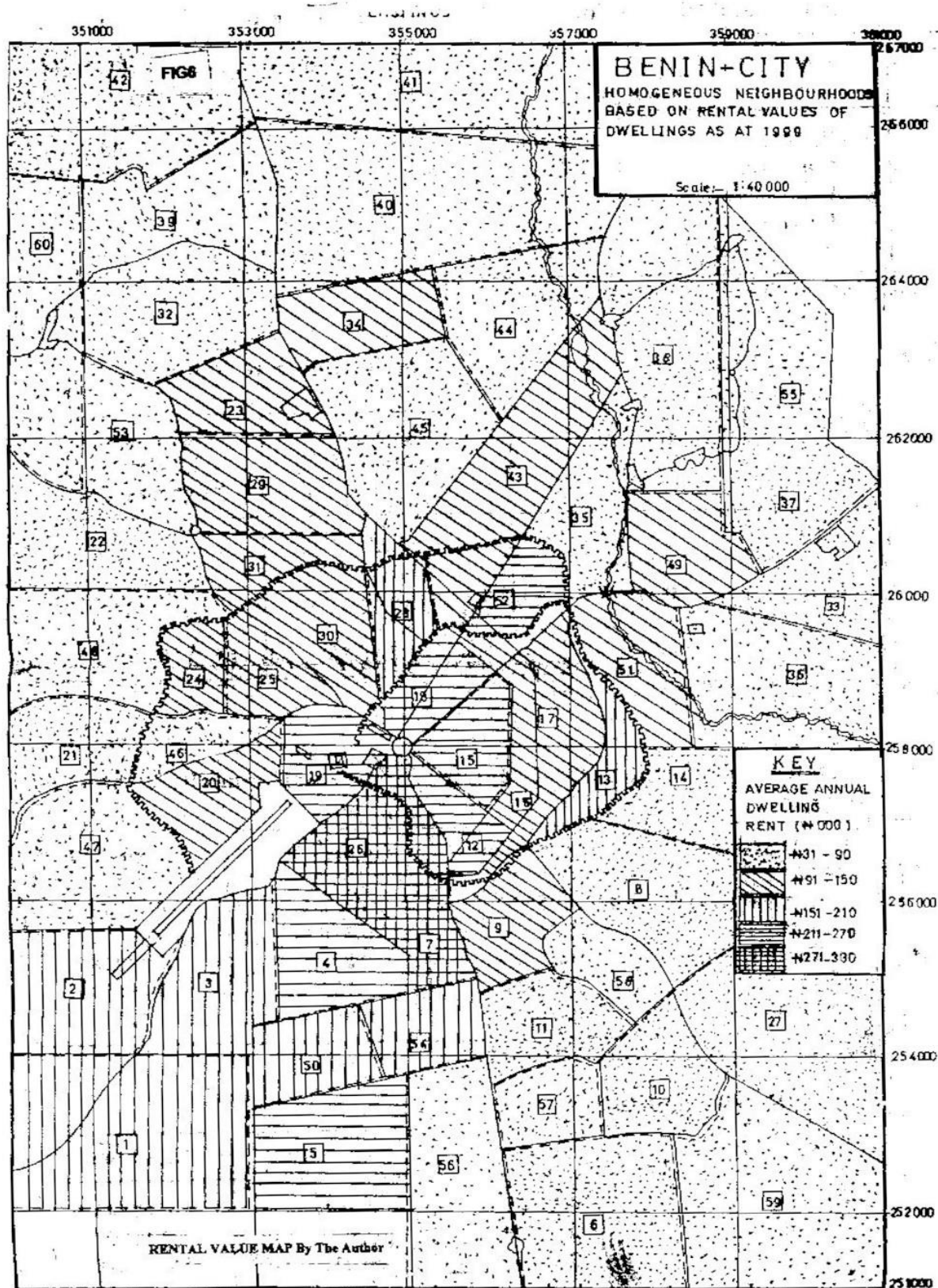


Fig. 6. Land Value Map by the Author (Based on Rental Values as at 1999)

Land values and urban neighbourhood classification

Table 1. Variability and Distribution of Site Rental Value Profile in 60 Neighbourhoods

S/No.	Land Use Type	Mean Value N'000	Standard Deviation	Coefficient of Variation %
1	Residential	279,6333	188.769	68
2	Commercial	585,6833	483.5567	83
3	Industrial	132,1833	167.957	127
4	Unstitutional	368,1833	351.845	96
5	Agricultural	101,5333	108.5581	170

Computer Output: SPPSS/PC+ OAU, Ile-Ife.

Table 2. Dimensions of Principal Component Analysis on Site Rental Data in 60 Neighbourhoods

Component	Eigen Value	Proportion Explained %	Cummulative Proportion Explained %
I	2.67189	53.44	53.44
II	1.70949	34.19	87.63
III	0.31984	6.40	94.02
IV	0.21952	4.39	98.41
V	0.07926	1.59	100.00

Computer Output: SPPSS/PS+ OAU, Ile-Ife.

Table 3. Unrotated Component Loading Matrix of Site Rental Values Based on Land Use Types

S/No.	Land Use Type	Component	Component	Uniqueness
1	Residential	0.95695	0.9389	0.07543
2	Commercial	0.85174	0.31076	0.17797
3	Industrial	-0.25424	0.88999	0.14328
4	Unstitutional	0.94134	0.13146	0.09659
5	Agricultural	-0.28268	0.89148	0.12535

Table 4. Varimax Rotated Component Loading Matrix

S/No.	Land Use Type	Component	Component	Uniqueness
1	Residential	-0.74799	0.60422	0.07543
2	Commercial	-0.82509	0.37584	0.17797
3	Industrial	-0.44295	-0.81272	0.14328
4	Unstitutional	-0.76321	0.56649	0.09659
5	Agricultural	-0.42373	0.83373	0.12535

Table 5. Distribution of Principal Component Scores

S/No.	NEIGHBOURHOODS	PC I	PC II
1	OGBA	.6105868	-.42895
2	OKO	-.358538	-.525687
3	ELEMA	-.317943	-.779208
4	EVIAN	-.360344	-.9003936
5	ETETE	-.471393	-1.150886
6	EVBORIARIA	.73382	-.323806
7	IKPOKPAN	-2.37586	-1.471802
8	UGBEKUN	.73396	-.305937
9	ST. MARIA GOROTTI	.660997	-.019678
10	ARBICO	.810218	-.260229
11	IDUMNVBIOTO	.212872	-.890334
12	OGBELAKA	-.347681	1.19483
13	ICC	.471662	.773483
14	IHINWINRIN	.610628	-.501336
15	IKPEMA OGBOKA	-1.083363	1.761894
16	IHUMIDUMU	-2.305377	2.283711
17	OKEDO	-2.72027	2.316835
18	EBEN	-.90058	2.049694
19	OGBE	-1.92219	2.220151
20	OGBE-AIRPORT	.181576	.978660
21	EVBOTUBU	.8977950	.068874
22	USE-EVBOGIDA	.912959	-.012644
23	USELU-EDAIKENU	.574461	.727391
24	UZERU	.697774	.690434
25	OLHA	.643095	.672464
26	GRA	-3.442283	-3.331404
27	OKAI	.998994	.017590
28	URUBI	-.836944	-.676794
29	EDO-TEXTILE	.714836	.616204
30	IHOGBE	.198760	.941876
31	OTOTE-TEXTILE	.208113	-.1834062
32	UWELU	.559447	-.296516
33	WESTERN BOYS	.919927	.573559
34	UGBOWO	-.670223	-1.080883
35	IKPOBA	.764682	-.296327
36	OREGBENI	.478848	-.171728
37	FED. HOU. ESTATE	.385423	-.0307929
38	IWOGBAN	.263365	-.793722
39	BDPA-UGBOWO	.194554	-.58358
40	UNIBEN	.259502	.097575
41	EKOSODIN	.523050	-.24996
42	ISIOHOR	.523050	-.429466
43	OKHORO	-.751036	-.1119297
44	BENIN-TECH	-.02753	.181340
45	B & T BARRACKS	.486736	.80602
46	EKEWAN CAMPUS	-.167060	-.66363
47	AIRPORT	.313087	-.457663
48	CHILDREN MEDICAL	.505728	-.299166
49	IKPOBA-HILL	-.439544	-1.030635
50	FAITH-WAY	-1.38671	-1.359072
51	JRMILA HOTEL	-.108517	-.955766
52	HOLY CROSS	-.272907	1.21876
53	POLICE COLLEGE	.759670	.635997
54	SAPELE-PARK-AGGS	.235277	.855992
55	OMOREGIE-ITE	.985238	.064531
56	FMWT/SAPELE ROAD	.266956	-.305766
57	GOVT. PRESS	.230799	-.138674
58	UGBEKUN PRY SCH.	.580443	.061932
59	OKABERE-OKA	1.35023	.06842
60	UWELU GRAM. SCH.	.804506	.149671

Land values and urban neighbourhood classification

Table I showed that the residential, commercial and institutional uses were more uniformly distributed over the 60 neighbourhood than the industrial and agricultural uses. This is evidence by their lower coefficients of variations of 68%, 83% and 96% unlike industrial with 127% and Agricultural 170%. In table 2, the principal component analysis showed that two principal components I & II explained 87.63% of the total variance in the site rental data. The two components had eigen values of 2.67189 and 1.70949 and explained of data variance ranging from 1.59% to 6.40%.

Tables 3 and 4 contained principal component loading of the various land use types. Theoretically, the higher the loading the more diagnostic the power of a variable. Thus principal component 1 which explained the highest proportion of 53.44% showed that commercial (.95695), institutional (.94134) and residential (.85174) were more diagnostic than agricultural and industrial uses for the study of Benin city spatial structure. Though residential uses had the greatest coefficient of variation, it had the lowest loading compared with commercial and institutional uses. This implies that it was inadequate to differentiate urban land use in Benin City or any other traditional city in Nigeria with residential land use only. Also in urban structure dominated by a mixture of land uses like in Benin, Ibadan, Ilorin, Lagos, Owerri etc. It was inappropriate to differentiate the spatial structure of those cities with residential use only. Hence it could be contended that Sada (1972) Onokerhoreye (1977a) Ayeni (1979), Mabogunje (1962 1968 and Abumere (1982) could be partial and incomplete as they ignored the spatial structure of commercial institutional, industrial and agricultural uses. This warrants a paradigm shift in urban geography of West African Cities.

Tables 5 shows the distribution of principal component scores over the 60 neighbourhoods. These scores replaced the average site rental values profile in Appendix I for cluster Analysis. The scores were calculated with the rotated principal component loading matrix. A preliminary grouping and mapping of the component scores was made after Mather (1976, p 237) and Oyebanji (1984) for preliminary description and interpretation. Figures 7 and 8 shows choropleth maps of homogeneous neighbourhoods categorized on bases of mixed land use only. In the distribution of mapping of component I scores it was found that the higher the positive score, the greater the residential land use dominance. This was found mostly in peripheral areas particularly in neighbourhood number 59, 58, 55, 41 etc. These areas required special planning focus in terms of housing quality, road network, electricity, water, light and health services. Also the higher the negative scores, the greater the mixture of commercial and institutional uses. The areas identified were the CBD neighbourhoods (15-19), GRA (26) and Ikpokpan (7).

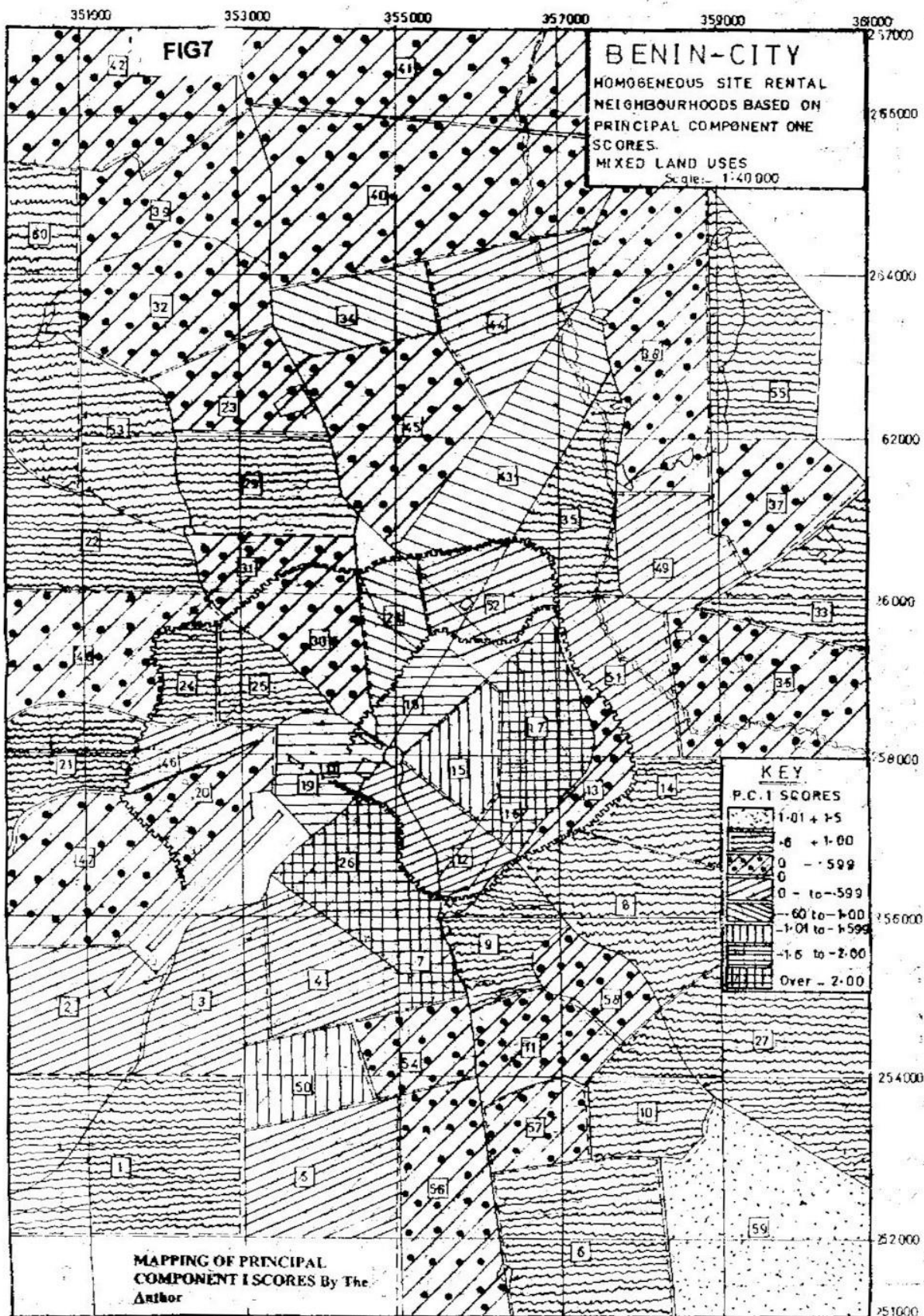


Fig 7. Mapping of Principal Component I Scores by the Author

Land values and urban neighbourhood classification

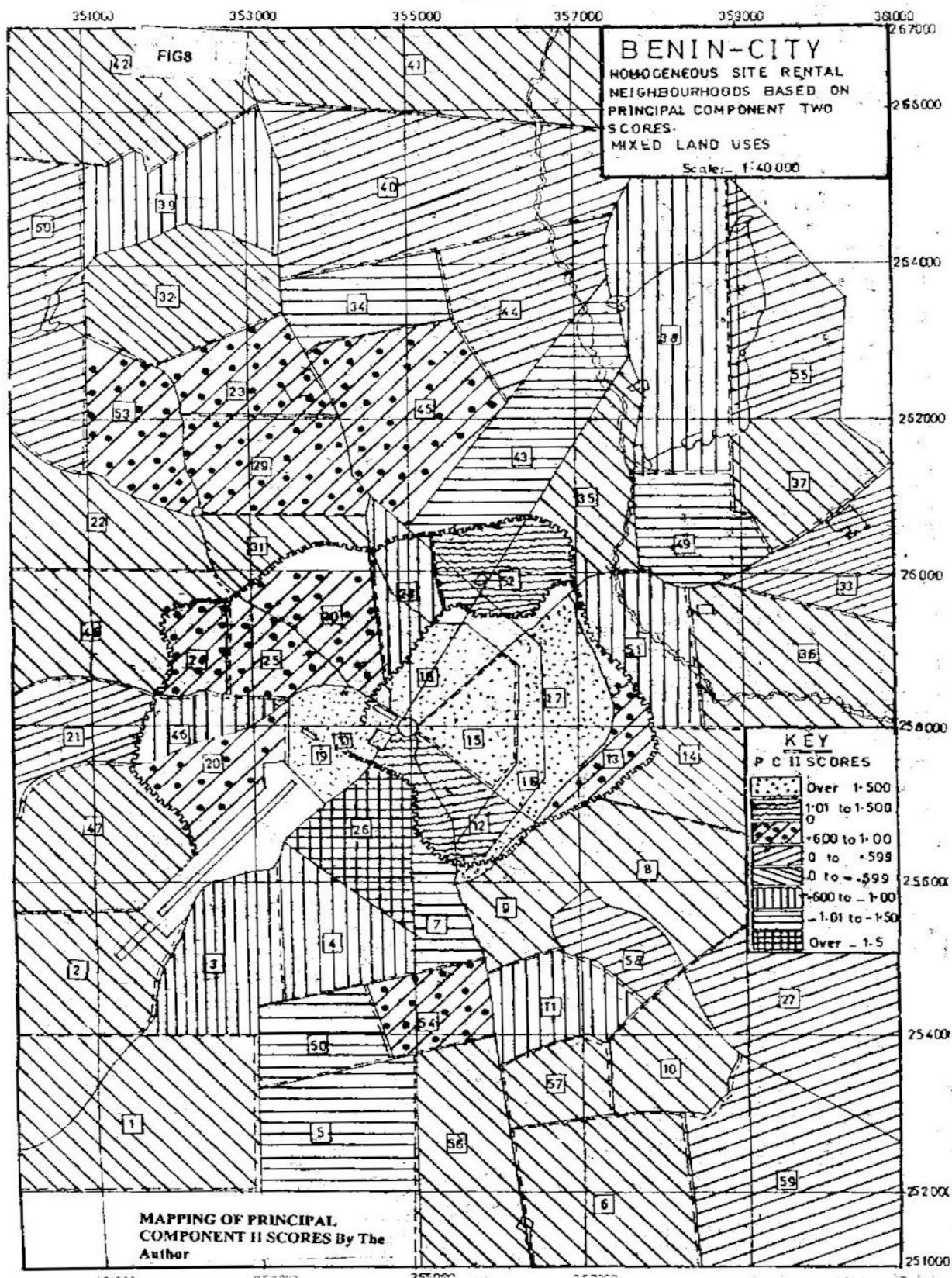


Fig 8. Mapping of Principal Component II Scores by the Author

The principal component I and II categorized Benin City on basis of mixture of land uses into eight. But socio-economic characteristics and other spatial varieties were omitted. Hierarchical agglomerative cluster analysis of the orthogonalized scores were done with Computer Department in OAU. Thus in Appendix II there was a sudden jump in the Euclidean distance coefficient from 640.243713 to 1171.056152. According to Akpan (1992, p. 143) in hierarchical agglomerative cluster analysis, the rule of thumb is to stop grouping where the cluster coefficient becomes suddenly large. In Appendix II, this was found in stage two and it implied that two broad categories could be found based on mixed land use. It was therefore concluded that site rental value alone cannot be used adequately for categorizing Benin City into planning sub-regions.

SUMMARY AND CONCLUSION

The existing literature on the morphology of West African Cities found no explicit relationship between land values and urban land use because of differences in their processes of urbanization, urban growth and urban development. This paper therefore sought to explore the extent land values could provide adequate proxy for urban neighbourhood differentiation for planning purposes.

Classification could be done on basis of similarities or inter-relationships between the neighbourhoods. This paper explored the use of the former, starting with single variable, land value or site rent. This was justified because of the existing debate in favour of land value against socio-economic characteristics. Urban classification was necessitated for theoretical and social interests. Regionalization would provide a sampling framework for further studies. Also classification was warranted for the implementation of National housing Policy (1991), the Environmental Protection Act (1989) the Urban and Regional Planning decree No 88 of 1992, and the identification of areas of urban poverty and areas for urban settlement sustainability.

No general theory of urban neighbourhood differentiation existed. The paper therefore relied on both nominal and quantitative approaches and used factorial ecology.

Benin City was used as the study areas because of its location and physical structure as well as its experience in an oil boom, population increase and urban development from 1977 to 2000. No single sampling frame could be used to procure adequate and representative sample data. Multi-stage cluster sampling coupled with systematic stratified and simple random sampling were used to collect data from 650 neighbourhoods, 1620 land and

Land values and urban neighbourhood classification

buildings and 4860 households. The most important variable used was the average site rental value data. This provided land value profile for the 60 neighbourhood for cluster analysis.

Meanwhile, a nominal classification was done to obtain land value and rental value maps of Benin. The land value map identified the CBD in a multi-centric urban milieu and confirmed Hoyt (1939) Harris and Ullman (1945)'s and Berry (1963) hypotheses. This confirmed the applicability of the western land use models.

Before cluster analyzing the site rental profile of the 60 neighbourhoods, the profile was orthogonalized with principal component Analysis to make the site rental data uncorrelated to prevent multi-collinearity and their adverse effect on the Euclidean distance co-efficient. The principal component analysis extracted two dimensions, which explained 87.63% of the total variance and divided Benin City into two on basis of mixed land use only. This showed that land value, to a considerable extent, provided a good proxy for differentiating urban neighbourhoods but with respect to urban spatial structure and form.

This omitted the social morphology of the city. This was because there was no perfect correlation between land value and land use, and there was no perfect correlation between dwelling land value and land use, and there was no perfect correlation between dwelling rent and social status of the people. Further, it was found to be partial and inadequate to differentiate urban structure of predominantly mixed land use with residential use only. In this paper, whereas commercial and institutional land value variable had principal component loading of .956595 and .95134 respectively, and covered 21% of the city land areas, the residential land value had a loading of .85124 though covered 47% of the city. This implied that both commercial and institutional land uses were more diagnostic of urban structure than the residential land use. This finding involved paradigm shift in two respects. Firstly that it was partial and inadequate to use residential use of the city to classify urban land use. Secondly, that culture and social factor in a traditional city of Benin and other towns may not have sufficiently diagnostic effect on land use.

Thus Mabogunji (1968) Onokerhoraye (1974, 1977), Sada (1972) Ayeni (1979) and Abumere (1982) lacked completeness and revision. It was found that the western land use models could be used for urban neighbourhood differentiation in West Africa irrespective of differences in their histories of urbanization.

Mabogunje (1968, p. 184) found that technological growth only succeeded in dividing urban structure in West Africa into twin cities. This paper confirmed this using land value as a product of interaction, for the interaction

or the interrelationships between the traditional and modern centres. The forgoing warrant further urban differentiation study with more morphological variables as the use of land value or dwelling rent looked oversimplification of the analysis.

REFERENCES

- Abumere, S. I. (1982) Residential Differentiation in Ibadan: Some Sketches of Explanation In *Ibadan Region* (Eds.) M. O. Filani, Department of Geography University of Ibadan..
- Abumere, S. I. (1998) City Consultations Process for Poverty Alleviation in Ijebu-Ode Paper presented at the workshop on city consultation process held at Development Policy Centre, Ibadan, May
- Alonso, W. (1964) *Location and Land Use* Harvard University Press Cambridge.
- Ayeni, Biola (1979) *Concepts and Techniques in Urban Analysis* Croom Helm Ltd., London. S. W.
- Arvidson, E. (1995) Cognitive mapping and class politics: Towards a non-determinant image of the city *Rethinking Marxism* Vol. 8 pp. 6-23.
- Berry, B. T. L. (1965) Internal structure of the city *Law and Contemporary Problems* Vol., 30 No, 1, 1965.
- Burgess, E. (1925): The Growth of the City: An Introduction to a Research Project. In R. E. Park et al (Eds.) *The City* Chicago, Chicago University Press.
- Clerk, W. A. (1999): Geographical Analysis at the beginning of a new Century *Geographical Analysis* Vol. 31 No 4, October 1999.
- Dear, M and F. Lusty, S. (1998): Postmodern Urbanism *Analysis of the Association of American Geographers* Vol. 38, pp. 50-72.
- Doxiadis Associate Nig. Ltd. (1981): Regional Development Planning for Federal Capital Territory, Abuja Published by Federal Capital Development

Land values and urban neighbourhood classification

Authority, Abuja

- Egunjobi, L. (1999) *Our Grasping Cities* Being an inaugural lecture delivered at the University of Ibadan, Ibadan. Published by Vantage Publishers Ltd. Ibadan.
- Foley, D. (1964): An Approach to Metropolitan Spatial Structure in S. Gale and E. G. Moore eds. *The Manipulated City* Published by Maacoufa Press, Chicago.
- Harris, C. D. and Ullman E. L. (1945): *The Nature of Cities* Annals of the American Academy of Political and Social Sciences. Nov. 1945 pp. 1-7.
- Hoyt, Homer (1939) *The Structure and Growth of Residential Neighbourhood in American Cities*, Washington D. C. The United States Federal Housing Administration.
- Jon, Goss (1995) We know who you are and we know who are and we know where you live. The instrumental rationality of geodemographic system *Economic Geography* Vol. 71 No.1.]
- Lichfield, N. (1969) *Economics of Planned Development* Estate Gazette Ltd. Wardour Street, London.
- Mabogunje, A. L. (1968) *Urbanization in Nigeria*. University of London Press.
- Mabogunje, A. L. (1962) The Growth of Residential districts in Ibadan *Geographical Review*. Vol. 52 No. 1, pp. 56-77.
- Onokerhoraye, A. G (1977a) The Spatial Pattern of Residential Districts in Benin, Nigeria *Urban Studies* Vol. 14, pp. 291-302.
- Okoror, S. I. (2002) Correlates of Urban Land Values and Urban Morphology, A case study of Benin-City Nigeria being a Ph. D. Thesis presented to the Department of Geography, University of Ibadan, Ibadan.
- Sada, O. P. (1972) Residential Land Use in Lagos Metropolis: An Inquiry into the Relevance of Traditional Models *African Urban Notes* Vol. VLL No. 1.
- Tanimowo, H. B. (2002) Some Conceptual and Regional issues in Poverty Alleviation in Nigeria, *Journal of NITP*, Vol XV October, 2002.

APPENDIX I

**AVERAGE SITE RENTAL VALUES OF NEIGHBOURHOOD PROPERTIES -
N'000/HA FOR CLUSTER ANALYSIS**

Zone No.	Neighbourhood Name	Residential N'000	Commercial N'000	Industrial N'000	Institutional N'000	Agriculture N'000
1	OGBA	126	270	147	147	115
2	OKO	312	475	200	400	185
3	ELEMA	320	225	280	400	219
4	EVIAN	288	400	200	300	250
5	ETETE	288	400	325	250	225
6	EVBORIARIA	125	175	120	175	100
7	IKPOKPAN	891	600	392	400	375
8	UGBEKUN	140	200	105	140	105
9	ST. MARIA GOROTTI	171	324	200	200	0
10	ARBICO	130	200	105	120	90
11	IDUMNVBIOTO	150	300	350	150	105
12	OGBELAKA	463	95	0	700	0
13	ICC	303	683	0	289	0
14	IHINWINRIN	124	200	200	160	93
15	IKPEMA OGBOKA	375	1,720	0	1,200	0
16	IHUMIDUMU	750	1,886	0	1,680	0
17	OKEDO	1,100	2,100	0	1,500	0
18	EBEN	722	1,920	0	1,250	0
19	OGBE	500	2,000	0	1,700	0
20	OGBE-AIRPORT	288	900	0	504	0
21	EVBOTUBU	183	200	0	134	85
22	USE-EVBOGIDA	160	200	00	120	100
23	USELU-EDAIKENU	265	550	0	346	0
24	UZEBU	204	530	0	350	0
25	OLIIA	282	550	0	230	0
26	GRA	500	1,000	800	670	600
27	OKAI	135	160	0	140	88
28	URUBI	320	900	300	380	200
29	EDO-TEXTILE	290	450	0	200	0
30	IHOGBE	325	890	0	411	0
31	OTOTE-TEXTILE	290	410	300	200	0
32	UWELU	147	300	140	200	100
33	WESTERN BOYS	158	378	0	300	0
34	UGBOWO	210	860	400	250	200
35	IKPOBA	140	200	105	120	100
36	OREGBENI	180	380		230	175
37	FED. HOU. ESTATE	250	500	0	185	156
38	IWOGBAN	135	350	350	150	85
39	BDPA-UGBOWO	165	450	200	200	150
40	UNIBEN	250	500	0	330	125
41	EKOSODIN	158	300	140	200	90
42	ISIOHOR	150	300	200	150	88
43	OKHORO	320	610	400	280	200
44	BENIN-TECH	275	700	0	420	160
45	B & T BARRACKS	250	785	0	315	0
46	EKEWAN CAMPUS	250	350	250	370	160
47	AIRPORT	170	400	160	200	140
48	CHILDREN MEDICAL	150	350	150	200	100
49	IKPOBA-HILL	170	500	350	425	200
50	FAITH-WAY	300	750	500	600	250
51	JRMILA HOTEL	170	425	350	250	150
52	HOLY CROSS	400	1,450	0	400	0
53	POLICE COLLEGE	220	450	0	300	0
54	SAPELE-PARK-AGGS	400	685	0	350	0
55	OMOREGIE-ITE	150	200	0	120	80
56	FMWT/SAPELE ROAD	320	500	0	350	200
57	GOVT. PRESS	300	400	280	200	0
58	UGBEKUN PRY SCH.	200	350	0	250	120
59	OKABERE-OKA	70	150	0	0	50
60	UWELU GRAM. SCH.	200	300	0	150	80

APPENDIX II

HIERARCHICAL CLUSTER ANALYSIS BASED ON ORTHOGONALISED SITE
RENTAL PROFILES OF THE 60 NEIGHBOURHOODS

60 unweighted cases accepted.

0 cases rejected because of missing value.

Squared Euclidean measure used.

19 Apr 00 SPSS for MS WINDOWS Release 6.0

Page 11

***** HIERARCHICAL CLUSTER ANALYSIS*****

Agglomeration Schedule using Average Linkage (Between Groups)

Stage	Cluster Cluster 1	Combined Cluster 2	Coefficient	Stage Cluster Cluster 1	1st Appears Cluster 2	Nrxt Stage
1	55	59	640.243713	0	0	2
2	55	60	1171.056152	1	0	19
3	10	48	1233.458740	0	0	15
4	9	58	1574.503540	0	0	9
5	41	42	1770.192264	0	0	13
6	44	57	1983.937866	0	0	10
7	49	53	2151.405273	0	0	28
8	11	47	2302.929443	0	0	18
9	8	9	2355.411621	0	4	11
10	44	45	2405.980957	6	0	23
11	8	14	2620.808350	9	0	24
12	24	31	2691.518311	0	0	27
13	38	41	2955.727051	0	5	19
14	27	32	2985.858398	0	0	20
15	10	21	3097.134277	3	0	21
16	15	18	3158.490967	0	0	43
17	2	5	3211.221436	0	0	38
18	11	33	3233.271484	8	0	35
19	38	55	3381.775146	13	2	30
20	6	27	3962.776855	0	14	30
21	10	35	4002.664063	15	0	24
22	23	28	4071.659180	0	0	29
23	44	56	4233.471680	10	0	39
24	8	10	4320.225586	11	21	31
25	20	30	4430.047363	0	0	42
26	1	3	4512.694336	0	0	41
27	24	29	4971.616699	12	0	28
28	24	49	5151.376465	27	7	37
29	23	54	5381.018555	22	0	54
30	6	38	5719.525391	20	19	44
31	8	22	5767.645508	24	0	35
32	7	26	6316.617188	0	0	56
33	39	40	6646.875977	0	0	40
34	16	17	6810.742188	0	0	49
35	8	11	7460.871582	31	18	44
36	36	46	7923.931641	0	0	40
37	24	51	8319.004883	28	0	39
38	2	4	8550.005859	17	0	50
39	24	44	9139.577148	37	23	51
40	36	39	9567.779297	36	33	48
41	1	50	9714.302734	26	0	45
42	20	43	10540.939453	25	0	47
43	15	25	12325.649414	16	0	49
44	6	8	13255.564453	30	35	53
45	1	34	13755.731445	41	0	50

19 Apr 00 SPSS for MS WINDOWS Release 6.0

Page 12

***** HIERARCHICAL CLUSTER ANALYSIS*****

Agglomeration Schedule using Average Linkage (Between Groups) (CONT.)

Stage	Cluster	Combined	Coefficient	Stage Cluster	1st Appears	Nrxt
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	Stage
46	12	52	13854.483398	0	0	54
47	13	20	14339.770508	0	42	52
48	36	37	14710.198242	40	0	51
49	15	16	19542.525391	43	34	55
50	1	2	20652.695313	45	38	52
51	24	36	24388.275391	39	48	53
52	1	13	28307.515625	50	47	57
53	6	24	35229.753906	44	51	57
54	12	23	37760.933594	46	29	56
55	15	19	57637.757813	49	0	58
56	7	12	85709.468750	32	54	58
57	1	6	86311.664063	52	53	59
58	7	15	275816.90625	56	55	59
59	1	7	835790.06250	57	58	0