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URBAN DEVELOPMENT CLASSIFICATION OF AKWA-IBOM STATE, NIGERIA USING KMEANS ALGORITHM

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ABSTRACT
K-means algorithm presents a less cumbersome technique for easy classification of urban centres based on empirical causal factors. The user of the algorithm has no influence over the classification result of the algorithm. Instead, the algorithm delineates urban centres by using cluster characteristics of the variables to define soft separation boundaries between or amongst *k*-classes. No training of the k-means algorithm is required since k-means is an unsupervised classifier. The *k* cluster centroid locations and sums of point-to-centroid distances are first computed, and thereafter the distances from each point to every centroid. The classification solution for each pixel is found by determining the class that yields the least computed distance from each point to every centroid; such that the successful class wins the classification for that pixel. This study presents the application of an unsupervised kmeans algorithm to the delineation of urban development centres in Akwa-Ibom State, Nigeria. Using 21 variables, 82 settlements drawn from 25 out of 31 local government areas of Akwa-Ibom State are classified into three levels of urban development: high, medium, and low. Eighty-two settlements experimented in this research are classified into eight high, twenty-two medium, and fifty-two low level development centres respectively.
Keywords: Classification; Kmeans; Urban Development

INTRODUCTION
Urbanisation has been described as one of the most remarkable developments in human settlements in the world (Ofem, 2010). In Akwa-Ibom State as it is in other parts of Nigeria, urban settlements and emerging growth centres are faced with challenges and opportunities. It is important for the State – a developing and predominantly rural one with just 12 per cent of its population living in urban areas to face squarely the challenges posed by the emerging centres as they also offer opportunities for human development (Federal Government of Nigeria, 1991). These challenges are: developing more urban centres to forestall inadequacies in infrastructure, inaccessibility of the people to economic opportunities, poor conditions of living and having more people accommodated in them. Such challenges often originate from the planlessness of developing 'young urban areas' (that serve as growth centres to surrounding rural areas) to adequately provide socio-economic infrastructure for human development and decent living. Preliminary investigation indicates that Akwa Ibom State has over 80 of such rural settlements that are strategically located at major road intersections. These settlements which may be acting as growth centres besides serving as transport routes are perceived to be providing higher order goods and services to surrounding villages that lack such services and are not self-sufficient. These settlements are akin to the Rhode Island's spontaneously

growing rural settlements reported in the classic work on growth centres by Deller *et al.,* (2002). Such settlements tend to be dynamic and efficient centres for development that have a core of commercial, community services and residential development. The opportunities that abound in urban areas that justify their necessity for a developing State like Akwa Ibom as enunciated by UNCHS (1994) are enormous. Prominent among which is the contribution of urbanisation in the lowering of population fertility rates and average family sizes. However, fertility rate is still relatively high in Nigeria (2.5 – 3.0%), as well as urbanisation rate of 5.8% (Federal Government of Nigeria, 2006). Animashaun (2005) argued that the reasons that Nigeria has not fully benefitted from her urban centres are essentially because of their processes of evolution, nature and characteristics as well as the low relative number as growth centres. The UNCHS assertion as supported by Newman (2006) is believed largely to be the result of behavioural and lifestyle changes which characterise urbanisation. If the state must develop, our rural populace deserves these changes and must have access to urban based services. What this means is to deliberately create urban centres that would serve as growth centres close to the rural communities.

With all these perceived benefits accruing from urban areas, it behoves policy makers, administrators and settlement managers to deliberately select, plan and develop more settlements that could qualify as growth centres in Akwa Ibom State. Such settlements should be central, dynamic and efficient centres for development like the Rhode Island example. This process can forestall a reoccurrence of various urban problems expressed in unplanned but "developed" old urban centres should they develop organically into urban centres in future. This type of development is characterised by reactionary pockets of planned estates, a phenomenon Mabogunje (2002) described as "planned neighbourhood islands in the midst of an ocean of uncontrolled, unplanned and uncared for urbanisation" which have made it difficult to affect positively the development of their surrounding settlements. Consequently, the classification of urban development centres in Akwa-Ibom State is essential to guide planning, development and improve the welfare of residents in the long run (Ofem, 2010). The objective of this research therefore is to categorise urban development centres in Akwa-Ibom State using the kmeans unsupervised classifier into three levels of urban development: high, medium, and low.

K-Means Algorithm

K-means (MacQueen, 1967) is one of the simplest unsupervised classification algorithms. The procedure follows a simple and easy way to classify a given data set through a certain number of clusters (assume *k* clusters) fixed *a priori*. The main idea is to define *k* centroids, one for each cluster. These centroids shoud be placed in a cunning way because different location causes different result. Therefore, the better choice is to place them as much as possible far away from each other. The next step is to take each point belonging to a given data set and associate it to the nearest centroid. When no point is pending, the first step is completed and an early groupage is done. At this point we need to re-calculate *k* new centroids as barycenters of the clusters resulting from the previous step. After we have these *k* new centroids, a new binding has to be done between the same data set points and the nearest new centroid. A loop has been generated. As a result of this loop we may notice that the *k* centroids change their location step by step until no more changes are done. In other words centroids do not move any more. Finally, this algorithm aims at minimizing an *objective function*, in this case a squared error function. The objective function,

$$J = \sum_{j=1}^{k} \sum_{i=1}^{n} \left\| x_i^{(j)} - c_j \right\|^2 , \tag{1}$$

where $\left\| x_i^{(j)} - c_j \right\|^2$ is a chosen distance measure between a data point $x_i^{(j)}$ and the cluster centre c_j is an indicator of the distance of the n data points from their respective cluster centres (MacQueen, 1967).

The algorithm is composed of the following steps:

i. Place K points into the space represented by the objects that are being clustered. These points represent initial group centroids;

ii. Assign each object to the group that has the closest centroid;

iii. When all objects have been assigned, recalculate the positions of the K centroids;

iv. Repeat Steps 2 and 3 until the centroids no longer move. This produces a separation of the objects into groups from which the metric to be minimized can be calculated. Although it can be proven that the procedure will always terminate, the k-means algorithm does not necessarily find the most optimal configuration, corresponding to the global objective function minimum. The algorithm is also significantly sensitive to the initial randomly selected cluster centres. The k-means algorithm can be run multiple times to reduce this effect (MacQueen, 1967).

Application

This work is based on a study done in Akwa-Ibom State, Nigeria. The experiment was based on 21 socio-economic variables that characterise 82 settlements drawn from 25 of 31 local government areas of Akwa-Ibom State (see Figure 1). Table 1 presents the raw data on the indicator or socio-economic variables gathered from the field and weighted. Data on the 21 variables are recorded against the 82 settlements drawn from 25 out of 31 local government areas of Akwa-Ibom State (Table 1). The variables bothered on socio-economic infrastructure and activities available in the settlements. Table 1 shows that, most of the settlements have basic urban functions like: schools, healthcare facilities, public power and water supplies; recreational facilities, GSM masts, technical services, traditional craft services and shops. Others are market type, churches, cooperative societies, waste management method, predominant occupation and mode of transport (Ofem, 2010). The experiment was implemented in MATLAB. The final classification results are given in Table 4. Pre-classification results are given in Tables 2 and 3. The MATLAB function *[IDX,C] = kmeans(X,k)* returns the *k* cluster centroid locations in the k-by-p matrix C (see Table 2); the function *[IDX,C,sumd] = kmeans(X,k)* returns the within-cluster sums of point-to-centroid distances in the 1-by-k vector sumd (see Table 3); the function *[IDX,C,sumd,D] = kmeans(X,k)* returns distances from each point to every centroid in the n-by-k matrix D (see Table 4). Where *IDX* represents the classification indices for the three urban development classes; *C* represents the computed K cluster centroid locations; *X* represents the input data given in Table 1; *k* represents the urban development classifications (see Table 4); *sumd* represents the computed sums of point-to-centroid distances (see Table 3); and *D* represents computed distances from each point to every centroid (see Table 4). From Table 4, any class which yields the least computed distance from each point to every centroid wins the classification for that settlement. The final classification result is as follows: 1) high, 2) medium, and 3) low level development (see Table 4). From Table 5, eight, twenty-two, and fifty-two settlements were classified as high, medium, and low development centres respectively.

CONCLUSION

From the result of this research, very few and few settlements were categorised as high and medium level urban development centres respectively; while majority of the settlements were categorised as low level development centres. Kmeans being an unsupervised classification algorithm presents a simple analytical technique for determining soft boundaries among real-world objects based on certain attributes/variables that characterise such real-world objects. The result of this research will assist urban planners and policy makers in allotting state resources in the urban development planning of Akwa-Ibom State.

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Table 1 *Weighted data from the field. Ofem (2010, p. 83)*

LGAs	S/No	Settlements	Nursery/Primary School	Secondary School	Health Facilities	Postal Agency	Police Post	Bank	Public Borehole	Public Power Supply	Recreation Facilities	GSM Mast	Motor Park	Technical services	Traditional craft	Shops (General)	Daily market	Church	Cooperative Societies	Court	Waste Disposal System	Predominant Occupation	Predominant Mode of Transport
Abak	1	Abak Ikot	2	0	2	0	0	0	2	1	2	0	0	3	0	4	1	3	3	0	1	1	1
	2	Ikwek	2	1	3	1	0	0	2	1	1	1	0	2	2	3	1	3	2	0	1	1	1
	3	Ikot Okudom	1	0	2	0	0	0	0	1	1	0	0	2	0	2	1	3	0	0	1	1	1
	4	Ikot Ibiok	3	2	5	1	1	1	2	1	3	4	0	14	3	8	2	6	4	1	2	2	2
Essien Udim	5	Ukana Iba	2	1	2	0	0	0	2	1	2	1	0	2	1	5	1	4	3	0	1	1	1
	6	Ikot Ntuen	2	1	2	0	0	0	2	1	2	1	0	3	2	3	1	2	1	1	1	1	1
	7	Nsasak	2	1	3	0	0	0	2	1	2	2	0	13	0	5	2	5	3	0	1	2	1
	8	Uwa	2	1	4	1	0	0	2	1	3	2	0	16	2	5	2	2	2	0	2	2	2
	9	Ikot Ineme	1	0	2	0	0	0	2	1	3	1	0	12	4	3	1	3	2	0	2	2	1
Etinan	10	Ikot Nkang	1	0	1	0	0	0	0	0	2	1	0	1	0	2	1	2	0	0	1	1	1
	11	Ikot Ekan	1	0	2	1	1	0	2	1	3	1	0	4	0	3	1	3	2	0	2	1	1
	12	Ikot Isong	1	0	3	0	0	0	2	1	3	0	0	13	0	4	1	4	1	0	2	2	1
Ibesikpo	13	Ikot Akpa Erong	1	1	2	0	0	0	2	1	4	2	0	13	1	4	1	3	0	0	1	2	1
	14	Ikot Iyan	0	0	1	0	0	0	0	1	1	0	0	0	1	1	1	1	0	0	1	1	1
Ibiono Iban	15	Ikot Ebom	1	0	1	0	0	0	0	1	1	0	0	2	0	1	1	1	1	0	1	1	1
	16	Afaha Itiat Nsasi	1	0	0	0	0	0	0	0	0	0	0	2	0	2	1	2	1	0	1	1	1
	17	Ikot Adaidem	1	1	2	0	0	0	0	1	1	1	0	1	0	4	1	2	2	0	1	1	1
Ika	18	Ikot Osukpong	1	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	0	0	1	1	1
Ikono	19	Ikot Akpa Edok	1	0	2	0	0	0	0	0	1	0	0	3	0	2	1	1	2	0	1	1	1
	20	Aka Ekpene	1	0	1	0	0	0	2	1	1	0	0	3	0	2	1	2	1	0	1	1	1
	21	Nung Udoe	2	2	5	1	1	1	2	1	5	4	1	16	2	5	2	6	3	1	2	2	2
Ikot Abasi	22	Ikot Usop	2	0	1	1	1	0	2	1	2	1	0	2	1	3	1	3	1	0	1	2	1
	23	Essene	5	3	6	1	2	2	3	1	12	4	1	12	7	14	2	12	4	1	3	2	2
	24	Ete	1	1	7	1	1	1	2	1	8	3	1	18	3	15	2	3	1	0	3	2	2
	25	Iqua	1	0	3	0	0	0	0	1	2	1	0	3	1	3	1	3	1	0	1	1	1
	26	Ikot Etetuk	1	0	2	0	1	0	0	1	1	1	0	3	0	6	1	2	0	0	1	1	1
	27	Ikot Akan	1	0	1	0	0	0	0	1	2	0	0	4	0	4	1	3	1	0	1	1	1
Ikot Ekpene	28	Ikot Atausung	1	0	1	0	0	0	2	1	1	0	0	3	2	1	1	1	1	0	1	1	1
	29	Utu Edem usung	2	1	3	1	1	0	2	1	3	3	0	15	3	5	2	5	2	0	2	2	2
	30	Utu Ikot Inyang	1	0	2	0	0	0	2	1	1	1	0	2	0	2	1	2	1	0	1	1	1
	31	Ibiakpan	1	1	2	0	0	0	2	1	1	2	0	2	1	4	1	2	2	0	1	1	1
	32	Ifuho	3	2	5	1	1	2	2	1	10	4	1	10	5	15	2	8	3	1	3	2	2
	33	Ikot Abia Idem	2	2	3	0	1	0	2	1	4	2	1	16	3	7	2	5	2	0	2	2	1
	34	Abak Ifia	1	0	1	0	0	0	2	1	1	0	0	3	0	2	1	2	0	0	1	1	1
Ini	35	Ikot Udofia	0	0	1	0	0	0	0	1	0	0	0	1	0	1	1	1	0	0	1	1	1
Itu	36	Obong	2	1	3	0	0	0	2	1	3	2	0	14	1	6	2	4	2	0	2	2	2
	37	Uyo Itam	1	0	2	0	0	0	0	1	1	1	0	2	0	2	1	2	0	0	1	1	1
Mbo	38	Uduo Ebughu	2	1	2	0	1	0	2	1	3	1	1	3	1	5	2	3	2	0	2	2	1
	39	Okobo Ebughu	3	1	4	1	1	0	2	1	4	2	1	14	3	6	2	6	2	1	2	2	2
Mkpat Enin	40	Ikot Ekpaw	2	0	1	1	0	0	2	1	1	1	0	3	1	3	1	3	0	0	2	1	1
	41	Ukam	1	1	3	1	1	1	2	1	3	2	1	8	2	4	1	4	1	1	2	2	1
	42	Atanuk	1	0	2	1	0	0	2	1	2	0	0	3	1	3	1	3	0	0	1	1	1
	43	Ikot Akpaden	2	1	4	1	1	1	2	1	4	3	1	8	2	5	2	3	3	0	2	2	2
	44	Ikot Ebak	2	1	2	1	0	0	2	1	5	0	0	4	2	3	1	3	2	1	2	2	1
	45	Ikot Umiang	2	0	2	0	1	0	0	1	1	0	0	2	1	4	1	4	1	0	2	1	1
Nsit Ibom	46	Afaha Abia	1	1	3	0	0	0	2	1	1	0	0	8	3	4	1	4	3	0	1	2	1
	47	Mbiaso	0	0	2	0	0	0	2	1	1	1	0	2	1	2	1	1	0	0	1	1	1
	48	Ekpene Ikpan	2	1	2	0	0	0	0	1	1	0	0	3	0	4	1	3	2	0	2	1	1
Nsit Ubium	49	Ikot Akpan	0	0	2	0	0	0	2	1	1	0	0	2	0	2	1	1	1	0	1	1	1
	50	Ikot Eyo	4	2	5	1	1	1	2	1	6	4	1	14	6	12	2	10	4	1	2	2	2
	51	Itireto	1	0	2	0	0	0	0	0	1	0	0	2	0	2	1	3	1	0	1	1	1
	52	Ikot Ubo	3	1	5	0	1	0	2	1	3	2	0	16	2	5	2	4	4	0	2	2	2
	53	Ndiya	1	1	3	0	1	0	2	1	2	1	0	6	1	3	1	3	2	0	2	2	1
Obot Akara	54	Nto Ndantg	1	0	1	1	1	0	2	1	2	1	0	4	2	3	1	2	0	0	1	1	1
Okobo	55	Nung Atai	2	1	3	0	0	0	2	1	3	3	0	10	1	4	2	5	1	0	2	2	1
	56	Oti Oron	1	0	3	0	0	0	2	1	1	1	0	3	2	3	1	2	0	0	1	1	1
	57	Urue Ita	1	0	2	0	0	0	0	1	1	0	0	4	0	3	1	3	0	1	1	1	1
Onna	58	Ndon Eyo	3	1	4	0	1	0	2	1	3	2	1	8	2	5	2	5	2	0	2	2	2
Oron	59	Uya Oron	2	1	4	1	1	1	3	1	3	2	1	10	3	11	2	3	2	0	2	2	2
	60	Iquita	6	4	8	1	1	2	3	1	13	5	1	20	10	24	2	15	8	1	3	2	2
	61	Eyo Abasi	2	1	3	1	1	0	2	1	4	2	0	7	2	10	2	4	2	0	2	2	1
Oruk Anam	62	Ikot Esenam	1	1	3	0	0	0	2	1	2	2	0	4	6	4	2	3	1	0	2	2	1
	63	Ikot Obiosan	1	0	1	0	0	0	2	1	1	0	0	0	0	1	1	2	1	0	1	1	1
	64	Ibesit	1	1	3	1	0	0	0	0	2	0	0	2	3	3	1	2	1	0	1	1	1
	65	Ekparakwa	3	1	4	1	1	1	2	1	5	3	3	16	3	13	2	4	3	1	2	2	2
	66	Ikot Ntuen	1	0	1	0	0	0	2	1	1	0	0	2	2	3	1	2	0	0	1	1	1
	67	Aya Obiokpa	1	0	1	0	0	0	0	0	1	0	0	2	1	2	1	2	2	0	1	1	1
	68	Ikot Akpan Essien	1	1	1	0	0	0	0	0	3	0	0	3	0	3	1	2	2	0	1	1	1
Udung Uko	69	Eyotai	2	1	3	1	0	0	2	1	1	2	0	7	3	5	2	3	0	0	2	2	1
	70	Eyo Nsek	1	0	1	0	0	0	0	1	1	1	0	2	1	2	1	1	1	0	1	1	1
Ukanafun	71	Afaha Obio	2	1	4	0	0	0	2	1	3	2	0	4	3	4	1	4	2	1	2	2	1
	72	Ikot Etim	1	0	3	0	0	0	2	1	2	1	0	3	1	2	1	2	1	0	1	1	1
Urue Offong	73	Umume	1	0	1	0	0	0	0	1	1	0	0	3	0	2	1	2	1	0	1	1	1
	74	Oyubia	2	1	4	1	1	0	2	1	3	3	0	5	1	6	1	3	1	1	2	2	1
	75	Ukuko	1	1	2	0	0	0	0	1	4	1	0	8	1	4	1	3	0	0	1	2	1
Uruan	76	Ifiayong Obot	1	0	0	0	0	0	0	0	3	0	0	2	3	2	1	2	2	0	1	1	1
	77	Ndon Uruan	1	0	0	0	0	0	0	0	2	0	0	3	2	2	1	1	1	0	1	1	1
	78	Use Uruan	1	1	1	1	0	0	0	1	1	1	0	2	2	2	1	2	2	0	1	1	1
	79	Ekekpen Ibia	1	0	0	0	0	0	0	1	1	0	0	2	0	2	1	2	1	0	1	1	1
	80	Ibiaku Ishiet	3	1	5	1	1	0	2	1	5	3	0	12	2	5	2	4	2	1	2	2	2
	81	Ituk Mbang	3	2	6	1	1	1	2	1	7	4	1	14	3	10	2	10	3	1	3	2	2
	82	Ndon Ebom	5	3	8	1	1	1	2	1	10	8	1	16	3	10	2	12	7	1	3	2	2

Table 2 *Computed K cluster centroid locations*

VARIABLES	HIGH	MEDIUM	LOW
A	3.75	1.954545	1.153846
B	2.25	1.045455	0.288462
C	6.125	3.454545	1.673077
D	1	0.5	0.192308
E	1.125	0.545455	0.153846
F	1.375	0.227273	0
G	2.25	1.954545	1
H	1	1	0.807692
I	8.875	3.227273	1.5
J	4.375	2.136364	0.557692
K	1.25	0.318182	0.019231
L	15	11.27273	2.576923
M	5	2.045455	0.942308
N	12.875	5.454545	2.788462
O	2	1.727273	1.038462
P	9.25	4.136364	2.25
Q	4.125	1.954545	1.057692
R	0.875	0.227273	0.096154
S	2.75	1.818182	1.192308
T	2	2	1.134615
U	2	1.5	1

Table 3 *Computed sums of point-to-centroid distances*

CLASS	SUMS
High	626
Medium	549.6818
Low	509.9615

Table 4 *Computed distances from each point to every centroid (SE=settlements; High=1; Medium=2; Low=3)*

SE	HIGH	MEDIUM	LOW	CLASS
1	392.25	89.60537	9.50074	3
2	418.5	102.969	8.154586	3
3	496.75	127.8781	5.462278	3
4	198.25	77.96901	95.19305	2
5	368.75	96.51446	15.00074	3
6	405	88.60537	5.154586	3
7	188.25	12.69628	133.8854	2
8	184.5	28.60537	203.1546	2
9	235.75	18.69628	104.8084	2
10	525	148.8781	7.962278	3
11	370.5	72.33264	10.15459	3
12	230.25	18.60537	121.0007	2
13	222	17.15083	122.6546	2
14	567.75	175.3326	12.96228	3
15	550.5	145.3326	8.26997	3
16	541.25	144.5145	9.154586	3
17	474	132.6963	8.039201	3
18	588	171.6054	13.61612	3

19	489.25	116.0599	6.693047	3
20	482.25	110.7872	4.039201	3
21	104.25	39.51446	251.3469	2
22	433.75	107.3326	5.846893	3
23	113.25	202.6054	413.4623	1
24	80	179.7872	479.2315	1
25	405	89.78719	4.26997	3
26	405.25	98.60537	15.07766	3
27	396.5	82.51446	7.231509	3
28	504.5	119.7872	8.346893	3
29	144.25	17.78719	188.8469	2
30	490.25	121.1508	3.731509	3
31	427.25	104.969	6.885355	3
32	36.25	177.6054	373.1546	1
33	109.75	29.51446	229.4238	2
34	489.5	113.6963	5.154586	3
35	608	176.1508	14.84689	3
36	158	10.24174	156.5007	2
37	502.5	127.8781	4.846893	3
38	338.5	75.8781	15.38536	3
39	106	16.05992	185.1546	2
40	430.5	96.60537	6.00074	3
41	236	17.8781	48.26997	2
42	421.25	94.05992	4.462278	3
43	196.75	16.8781	66.30843	2
44	334.25	72.15083	22.46228	3
45	421.25	109.1508	8.808432	3
46	264.5	24.42355	46.57766	2
47	510.5	129.1508	6.76997	3
48	409.25	94.05992	7.654586	3
49	520	132.6054	6.654586	3
50	14	125.6054	372.3469	1
51	490.5	125.969	4.962278	3
52	149	31.33264	222.3469	2
53	323.5	41.60537	19.15459	3
54	405	81.24174	7.846893	3
55	206.5	8.605372	78.76997	2
56	428.5	94.51446	6.00074	3
57	427.25	89.42355	7.385355	3
58	193.75	14.51446	63.61612	2
59	127.5	37.96901	149.8854	2
60	252	794.8781	1292.693	1
61	163	40.78719	92.69305	2
62	329.5	76.60537	37.69305	3
63	586	177.3326	13.07766	3
64	435.75	113.6054	9.923817	3
65	61.25	95.78719	339.5007	1
66	477.75	121.1508	4.962278	3
67	499	129.1508	4.808432	3
68	458.75	107.6963	5.385355	3
69	275.25	30.78719	39.73151	2
70	511	131.0599	4.693047	3

71	293.5	58.42355	25.96228	3
72	434.25	95.15083	4.346893	3
73	487.25	114.6054	4.039201	3
74	263.75	46.05992	36.23151	3
75	277.75	29.96901	41.5392	2
76	470.75	129.969	13.38536	3
77	484.25	119.1508	8.731509	3
78	478.75	122.6963	6.231509	3
79	523.5	138.0599	6.539201	3
80	136.5	9.696281	138.5007	2
81	19.75	94.51446	328.8469	1
82	49.5	249.0599	567.7315	1

Table 5 Number *of settlements classified as high, medium, and low level development*

CLASS	NO. OF SETTLEMENTS
High	8
Medium	22
Low	52

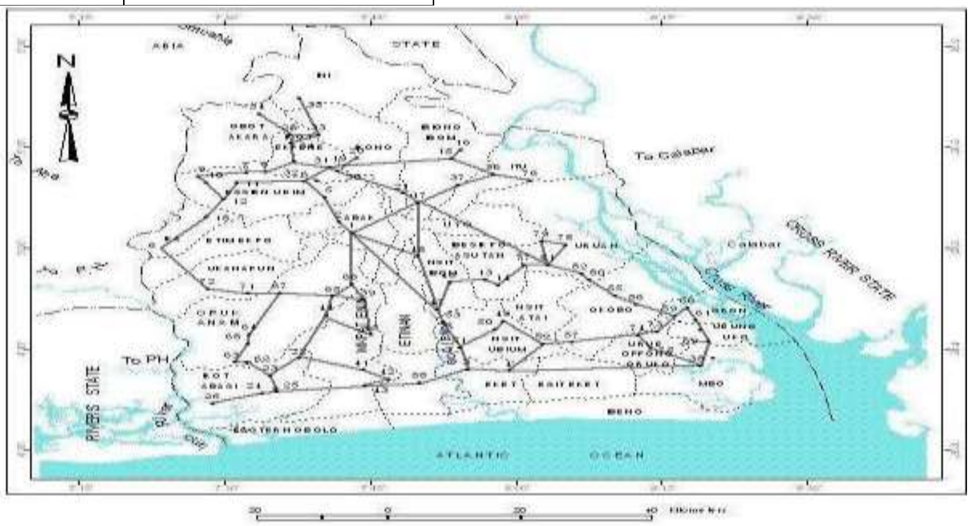

Fig. 3.2 : Topological graph for accessibility indices of the study settlements in Akwa Ibom State

Figure 1 *Map for accessibility indices of the study settlements in Akwa-Ibom State. Ofem (2010, p. 72)*

Key:*1. Abak Ikot 2. Ikwek 3. Ikot Okudom 4. Ikot IBiok 5. Ukana Iba 6. Ikot Ntuen 7. Nsasak 8. Uwa 9. Ikot Ineme 10. Ikot Nkang 11. Ikot Ekan 12. Ikot Isong 13. Ikot Akpa Erong 14. Ikot Iyan 15. Ikot Ebom 16. Afaha Itiat Nsasi 17. Ikot Ada Idem 18. Ikot Osukpong 19. Ikot Akpa Edok 20. Aka Ekpene 21. Nung Udoe 22. Ikot Usop 23. Essene 24. Ete 25. Iqua 26. Ikot Etetuk 27. Ikot Akan 28. Ikot Atausung 29. Utu Edem Usung 30. Utu Ikot Inyang 31. Ibiakpan 32. Ifuho 33. Ikot Abia Idem 34. Abak Ifia 35. Ikot Udofia 36. Obong 37. Uyo Itam38. Uduo Ebughu 39. Okobo Ebughu 40. Ikot Ekpaw 41. Ukam 42. Atanuk 43. Ikot Akpaden 44. Ikot Ebak 45. Ikot Umiang 46. Afia Abia 47. Mbiaso 48. Ekpene Ikpan 49. Ikot Akpan 50. Ikot Eyo 51. Itireto 52. Ikot Ubo 53. Ndiya 54. Nto Ndang 55. Ntung Atai 56. Oti Oron 57. Urue Ita 58. Ndon Eyo 59. Uya Oron 60. Iquita 61. Eyo Abasi 62. Ikot Esenam 63. Ikot Obiosan 64. Ibesit 65. Ekparakwa 66. Ikot Ntuen 67. Aya Obio Akpa 68. Ikot Akpan Essien 69. Eyoatai 70. Eyo Nsek 71. Afaha Obo 72. Ikot Etim 73. Umume 74. Oyubia 75. Ukuko 76. Ifiayong Obot 77. Ndon Uruan 78. Use Uruan 79. Ekepen Ibia 80. Ibiaku Ishiet 81. Ituk Mbang 82. Ndon Ebom*