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An Analysis of Duality in the Space Economy of Rivers State Nigeria

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Abstract
This work is an attempt to evaluate the extent of dualism in the space economy in Rivers State as it affects the geographical spread of social facilities and infrastructure on the basis of L.G.A and as based on the principle of equity. The study has uncovered some factors responsible for the existing pattern of dualism in the state. The socio-economic facilities selected for analysis were factor analyzed and then collapsed into only two dimensions of development namely social services factor and social infrastructure factor. The scores of the 23 LGA of the State on each dimension were mapped. A multi-criteria grouping was carried out using cluster analysis technique. Again extracted factors from the socio-economic facilities earlier factor analysed were regressed each with the distance from Port Harcourt city. The result was negative implying that the father away a local government is from Port Harcourt, the less developed.

INTRODUCTION

Economic Development is a global concern and levels of economic development vary from one country to another. Even within the same country, levels of economic development also vary.

It has been observed that the space economies of the developing countries are different from that of the developed ones. The space economies of countries that were under European powers exhibit a polarized pattern of development Ex-colonial countries such as Nigeria, Kenya and Sierra Leone have the origin of their modern development in space from the coastal areas from where it subsequently spread spatially into the hinterlands.

The Niger Delta Region, formally neglected, has now received attention. It is now agreed that this region needs specially attention by the Federal Republic of Nigeria. This has necessitated the setting up of special commission in the area such as the Defunct Oil Mineral Producing Areas Development Commission (OMPADEC), which has now been replaced by Niger Delta Development Commission (NDDC).

The establishment of commission such as the NDDC is born out of the conviction that regions within a nation develop differently both in direction and rate. It is inevitable that some areas are already poorer than others and are likely to become even more so.

The geographers contribution to the debate on a balanced development include identifying defects in the spatial allocation of national resources and considering alternative form of greater benefits to society.

The Niger Delta problem is not limited to poor infrastructure and other fruits of development. There is also the problem of optimum distribution of available facilities amongst the people in the Region. It has been generally admitted by the federal government that the provision of infrastructure within the nation is characterized by unreliability distribution with key facilities in a state of despair (federal Republic of Nigeria 2000).

Rivers State, which is the area of focus was created in 1967 and by 1996 Bayelsa State was carved out of it. Presently it is made up of 23 Local Government Areas and has distinctive physical characteristics, being in the Niger Delta Region. The state being, in the heart of NDR, is made up of difficult terrain and much ecological difficulties. The state has notable physiographic divisions viz, upland areas and riverine areas.

The upland area is within the outer Niger Delta while the Riverine area is within the inner Niger Delta. The out Niger Delta and the inner Delta areas are as delineated by Ikporukpo (1994). The Reverie areas or inner Niger Delta clamour for more facilities. They claim that they have been marginalized in favour of the upland areas. There is thus an atmosphere of friction/suspicion between the inner Niger Delta and outer Niger Delta peoples.

The major obstacle in the way of consolidating a democratic system today is the appalling level of social inequality that can be found in the country. There is inequality between Northern and Southern parts of Nigeria and within the state and local government areas. Agitation against marginalization and neglect are marked by violent civil disorders. For example, OMPADEC communication since May 29, 1999 have mounted opposition against the federal government degradation occasioned by oil exploration and exploitation.

The Riverine areas of Rivers state for instance, petitioned Governor Odili and accused his administration of non-provision of Riverine areas with socio-economic facilities such as schools, health and educational facilities access roads, potable water and electricity.

One of the major problems facing Rivers State is the difference in economic development and access to socio-economic and welfare facilities between the Riverine and Upland parts of the state.

This work focuses on the territorial distributions of social and economic facilities and infrastructure on

the basis of equality. Distributional inequity is taken to mean differential availability of the fruits of economic growth in Rivers State. This should entail fair distribution of the benefits of development among administrative units of the state. We strongly associate ourselves with Abumere's opinion that "if the benefits of economic growth were concentrated in the hands of a few people in a few areas it would not be economic development at all. Equality of access by people and areas of life is therefore, perhaps the best way of measuring development (Abumere 1998)"

This study will examine the phenomenon of spatial dualism the phenomenon of spatial dualism in Rivers State within the context of the major postulations of the theory of dualism.

Based on the foregoing, the questions that arise are:

(a) Do developmental infrastructure cluster in either the Reverine or upland areas of Rivers State.
(b) Does the level of development decrease as distance increases away from Port Harcourt.

FACTORS ANALYTICAL MODEL OF DUALISM

In an attempt to view an operational meaning to development infrastructure, a number of variables were chosen on the bases of our intuition that they can be taken as development indicators the selected variables are:

HEALTH

a) Number of Hospital beds/population
b) Number of Hospitals! Population
c) Number of Doctors per population.

EDUCATION

d) Number of schools per population.
e) Ratio of Total secondary school enrolment per population.
f) Ratio of female enrolment to the population

ECONOMIC

g) Percentage of population with potable water supplies.
h) Percentage of population with electricity supply.

Numerical information on each of' the indices listed above were obtained from the relevant Rivers State government ministries and agencies and Federal Government agencies in the state.

The local government areas, which are 23 in all, are commonly the official units of data recording. They also constitute the spatial units of analysis. Their small area extent minimizes internal variation within them.

DEFINITION AND MEASUREMENT OF THE SELECTED VARIABLES

Data on the selected indicators of development were measured on interval and ratio scale. The eight variables that were measured on the metric scale were ranked. Using ranked data allows more confidence to be placed on the relative position of the districts on each of the variables than on their absolute values. When ranking is carried out, the initial homogeneity of date is ensured and extreme values are eliminated. These two advantages are of importance in carrying out factor analysis.

TEST OF NORMALITY

The need to test for the normality of our data arose when the histograms of some of the variables were made. Some of the histograms indicated skewness of both negative and positive types.

The assumption of normality of a given data set is basic in parametric statistics. Consequently, the serious repercussions of non-normal data sets for the validity of conclusion are quite obvious. This is more so because the standard deviation, the standard error of the mean significance tests in statistical inferences correlation, multi pie regression, principal components analysis and factor analysis all assume that the data set on which they are applied is normally distributed.

The normality assumption also strongly influences two other assumptions, i.e homoseedastricity and linearity of relationship between variables. It is assumed that once a given data set is normally distributed the assumption of linearity and homoseedasticity are also satisfied. The former assumption implies that the independent variables are linearly independent of each other and if this is not satisfied in a specific case, multicollinearity is said to be present. On the other hand, the homoseedasticity assumption implies that for each value of an independent variable there is a conditional distribution of dependent variable values.

Various ways of testing for normality exist. These include visual comparism of the frequency curves of the data set with the ideal normal curve; the chi- square test and equal areas under the curve. These do not go far enough; they are rather insensitive for our data. Consequently testing through stewness and Kurtosis measures

was preferred. Skewness measures the extent to which the frequency curve is symmetrical or asymmetrical about the mean, together with the direction of the asymmetry.

The formula for skewness is the "third moment about the mean" (i.e the average of the sum of the cubes of the deviations) divided by the standard deviation cubed thus:

$$\text{Skewness} = \frac{\left(\frac{E-x}{n}\right)^2}{\left\{\sqrt{F\left(\frac{x-x}{n}\right)^2}\right\}^3} \quad \text{..... (4)}$$

These symbols are the same as those used in the calculation of the standard deviation. Skewness value is zero for a perfectly symmetrical curve. Skewness value increases as asymmetry increases.

On the other hand, the term kurtosis implies to the degree to which the frequency distribution is concentrated around the frequency peak. Kurtosis describes the degree of "peakedbess" of the curve. The basic formula for this is to divide the "fourth moment" ie the average of the sum of the fourth powers of the deviations by the standard deviation raised to the power thus:

Kurtosis indices for a normal distribution equals to zero. If however, a negative kurtosis value results, then this indicates that a greater proportion of the data are concentrated near the mean than would be the ease in a normal distribution. On the other hand a positive kurtosis index indicates the reverse i.e a lesser concentration close to the mean. The former situation is referred to as Leptokurlic while the later is described as platykurtic. If the properties of the normal distribution curve arc to be used in statistical analysis, the Kurtosis index for a data set must not depart greatly from zero. This is in addition to having a symmetrical curve with zero

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$$\text{Kurtosis} = \frac{\left(\frac{x-x}{n}\right)^4}{\left\{\sqrt{F\left(\frac{x-x}{m}\right)^2}\right\}} \quad (5)$$

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TABLE 1.1: Test of Normality

Variables	Kurtosis	Skewness	Type of distribution
Portable water	0.99	1.15	Normal
Hospital Beds	11.26	3.16	Not normal
Hospitals	9.77	3.09	Not normal
Doctors	9.30	2.89	Not normal
Schools	18.66	4.16	Not normal
Enrolment	3.15	1.58	Not normal
Female Enrolment	5.47	2.27	Not normal
Electricity	0.22	1.02	Normal

In other to take a decision on which variable to transform the student's distribution table was used. This means that any variable with either or both of kurtosis and skewness values greater than the critical values of 2.12 at 5% level of probability is not normally distributed. Out of eight, six variables failed the test and had to be transformed by common logarithms (because they are positively skewed) in other to fulfill the conditions of normality and therefore those of serial independence and homoseedasticity.

It is noteworthy to state that the number of observations here is more than the total number of variables. This fulfills one of the prerequisites for carrying out a multivariate statistical technique such as factor analysis.

MULTIPLE CORRELATIONS

An 8 by 8 correlation matrix among every pair of the variable was computed as one of the initial steps of factor analysis. One of the hypothesis states that these is no variation in the distribution of socio-economic facilities among L.G.As in Rivers State.

The correlation matrix shows that majority of the variables indexing socio-economic facilities have high correlation with one another. The only exceptions are the availability of potable water and availability of electricity, which as was to be expected have low correlation with one another and the other variables. The range of the coefficient varies from 00.019 to 0.92 as shown in appendix 5.1

THE FACTORS ANALYSIS MODEL

The factor analytical model is general of the form

$Z_4 = a_{11} F + 3_n$ F_2…….$31_mF_m4+d_1U_1$…..6.1

$Z_2 = a_{21} F_1 + a_{22}$ F_2+……..31_mFm4 +d_2U_2…6.2

$Z_{42} = a_{12} F_1 + a_{12}$ $2F_2$+……$a_{12m}F + d_{12}U_{12}$…6.3

This model can also be presented in tabular form in which only the coefficients of the factors designations arc placed at the head of the columns (Harman 1970 p. 20). In either case, the extracted common factors, fo (F=1,2,…m) are either correlated or orthogonal to one another while the unique factors Up (i... 1,2,... .n) are uncorrelated among themselves or with any of the common factors (Harman 1970).

The factor analysis methods used in this analysis are the principal axis method of factoring and the normal varimax method of rotational transformation (Harman 1970 p. 54). A principal axes factor analysis of the correlation matrix produced a next matrix of factor loadings, which are the new correlations of each of the original ones, these are regarded as indicating the underlying factors of the particular problem being considered.

The factors are extracted by factoring the correlation matrix R to a point when the R matrix becomes a residual one with essentially zero entries and all the covariance originally present is fully accounted for. In practice factor extraction may also be done subjectively by working with those factors whose eigen values equal or exceed unity, or by choosing as the last factor one whose cumulative percentage of total explanation is about 90 percent. The flattening point on a factor cumulative — percentage graph may be taken as the one representing the last extractable factor. In this study, the criterion in which eigen-value equal or exceed unity was opted for. This decision follows the reasoning first postulated by Kaiser (Rummel 1970 P. 362) that the sum of the eigen-values is equal to the sum of the principal diagonal element of the factored matrix. Since the matrix factored unities in the diagonal the sum of the engine values will equal the number of variables. The average engine values will therefore be unity and hence the need to exclude factors that do not account for at least the total variance of one variable. The factor analysis was run on an SPSS package version 11.

Table 5.2 shows the two factors extracted from the 8 variables-data set on the basis of the eigen value one criterion which accounts for 84% percent of tota1 variance.

Table 1.2 The Eigen Values Of the Factor Matrix

Factors	Eigen % of Explanation	Total cumulative	% 0f explanation
1	5.328	66.699	66.599
2	1.394	17.426	84.025

Table 5.3 shows tie factor loadings of each variable on the two unrotated common factors. The loading pattern is somewhat muddled up in the sense that a number of the variables load moderately high on the two factors. This loading pattern particularly the loadings on the first factors, does not facilitate easy and meaningful interpretation of the underlying structure of the duality in the space economy of Rivers State. It is because of this problem that Cattel (1965 P. 205) considers the unrotated factors as not completely diagnostic of the pattern of any of the real influences behind the data.

In an attempt to simplify the interpretation and still retain the total variance explained, the factor matrix was rotated or transformed using the varimax rotation method. Further, it should be noted that quartimax method was not used because the latter simplifies the rows of the factor matrix and minimizes the variance of the squared loadings (Cooley and Lohnes 1971) P. 145). We agreed not to rotate the factor matrix obliquely because then, the sum of the squared loading along a row of the loading matrix would then not add up to the achieved communality as in the case of the orthogonal rotation (Cattel, 1965 P 209). Again if oblique rotation is used, then the correlated factor scores will negate their values as inputs into a multiple regression analysis.

Normal varimax was chosen because it emphasizes on “cleaning up factors rather than variables” (Cooley and Lohnes 1971 P. 145). This makes it the best means of achieving the simple structure solution first suggested by Thurstone (Harman 1970 P. 98). The simple structure solution is one in which each factor affects a limited number of variable and in turn each variable is correlated with only a few of the factors when this is achieved, there is the tendency for each factor to have a few variables loading highly on it while the rest are zero

or near zero. Hence, simple structure can be described as one in which the description of each factor can be made simple as possible (Henshall and Kings 1966 P. 79).

Table 1.3 Unrotated Factor Loading Matrix

Variable	Factor 1	Factor 2
Sec. School Enrolment	922	-219
Medical Doctors	-916	-133
Female Enrolment in Sec Sch	-922	-170
Hospital Heads	-924	-9.927
Hospitals	-897	-5.723
Provision of Electricity	-759	-368
Secondary schools	-891	-150
Provision of Potable water	-2.59	-905

Table 1.4 Rotated Factor Loading Matrix

Variable	Factor 1	Factor 2
Sec. School Enrolment	948	-291e-02-219
Medical doctors	.850	.367
Female Enrolment in Sec Sch	-.934	7.590E-02
Hospital Heads	.918	.145
Hospitals	.881	.179
Provision of Electricity	-.617	.553
Secondary schools	-.899	8.732E-02
Provision of Potable water	1.454E-02	941

The rotated factor — loading matrix (table 5.4) shows the loadings on the two orthogonal common factors. The first common factor has the common factor has the first five variables loading very high on it. The variables arc secondary school enrolment, medical doctors, female enrolment in secondary schools, electricity, hospital beds and hospitals. This factor accounts for 66.599 percent of the variance of the original data set.

Electricity loads moderately here water supply also has a very significant coefficients on this factor (.941). This first factor can be identified as social services factor. Electricity and potable water supply are significant on the second factor. This second can thus be called social amenities factors it accounts for 17.426 percent of the variance of the original data set.

The guiding principle extraction of factors in this study inc1ude:

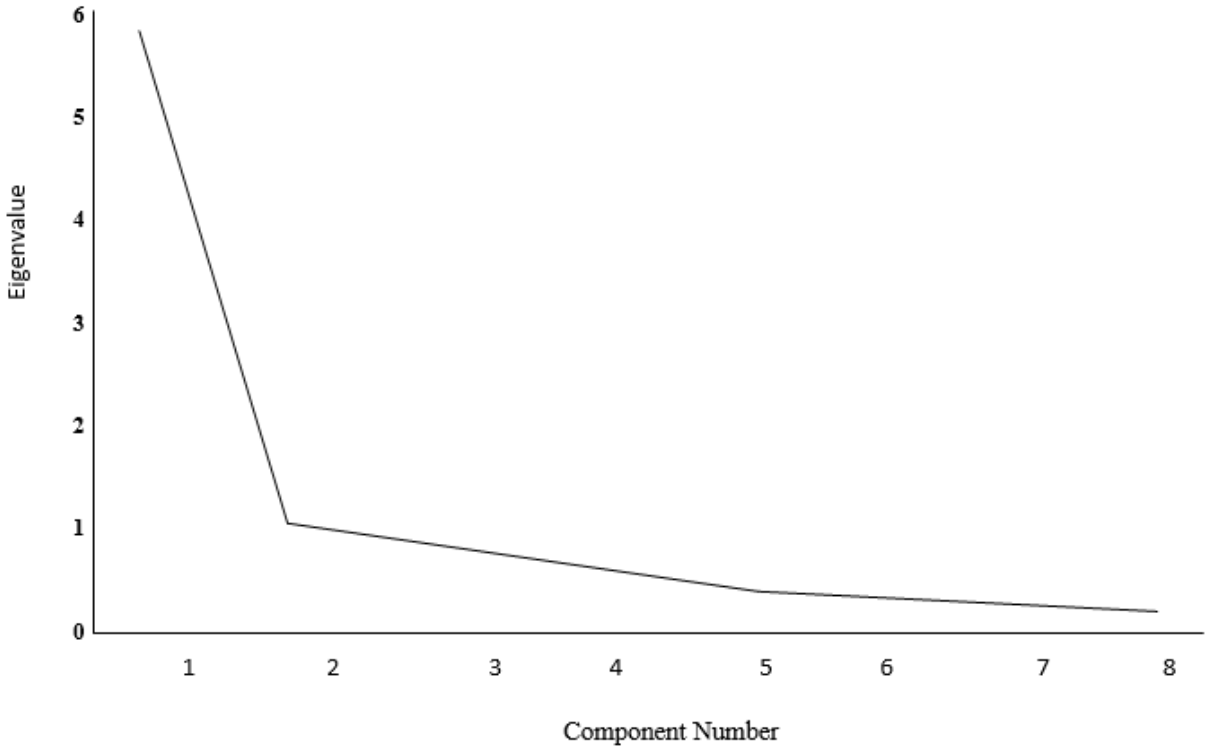
a) Choosing those factors whose eigen values equal or exceed unity
b) Using the cumulative percentage graph or scree plot complemented this. Table 5.5 shows the total variance explained while figure 5.1 is the seree plot which help to identify the flattering point which will assed in the selection of the last extractable factor.

Table 1.5 TOTAL VARIANCE EXPLAINED INITIAL EIGEN VALUES

Component	Total	% Of Variance	Cumulative%
1.	5.637	70.466	70.466
2.	1.085	13.558	84.025
3.	.579	7.242	91.267
4.	.339	4.242	95.508
5.	.147	1.832	97.340
6.	.22	1.522	98.863
7.	6.449E-02	.806	99.669
8.	2.651E	1331	100.000

SCREE PLOT

Fig. 1 Scree Plot



The pattern of association in our data set has been identified to be two in number namely social services and social amenities factors. These are regarded as the underlying dimensions of the spatial pattern of development of Rivers state. They thus provide us with a basis for differentiating the twenty- three local government areas of Rivers State.

SPATIAL PATTERN OF DEVELOMENT IN RIVERS STATE.

It will be recalled that hierarchical method was used to differentiate the various local government areas based on each of 3 variables used for this study. In this chapter, the spatial units, the local government areas will be further differentiated along the two axis that were exposed by factor analysis just discussed. This was carried out through mapping scores of' each factor for each of the twenty three local government area and carefully interpreting them. By doing this, it will be possible to meaningfully translate the two abstract dimension of development into very clear spatial terms (Abumere 1978, Ayeni 1994).

The technique of factor analysis has thus enabled us to identify the underlying dimensions of spatial development in Rivers state. These two dimensions in turn provide a means of differentiating the twenty three Local Government Areas along two axis.

The scores on the first common factor of the LGA in Rivers state are mapped (Fig 1.2). Negative scores characterized the following LGAs Ahoada West, Bonny, Andoni, Opobo Nkoro, Tai Degema, Akuku Toru, Asari Toru, Okrika Ogu and Etche. Low positive scores characterize Abua/Odual.

Table 1.6 LGA SCORES ON THE FACTORS

S/no	LGA	Scores on Factor 1	Scores on factor 2
1	ABUA/ODUAL	.05	-1.50
2	AHOADA EAST	.64	.39
3	AHOADA WEST	-67	-03
4.	OGBA//EGBEMA NDONI	.47	.99
5.	BONNY	.45	.48
6.	ANDONI	.45	1.68
7.	OPOBO/NORO	-1.22	-1.18
8.	GOKANA	.53	-18
9.	KHANA	1.18	-86
10.	OYIGBO	1.33	-1.03
11.	TAI	-1.11	.18
12.	ELEME	-40	.25
13.	DEGEMA	-65	.17
14.	AKUKU TORU	-60	.16
15.	ASARI TORU	-1.20	.70
16.	OKRIKA	-60	1.63
17.	OGU/BOLO	-1.85	.97
18.	IKWERRE	.88	.81
19.	EMOHUA	1.11	-77
20.	ETCHE	1.30	.1.17
21.	OMUMA	-94	-1.21
22.	PORT HARCOURT	1.48	1.43
23.	OBIO/AKPOR	1.43	1.43

The LGAs with high positive scores are differentiated as those which are more developed with respect to social service. This differentiation is made as a result of the orthogonal rotation of the facts that was carried out fig.1.1 shows the performance of the LGA's on social services factors.

Fig 1 .2 shows the performance of the LGA's on social infrastructure factor. High positive scores indicate tire inure developed L.G.A in social infrastructure whereas, negative scores characterize those that are less developed. Areas with high positive scores include Port Harcourt, Obio/Akpor, Okrika, Asari Toru, Ogu/Bolo, Ogba/Egbema LGA' s apart from Ogba/Egbema the other LGAs are close to Port Harcourt city. This differentiation is made possible because the factor was orthogonally rotated. The high and low negative scores indicate LGA's that are less developed on this dimension of social infrastructure.

The two map of the extracted dimension, indicate the emerging pattern of development in the space economy of Rivers State. The existence of' a duality in the State is suggested by the pattern of development that have emerged. The confirmation of duality in the space economy of Rivers Stale will be treated next.

THE STRUCTURE OF THE SPACE ECONOMY OF RIVER STATE

An insight into the details of what appears to be dualism in the space economy of Rivers State from the previous analysis was achieved. A grouping model was used to adequately address the issue raised by the hypothesis. The grouping model was thought to be the most appropriate for this purpose is the cluster analysis. This technique aims to find a grouping of units such that all units in a group are relatively similar to each other (Krzano its major advantage is that it produces optimum clustering for a regard number of clusters regardless of previous stages in the analysis. The result of the cluster analysis is contained in Fig. 1.3

SPATIAL INEQUALITIES

Two groups are desired as this will help us to examine how the twenty three LGA's cluster along developed/more developed and less developed axis. Considering our earlier discussion, this is in line with what the theory of spatial dualism postulates. Rivers State is a one-city state hence the first category is reserved for Port Harcourt other developed areas while the rest two are reserved for the remaining part of Rivers State. Fig 1.4 shows the grouping of the twenty-three LGA's according to their level of economy development. The development axis is in a north/west south/east direction encompassing Oyigbo, Port Harcourt, Obio/Akpor, Emohua, Ikwerre, Ogba/Egbema/Ndoni and Ahoada East.

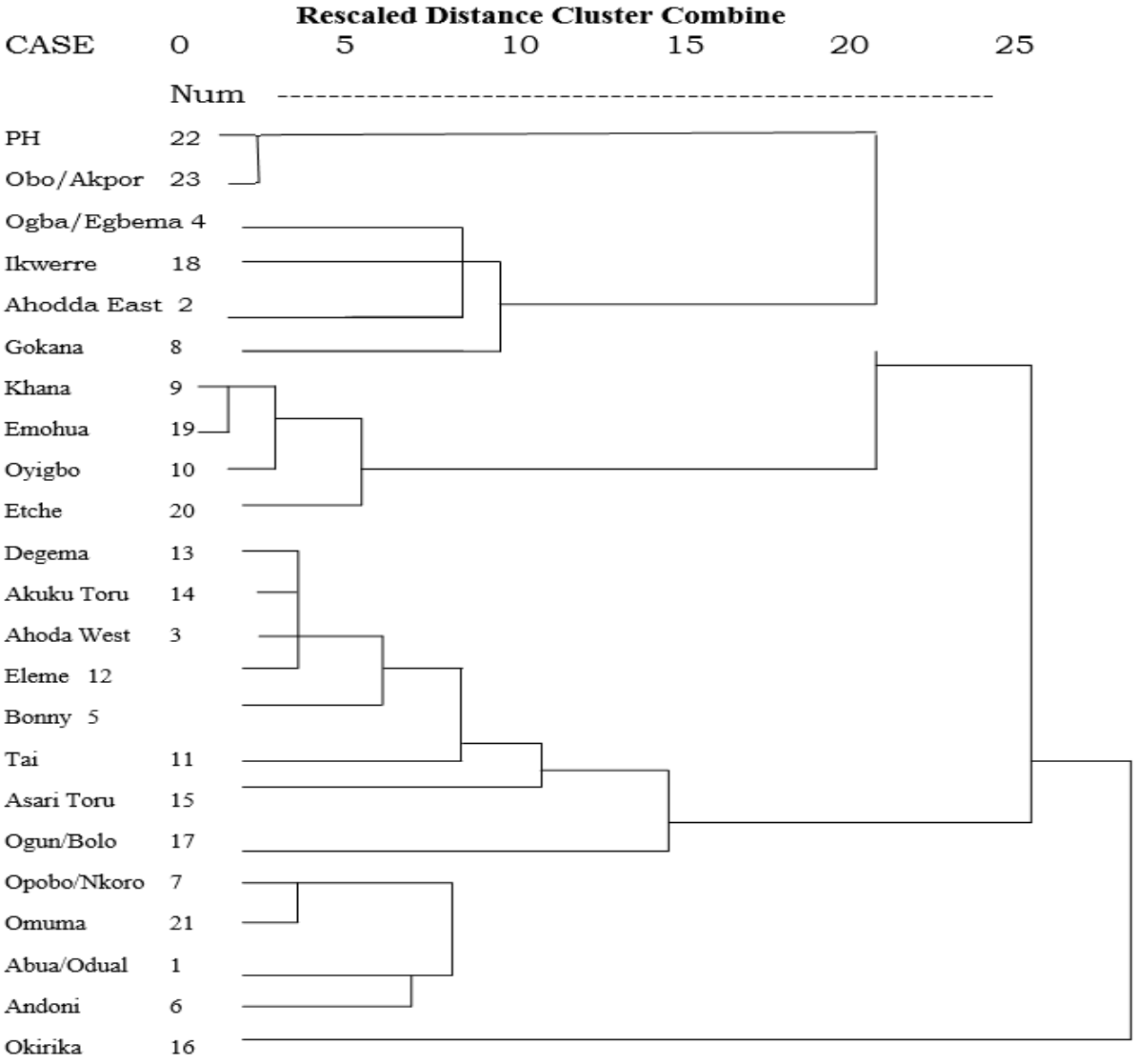
It is necessary to note that neither the Riverine nor upland areas wholly constitute a developed Region or a less developed one, Rather he developed axis is contiguous with both upland and Riverine Region. Although this developed axis is in the upland area, pockets of under developed areas exist within the upland area. This is a common problem that is associated with this type of differentiation of the space economy. Abumere (1987) has

observed such a problem in his study of Nigeria. This is so because the more developed (modern) and the less developed (traditional) region are in reality, both mixed.

From the foregoing one can conclude that there exist two economic systems in Rivers State, which cluster in space with a discernable pattern in conformity with the theory of spatial dualism.

This situation has established the existence of spatial dualism and hence regional inequalities in the space economy of Rivers state.

Fig 1.3: Hierarchical Cluster Analysis Diagram Using Single Linkage.



DISTANCE FROM PORT HARCOURT AND LEVELS OF DEVELOPMENT IN RIVERS STATE.

The relationship between distance from the state capital city of Port Harcourt and the levels of development in the space economy of the state is examined. The analysis was carried out within the framework of the growth pole and center periphery theories. These theories deal with spatial dualism, identity the structural components of spatial dualism and their development characteristics. They also have strong links with the urban system. Centre periphery and growth pole theories both contain the idea of polarized development and hence are equipped to proffer a meaningful explanation for the process of spatial development.

Table 1.7 Correlation Results Between Distance from Port Harcourt and Factors I and 2

	R	R2	Df n 2	Significance level	t-test	Tabulated value	significant
Distance from PH and factor 1	247	0.061	21	05	1.23	2.08	No
Distance from PH and factor 2	.48	0.24	21	05	2.70	2.08	Yes

Government Area from the city of Port Harcourt was correlated with the factor scores of each of the two dimensions of development in the space economy of Rivers State.

The correlation between the distance of the local government. Areas from Port Harcourt city and social services, which is the first dimension of development, has a coefficient of - 0.247. This is negative and also not significant at the 05 level (see table1.7). This suggests that the farther away a local government Area is from the city, the less developed with respect to this factor.

The secondary correlation between distance of the local Government Area from Port Harcourt city and social services, which is the first dimension of development, has a coefficient of -0.247. This is negative and also not significant at .05 level (see table 1.7). This is suggest that the farther away a local government area is from the city, the less developed with respect to this factor.

The second correlation between the physical distance from the city of Port Harcourt and the provision of social infrastructure has a coefficient of .0487. This is negative and also significant at the 0.05 level of significance. It also suggests that the farther away a local government is from Port Harcourt city, the less developed the LGA performs. Thus the city which constitutes the core of the Rivers State space economy, is where growth is initiated and from where its impulses are transmitted to its geographic region periphery, in the case of Rivers State the impact of distance on development is compounded by the ecological difficulties of difficult terrain, mass expanse of swamps, which constrain the development of road network, canals or jetties. As distance increases away from Port Harcourt, level of development decreases.

CONCLUSION

The findings in this paper clearly reveal the nature of the spatial patterns of development that has emerged in River State. They conform with the conform theory in that both economic systems cluster in space, with a discernable pattern. The more developed districts are found to cluster along a northwest/southeast direction above the boundary of the inner and outer Niger Delta Regions.

The details of the duality in the space economy of Rivers State are in conformity with the postulations of the theory. The relationship between distance of the local Government areas from Port Harcourt and level of development is such that LGA's that are far away are generally speaking, the less developed (traditional) areas.

The emerging regional dualism needs to be concretely redressed through a heavy an meaningful investment in infrastructural facilities in the less developed areas. This has become necessary to check the development of an asymmetrical relationship of dominance and dependence and its attendant intertwined problems with the Port Harcourt metropolise.

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