



**Analysis of the Linkage between Infrastructure Provision and Tourism  
Development in the Rural Areas of Rivers State, Nigeria, Using Canonical  
Correlation Analysis.**

By

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**Abstract**

*The relationship between the level of infrastructural development and tourism performance in Rivers State, Nigeria, was investigated for purposes of rural development. To achieve this, thirty (30) communities were selected in the State and data collected on seventeen (17) key infrastructure facilities that could relate to tourism development in the communities. Four hundred and forty (440) copies of questionnaire were administered to both tourists and heads of households. The major impediments to rural tourism development were found to include deficiencies in key infrastructure such as Hotels, Banks, Postal facilities, Road density and modern waste treatment facilities; all which returned low mean values. Seventeen infrastructure variables and eleven tourism performance variables were linked directly using canonical correlation with a view to identifying the major infrastructural blocks that govern tourism development in the study area. The first canonical variate revealed a linkage between Ethnic tourism and both road and accommodation related infrastructure; the second showed how poor road network development impacted negatively on agriculture in the study area; while the third showed that Historical tourism was positively related to the provision of communication, health and education related infrastructure. These variables reported canonical loadings of 0.50 and above. Based on such high loadings, It was*

*recommended that these relationships be used to develop an infrastructure/tourism development model for the area.*

**Key Words:** Linkage, Infrastructure variables, Tourism variables, Rural development, Canonical correlation.

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## **1. Introduction**

Infrastructure represents everything that is invested before a meaningful plan can take —off and be sustained and it may have at least two connotations. First, it may be categorized into economic and social components; transport, communication, power and water supply fall under economic infrastructure while housing and medical services come under social infrastructure (Obot,1994). Second, it may be divided into two - hard infrastructure which includes roads, railways, ports, airports, sewage system, irrigation etc. and soft infrastructure such as transportation, trained security, irrigation, educational and medical system etc. Thus, while hard infrastructure has to do with the large physical network needed to sustain a system, soft infrastructure is more about institutions established to maintain standards of culture such as the economy, education, health, emergency services, security etc. Tourism on the other hand encompasses the entire world industry of travels, hotels, transport and other components, including the promotion which serves the needs and wants of travelers (Macintosh and Gupta, 1980). Environmentally, tourism is perceived as a “smokeless ‘industry with emphasis on the exploration and harnessing of ‘free’ resources-sun, sea, sand, the natural habitats and friendly people (Bricker and Tracy, 2000). Tourism infrastructure according to Davidson (1993) is the physical element that is created or made to cater for tourists .Accordingly, tourism may be classified into Ethnic, Cultural, Historical, Environmental and Recreational tourism.

Ample evidence abound in the literature to support the existence of a relationship between infrastructure provision and economic development (Samanta and Mohanty, 2005).For example, Yoshino and Nakahigashi (2000) investigated the effect of infrastructure on productivity as well as the relationship between infrastructure and poverty in south Asian countries. They concluded among other findings that infrastructure did have effect on productivity in some of those countries. Following from this, it was observed in a paper jointly prepared by the African Union Commission and NEPAD Agency that the relationship between the economy and infrastructure is evidently critical to promoting inclusive growth and sustainable

development. Yet Sub-Saharan Africa ranks consistently at the bottom of all developing regions in terms of infrastructure performance and continues to lose grounds in the quantity, quality and accessibility of core infrastructure services (Calderon and Serven,2008).For this reason, many researchers consider Africa's deficient infrastructure as a major impediment to economic development in the region.

In the area of rural development, Esang (1981) confirmed the existence of such a relationship emphasizing that priority should be given to the construction of rural infrastructure to make for effective contribution to development. Ogunfowara and Olayide (1981) agreed that rural development can only succeed when it is supported by adequate infrastructural facilities such as roads, telephone, banks, water supply, electricity, etc. It has been argued (Isu, 1988) that the costs involved in the provision of infrastructure are enormous both economically and socially, because the lack of infrastructure limits investment, and the lack of investment limits infrastructure. In spite of what seems an overwhelming evidence, Idachaba (1981) remarked that the mere provision of physical and social infrastructure is not a panacea for accelerated rural development. Along the same line, Ajakiye and Ncube (2010) also observed that in the literature, the causal nexus between infrastructure capital and economic growth and development in general has been rather ambiguous.

Rural development entails a process through which rural poverty may be alleviated by sustained increase in productivity and income of low income earners and households (The World Bank,1975 and Gana,1987). According to Ogbazi (1992) rural development encompasses a broad spectrum of issues among which are agriculture, modernization, rural industrialization, job creation, transport development and the provision of adequate housing. The relevance of tourism to the development of rural areas cannot therefore be overstressed.

The promotion of tourism as a veritable tool of development by international development agencies has been an attractive option (Grandoit, 2005 and Trong, 1990). To address development challenges, the Caribbean countries and others have implemented several development strategies that subsequently led to the adoption of tourism development strategies. However, Mistilis (1999) had observed that tourism forecasts, in other to be realized, are dependent on the maintenance of items in tourism delivery system. He noted that these systems are complex and interrelated, generally having a very long lead time from concept to reality. These according to him include the development of airline and accommodation facilities, investment in

service companies and financing public infrastructure projects such as roads, rail, ports and airports and other facilities. In view of the generally poor infrastructural development in Nigeria and the need to address rural development through tourism, the link between infrastructure and tourism development in the rural areas of Nigeria needs to be properly investigated.

Although Snieska and Simikunaite (2009) had argued that there was no agreed single set of infrastructure variables among researchers, they, however, identified three main factors upon which the analysis of infrastructure development impact is based: the definition of infrastructure, the determination of its components and the formation of a model for evaluation of the impact. Following from this, this paper sought to investigate the linkage between infrastructure provision and tourism development in rural Rivers State of Nigeria for purposes of rural development in the State. This goal is pursued by defining and assessing rural infrastructure, measuring the components of tourism in the sampled communities and modeling the linkage between the two in a multivariate way using canonical correlation analysis. This will enable the identification of the key infrastructure variables which may be targeted for purposes of rural development in the study area. The authors believe that rural development using the tourism option lies in the proper understanding of this linkage.

The general aim of this research was to assess the level of rural infrastructure development and its impact on the development of rural River State. This was achieved by evaluating the level of infrastructure development in the rural area of Rivers State; examining tourism development in Rural Rivers State; assessing the extent of interrelationship between infrastructure and tourism development in rural Rivers State and examining the problems of tourism development in Rural Rivers State.

## **2. Study area**

Rivers State is one of the core Niger Delta States of Nigeria. It is located between latitudes 4°20' and 5°45' North and longitudes 6°20' and 7°33' East with a land mass of approximately 10,261sqkm. Generally, the land form of the State is flat and monotonous. Characteristically, the topography is adorned by a maze of creeks, waterways and swamps criss-crossing the low lying plains. Rivers State is a catchment area for a number of river systems that traverse and drain this region. These include the Orashi River, the New Calabar River, the Otamini/Imo River and

the Niger River which after over 4,200 Kilometers from the Guinea Highlands finally empties into the Gulf of Guinea through tributaries that form the Niger Delta. Other rivers are the Abonnema, the Woji and the Elekohia which empty into the Amadi Creek.

Climate is sub-Equatorial with the winds, air masses and the ocean currents having great influences on climatic elements such as temperature, precipitation, humidity and air pressure. Vegetation types are the coastal swamps forest, the mangrove swamp forest, fresh water swamp forest as well as the tropical rain forest.

The people of Rivers State belong to the same Zoethnic language group (Aferé and Williamson, 1989). The major economic activities in the study area include palm oil processing in the upland region, coconut harvesting in the coastal sands, raffia palm tapping, cassava cultivation, fishing, craft such as pottery and canoe making.

### 3. Methods

The study utilized a target population from 2 units: The population of tourists in the selected tourist center; the population of households in these tourist centers. A total of thirty (30) tourist centers (representing 43%) were drawn from a population of seventy (70) select tourist centers in Rivers State. To select the thirty (30) tourists centers from the 70 recognized centers in Rivers State, a Table of Random Numbers was used. The choice of the number of households for each tourist center was done in proportion to the size of the household. In each center, questionnaire was administered in line with the systematic sampling procedure. In this case, every household in the transect was sampled.

For the sample size, the Yamane (1967) formula for determining the samples for a finite population was applied. The total number of households in the area was determined by dividing the 2008 projected population by 5 (which represents the average number of household size in Nigeria).

Where:

- N = sample size
- N = the finite population of households.
- E = level of significance
- 1 = unity [constant].

$$\text{Thus } n = \frac{79538}{1 + (79538 \times 0.0025)}$$

$$\frac{79538}{199.845}$$

$$\therefore n = 440$$

**Table 1:** Tourist centers and the number of households sampled in each center.

S/N	Tourist Centre	Projected 2008 Population	Total No. of Households	No. of Sampled households
1	Okwuzi	12823	2564	14
2	Omoku	69662	12132	67
3	Obagi	5029	1005	7
4	Edeoha	9603	1920	12
5	Obaji-Emohua	6136	12227	7
6	Ndele	4521	904	6
7	Igbo-Etche	2703	540	4
8	Ozuzu	2648	529	4
9	Okehi	7617	1523	10
10	Bane	11128	2225	12
11	Kono	4353	870	5
12	Sogbo	13425	2685	14
13	Kaa	5135	1027	6
14	Queens Town	5878	1175	8
15	Nkoro	10779	2155	12
16	Ikuru	5733	1146	7
17	Abonnema	65349	13069	68
18	Idama	2817	563	6
19	Obonoma	4490	893	5
20	uilkIri	61055	1211	67
21	Obrikom	8276	1655	6
22	Aggah	11099	2219	10
23	Isu	4537	907	7
24	Ebukama	1946	2389	12
25	Kula	12837	2567	15
26	Obelle	11714	2342	15
27	Rumuji	10461	2092	9
28	Odiemeranyl	3894	779	7
29	Kaani	14461	2892	10
30	Kpean	6581	1316	8
	<b>Total</b>	<b>39769079538440</b>		

For the purpose of this study, four hundred and forty copies of the questionnaire were administered to heads of households to obtain information on;

- i) Household demographic and socio-economic variables

- ii) Type of waste disposal
- iii) Ownership of a GSM telephone or line
- iv) House type
- v) Non-agricultural engagements
- vi) Utilization of electricity, pipe —borne water, dispensary, primary/secondary schools etc.

Copies of questionnaire were administered directly to respondents with the help of research assistants during a fieldwork exercise which was held between June 2007 and December 2008. Structured interviews were held with managers of beach resorts, creek resorts, souvenir shops, local crafts shops, non- agricultural establishments, and tour guides in each tourist's center to obtain data on the following tourism variables:

- i) Frequency of carnivals/cultural festivals and volume of tourist patronage.
- ii) Volume of tourists patronage on creeks, water resorts, beach and mangrove attractions; and;
- iii) Monthly income generated from souvenir shops and local crafts.

Direct observation was used to obtain data on infrastructure availability in each tourist center. Such information included:

- i) The length of paved roads [where available].
- ii) Average road density
- iii) Number of hospitals/dispensaries.
- iv) Number of rental agencies.
- v) Number of Banks; and
- vi) Number of primary and secondary schools.

#### **4. Level of Infrastructural Development in Rural Rivers State**

Table 2 shows the definition of variables used and their respective statistical description. The mean score for each variable indicated its availability status. Whereas a high mean score indicated a relative abundance of a variable, a low mean score stood for a relative scarcity of a variable. Assessment based on the average mean score of all the variables (27.9) showed that variables X1 (Housing), X6 (GSM telephone), X10 (borehole water), X11 (Electricity), X12 (Dispensary), X16 (Primary Schools), and X17 (Secondary School) reported mean scores of more than

27.9 respectively. These possessed high availability status. In contrast to the above, variables X1 (Banks), X2 (Hotels), X7 (Internet), X5 (Postal agency), X3 (Hospital), X8 [Modern waste facility), X9 (Pipe borne water), X13 (Paved roads) and X15 (Road density) showed mean scores below the average score of 27.9. This implied that they were relatively scarce in the study area. The most deficient infrastructure were Hotels (2.2), Banks (0.9), Postal agency (1.4), Internet facility (0.94) and Road density (2.8).

**Table 2.** Distribution of rural infrastructure in Rivers State

<b>Variable</b>	<b>Definition of variable</b>	<b>Mean</b>	<b>Std Dev.</b>	<b>Mm</b>	<b>Max</b>
X1	Housing	29.4	8.0	16.4	51.5
X2	Hotel	2.2	1.8	0.1	7.0
X3	Hospital	9.3	6.3	2.0	25.0
X4	Bank	0.9	1.3	0.1	5.0
X5	Postal agency	1.4	0.9	1.0	6.0
X6	% of G.S.M. Telephone	51.3	12.2	25.0	76.0
X7	Internet	0.94	1.1	0.1	3.3
X8	Modern waste facility	4.3	4.4	1.0	15.0
X9	% of Pipe-borne water	12.0	4.8	4.1	20.1
X10	% of bore-hole water	36.2	36.9	19.1	229.5
X11	% of Electricity	63.0	9.7	48.0	80.1
X12	% of Dispensary	38.3	11.4	20.0	61.0
X13	Length of paved roads	16.9	8.0	5.0	41.0
X14	Length of unpaved roads	25.1	9.6	9.10	45.0
X15	Road density	2.8	2.1	0.6	12.0
X16	% of Primary school	77.9	9.3	65.0	98.0
X17	% of Secondary school	60.3	14.3	38.0	87.0

### **5. Description of Tourism Variables**

Eleven variables indicating various aspects of tourism development were identified and utilized. Table2 presents the summary of field data for tourism development which included the total and mean values for all the tourism components utilized in the study.

**Table 3.** Descriptive analysis of tourism data.

<b>Variables</b>	<b>Definition</b>	<b>Total stock</b>	<b>Mean</b>
Y1	Climate attraction	94.6	31.5
Y2	Rural industry	377.2	12.57
Y3	Souvenir shop	926	30.9
Y4	Local craft shops	1064	35.5
Y5	Cultural festival	925	30.8



Y6	Beach attraction	1123.7	37.5
Y7	Mangrove	1677	55.9
Y8	Historic site	1226	40.9
Y9	Carnival	1386	46.2
Y10	Water resort	994	31.5
Y11	Creeks	775	25.2

A low mean score suggested a relatively less patronage for a variable. Accordingly, three variables had mean values of 40 and above. They included: Y8 (40.9) and Y9 (46.2). These variables enjoyed far more patronage than others. The least patronized variables included Y2 (12.57) and Y11 (25.2). These variables represented rural industry and creek attraction. The reasons for the low patronage are not farfetched. Most rural areas of the State have no industries that would attract tourists. In addition, the creeks of the Niger Delta are hostile due to the activities of militants.

## 6. Technique of Data Analysis

The multivariate technique of canonical correlation analysis was used to examine two different sets of multivariate data derived from a single population. The goal was to discern the interrelationship existing between the linear combinations of the first data set and linear combinations of the second data set. In this research, the linkage between infrastructure variables and tourism, development variables measured across the same population of tourist communities in Rivers State was sought. Canonical correlation requires that data be normally distributed and that accuracy of measurement be ensured. However, it does not require that both dependent and independent variables be uniform.

Data for the 17 infrastructure variables and 11 tourism variables were used for the analysis. The computer program CANCECORR in Statistical Analysis System (SAS) was applied.

## 7. Linking Infrastructure Provision with Tourism Development in Rural Rivers State

One of the primary objectives of this study was to discern the interrelationship existing between the linear combination of infrastructure variables [predictor] and tourism variables[criteria] .The essence was to derive a linear combination for each of the data sets in such a way that the correlation between them was maximized. To

achieve this objective, canonical correlation analysis was applied directly on the two data sets collected from the same population and shown in Tables 2 and 3.

Relevant statistical tests were employed to ascertain whether the existing interrelationship between the extracted canonical variates and two data sets were significant. These tests included: the Wilks’ Lambda Statistic, Pillai’s Trace, Hotelling- Lawley and Roy, Greatest Root. Table 4 shows the F- approximations and the significance level of these statistics. It is seen that the F-value for Wilks’ Lambda test at 187 degrees of freedom stood at 3.34 with a probability value which is less than 0.05. This test revealed that the extracted canonical correlation model is valid and that the existing relationship between infrastructure and tourism variables is significant at < .001 level. Additionally, the obtained F- value of 3.43 was high enough for the null hypothesis to be rejected. Essentially, the alternative hypothesis that there was a significant relationship between the level of infrastructure development and tourism development in rural Rivers State was upheld.

**Table 4:** Multivariate statistical test and F- approximations for the canonical correlation model

<b>Statistical Test</b>	<b>F-value</b>	<b>DF</b>	<b>Sig.</b>	<b>Remarks</b>
Wilks’ Lambda	3.43	187	<.0001	Significant
Pillai’s Trace	1.73	187	0.004	Significant
Hotelling-Lawley	1.32	0.5300	Not significant	832.63
Roy’s Greatest Root	17	<0.001	Significant	

Further details in Table 4 show that Pillai’s Trace and Roy’s Greatest Root statistical test also affirmed the validity and the significance of the canonical correlation model. They show F- values of 1.73 and 823.63 which were significant at 0.004 probability levels. The above statistical analysis revealed the statistical strength of the findings of this study. It showed that the three canonical variates used in discussing the relationship between tourism and infrastructure variables were appropriate both theoretically and empirically. It also showed that the three canonical variates adequately revealed and bore the link between the infrastructure and tourism variables in the study area.

The first stage of the canonical analysis yielded correlation coefficients between the dependent and the independent variables as presented in Table 5.

**Table 5:** Matrix of inter-correlations of the X and the Y variables

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17
Y1	0.02	0.5	0.19	0.28	0.13	-0.52	.18	.00	.59	.08	-0.16	.09	.41	-0.9	.00	.27	.32
Y2	0.45	-.80	.06	.08	-.48	0.38	.41	.81	.55	.41	0.53	.23	.59	10	11	.36	0.7
Y3	-.35	.34	-.27	-.52	0.01	0.90	9	-.06	-.74	.49	.45	.66	.58	49	12	-.26	-.11
Y4	.99	.40	.35	.05	.21	-.50	.32	-.45	.06	.45	40	.22	.03	.01	-.28	.54	.41
Y5	-.83	.01	.05	-.16	.21	-.72	50	0.9	.26	.02	.99	-.13	.68	.45	-.27	.84	.30
Y6	27	-.042	.05	.34	-.16	0.27	0.71	-.45	.31	.19	.17	.67	.60	.42	-.19	.73	.65
Y7	-.1.0	.97	.23	-.20	.39	-0.81	0.63	-.04	.79	.59	-.68	.79	-1.0	-.34	.84	.35	.37
Y8	.89	.47	-.04	-.13	.49	-.95	.42	-.54	-.58	.31	.21	-.05	0.15	.09	.42	.37	.40
Y9	.8	.18	.26	.54	0.39	0.19	.17	.12	.34	.58	.31	.12	.05	.09	-.14	-1.0	.80
Y10	1.0	-1.0	-.37	.63	-.80	-.78	.18	1.00	.23	-.23	-1.0	-.60	.23	-1.0	-.77	-.16	1.0
Y11	.08	-.98	.60	-.12	-.07	.61	.88	-.46	-0.36	.20	4.6	.67	.41	.63	-.53	.63	.71

Table 5 shows that the relationship between X1(Housing) and Y8 (Number of tourists to historical sites) yielded a positive correlation coefficient of 0.89. This showed that increase in housing facilities in the study area attracted more tourists to historic sites into the area. Hired accommodation is pivotal to tourism development and hence should be accorded priority attention. X2 (Hotel) also correlated with Y7 (No. of tourists for mangrove attraction). A correlation coefficient of 0.97 revealed a very high positive relationship between Hotel provision and increase in the volume of tourists. Tourists would prefer sites where they can enjoy comfortable accommodation for relaxation. Additionally, X7 (Internet services) correlated highly with Y11(No. of tourists for creek attraction) with a coefficient of 0.8. These two variables, therefore, showed a direct link. In other words, the density of internet services in the area had a close relationship with the volume of tourists for creek attraction. The matrix of inter-correlations shown in Table 5 contains high correlation coefficients both negative and positive. This indicated that the two data sets representing infrastructure and tourism development were related. This also implied that pairs of linear combination between them could be extracted.

However, as data in Table 6 has shown, only three of the eleven extracted canonical Variates were significant. The significant value for the three significant canonical variates indicated that Variate I had F-value of 3.43 which was significant at 0.001 and Variate III reported F-value of 1.79 which was significant at 0.01. The three canonical variates showed p-value less than 0.05 and were therefore significant.

Table 6 also revealed that the first pair of canonical variate related highly with other variables with a coefficient of 0.99. The second and the third significant variates also related highly with other variables in the data set.

**Table 6.** Extracted canonical variates

Cancorr Variate	Cancorr Correlation	Approx.	Standard Cancorr	Error Eigenvalue	% Variance	% Cumulative	F-Value	DF	Sig.
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I	0.99	Squared	0.99	1166.8	85.9	85.9	3.43	187	0.001
II	0.00	0.000	0.98	97.0	7.16	93.1	2.26	160	0.001
III	0.99	0.001	0.98	50.7	3.74	96.8	1.79	135	0.011
IV	0.97	0.003	0.95	23.9	1.74	98.6	1.06	91	0.407
V	0.95	0.007	0.90	9.56	0.71	99.3	1.06	91	0.407
VI	0.88	0.017	0.77	3.47	0.26	99.6	0.84	72	0.748
VII	0.84	0.041	0.70	2.40	0.18	99.8	0.74	55	0.851
VIII	0.75	0.052	0.57	1.36	0.10	99.9	0.62	40	0.928
IX	0.65	0.007	0.41	0.71	0.05	99.9	0.52	27	0.954
X	0.56	0.008	0.32	0.48	0.04	99.9	0.47	16	0.936
XI	0.42	0.015	0.17	0.21	0.02	100.0	0.37	7	0.950

Furthermore, canonical Variate I accounted for 85.9% of the variation in the two data sets. Canonical Variate II accounted for 7.2% while the third canonical variate accounted for 3.7%. In all, the three canonical variates explained about 96.8% of the variation in the data sets. The table also shows the values for the approximate standard error for the eleven extracted canonical variate. These values were very low, the highest being 0.15. This was an indication of the level of accuracy in both measurement and data collection, hence, the validity of the analysis. This relationship between the three significant variates and the original variables are presented in Table 7.

**Table 7:** Canonical structure loadings for tourism and infrastructure variables Canonical Variates: Tourism Variables

	<b>I</b>	<b>II</b>	<b>III</b>
Y1	0.68	0.27	0.01
Y2	0.74	0.52	0.21
V3	0.67	0.42	0.16
V4	0.63	0.42	0.20
V5	0.69	0.35	0.46
“6	0.37	-0.47	0.39
V7	0.41	-0.15	-0.17
“8	0.36	0.10	0.67
V9	0.71	0.02	0.68
Y10	0.77	-0.27	0.22
V11	0.64	-0.12	0.18

**Canonical Variates : Infrastructure Variables**

x1	0.66	-0.32	0.28
X2	0.75	-0.49	0.35
X3	0.38	-0.03	0.42
X4	0.44	0.19	-0.04
X5	0.08	-0.13	0.15
X6	0.47	-0.47	0.57
X7	0.15	-0.00	0.25
X8	0.43	-0.05	0.13

X9	0.62	0.28	0.23
X10	0.58	-0.50	0.20
X11	0.50	0.31	0.43
X12	0.30	0.03	0.52
X13	0.80	-0.50	0.44
X14	0.73	0.05	0.17
X15	0.69	0.13	0.25
X16	0.41	0.12	0.35
X17	0.12	0.19	0.74

In the interpretation of the canonical structure loadings, a cut-off value of 0.50 was adopted. By this decision, eight variables in the first data set (tourism data) on the one hand and eight variables in the second set [infrastructure data) on the other hand loaded highly on the first canonical variate. Essentially therefore, the first canonical variate represented the most important one because it related maximally the set of tourism indicators to the infrastructure situation in the study area. However, the specific relationships between the three canonical variates and the set of original variables are discussed as follows.

### Canonical Variate I

The first canonical variate revealed that the predicted number of tourists for climate attraction (Y1), Percentage of population engaged in non-agricultural establishments (Y2), Monthly revenue generated from souvenir shops (Y3), Monthly revenue generated from local craft shops (Y4), Number of tourists on cultural festivals (Y5), Number of tourists on annual carnivals (Y9), Number of tourists on water resort visits [Y10] and Number of tourists on creek attractions (Y11) were all positively related to infrastructure variables X1 Housing (0.66), X2 Hotels (0.75), X9 Pipe-borne water (0.62), X10 Bore-hole water (0.58), X11 Electricity (0.50), X13 Length of paved roads (0.80), X14 Length of unpaved roads (0.73) and X15 Road density (0.69). All these variables had canonical loadings of 0.50 and above.

### Canonical Variate II

The second pair of canonical variate did not display a dense pattern of linkage between it and the two sets of data. However, as Table 7 shows, there was a link between the percentage of the population engaged in non-agricultural establishments (Y2) with a loading of -0.52 and X10 (Borehole waters) and the length of paved roads (X13) with a loading of -0.50 respectively. The negative correlation was an

indication that the number of people engaged in non-agricultural establishment decreased with a unit increase in the length of paved roads and borehole water.

### **Canonical Variate III**

The third pair of canonical variate revealed a limited degree of linkage between the two data sets. For the dependent variables, the number of tourists to historic sites (Y8) and the number of tourists to annual carnivals (Y9) with canonical loadings of 0.67 and 0.68 respectively related positively with the independent variables: X6 GSM telephone (0.57), X12 Dispensary (0.52) and X17 Secondary School (0.74).

## **8. Conclusion and Recommendations**

It is clear from the study that the first canonical variate revealed a positive linkage between tourists attraction to souvenir shops, cultural festivals and water related activities (Ethnic Tourism) and both accommodation and road related infrastructure; the second revealed a strong negative linkage between the number of people engaged in non-agricultural employment and the length of paved roads, while the third showed tourists to both historic and annual carnivals (Historical Tourism) were positively related to available telephone communication, health and education related infrastructure. These variables reported canonical loadings of 0.50 and above. It is recommended that these relationships be used to develop an infrastructure/tourism development model for the area. The findings of this study have affirmed that sustainable tourism can be trusted to hinge principally on a sound infrastructure base. From Table 2, the major impediments to rural tourism development were found to include deficiencies in key infrastructure such as Hotels with a mean score of 2.2, Banks (0.9), Postal facilities (1.4), Road density (2.8) and modern waste treatment facilities (4.3). In addition to that, the present situation where infrastructure development is over-concentrated in Port Harcourt does not augur well for rural tourism development. Improvement in key rural infrastructure will open the doors for enhanced tourism development which will in turn create employment for rural dwellers and improve their earnings and standard of living. Government on the other hand would benefit if projects such as roads are given propriety. This will increase revenue that will accrue to it from the tourism. As additional income accrues to both households and government, a returned investment will be made in the area of infrastructure maintenance. Essentially therefore, the model portrays a positive and direct relationship between

infrastructure and tourism development. This study has brought to the fore the need for stakeholders to show genuine interest in rural development by investing massively in infrastructure provision capable of promoting tourism performance in the rural communities of Rivers State and Nigeria in general.

## 9. References

- Afere, E. E. and Williams, K. (1989). "Language" In Alegoa, L. and Temuno, S. (Eds) *Land and People of Nigeria: Rivers State*. Rivers State. Port Harcourt. Riverside Communications.
- Ajakaiye, O. and Ncube, M. (2010) Infrastructure and Economic Development in Africa: An Overview. *Journal of African Economics*, Vol. 19, supp, 1 i3 — i18.
- Bricker, K. and Tracy, B. (2000) *Sustainable Tourism Development: The Long Road from Theory to Practice*. United Nations Environment Programme.
- Calderon, C. and Serven, L. (2008) Infrastructure and Economic Development in Sub-Saharan Africa. *Policy Research Working Paper 4712*. The World Bank Development Research Group.
- Davidson, R. (1993). *Tourism*. Longman Group Ltd.
- Essang, S. M. (1981) The Strategy of Stimulating Economic Progress in Rural Economies. In: Olajide S.O. (ed.) *Elements of Rural Economies*. Ibadan: University Press.
- Gana, J. (1987). *A Strategy for Integrated Rural Development in Nigeria*. A Paper presented at the Workshop on Integrated Rural Development for All Chairmen of Local Government Areas in Nigeria.
- Grandoit, J. (2005) *Tourism as a Development Tool in the Caribbean and the Environmental By-products: the stresses on small island resources and viable remedies*. The Maxwell School of Syracuse University.
- Idachaba, F. (1987). "Rural infrastructure in Nigeria." Federal Department of Rural Development, Lagos, University of Ibadan Press.
- Lsu, H. O. (1998). Infrastructure as Key Growth Variable in Nigeria: A Dialectical Analysis. *West African Journal of Business*. 1 (1): 6 — 72.
- Mistilis, N. (1999) Public Infrastructure Development for Tourism in Australia: A Critical Issue. *Journal of Tourism Studies*, 10, (1) :p 40-50.
- Macintosh, R. and Gupta, S. (1977). *Tourism Principles, Practices and Philosophies*. 3<sup>rd</sup> Edition. Columbus, O. H. Grid Inc.
- Obot, J. U. (1994) Infrastructure. In Peters, S. W. (ed) *Akwa Ibom State, The Land of Promise: A Compendium*. Gabumo Publishing Company, Uyo.
- Ogbazi, N. J. (1992) The Role of Agriculture Education in Rural Development: The Case of Nigeria. In Olisa, M.S. and Obuikwu, J. I. (eds). *Rural Development in Nigeria — Dynamics and Strategies*. Awka, Mekstink Publishers.

- Ogunfowara, O. and S. O. Olayide (1981). *Agro-industries in Rural Economies. In Olaiyide, S. O. (ed). Elements of Rural Economies.* Ibadan; University Press.
- Samanta, P. K. and Mohanty, A. K. (2005) *Port Infrastructure and Economic Development.* Kalpaz Publications, Delhi.
- Snieska, V, and Simikunaite, I. (2009) Socio — Economic Impact of Infrastructure Investment. *Engineering Economics* (3). p 16-25.
- Trong, T. (1990) *Sex, Marriage and Morality; Prostitution and Tourism in South East Asia,* London, Zed Books.
- Yamane, T. (1967). *Statistics, An Introductory Analysis.* (2 Edition). New York, Harper and Sons.
- Yoshino, N. and Nakahigashi, M. (2000) The Role of Infrastructure in Economic Development. Center for Excellence (COE)/Ministry of Education with affiliation to Keio University.
- World Bank (1975). *Rural development: Sector Policy Paper.* Washington: The World Bank.