

# **Original Research Article**

## **On the Relationship between Government Expenditure on Economic and Social Service in Nigeria.**

### **Abstract**

*This paper examines the relationship between Government's expenditure and economic and human development in Nigeria over the period of 1961 – 2018, using Canonical Correlation. The Structure Vector for Economic and social Service as well as Redundancy Index were used to explain the standardized variability in the covariates. The result shows that strong positive relationship exist between national recurrent expenditure and economic service and Social service. The study also discovered that Nigeria Government placed more emphasis on other economic services, followed by Transport, Communication, Construction, and Agriculture being the least. In the case of the Social service, it was discovered that Nigeria Government placed more emphasis on other social service, Health, and Education being the least.*

**Keywords:** Canonical Correlation, Economic services, Social Services, Structure Vector, Redundancy Index

### **1.0 Introduction**

The relationship between Economic Development and Human Development has continued to generate series of debate among scholars. Human Development is defined by the United Nations Development Programme, UNDP (2009), as “the priority of human well-being, and aimed at ensuring and enlarging human choices which lead to equality of opportunities for all people in society and empowerment of people so that they participate in - and benefit from - the development process.” The provision of social and community service by the Government is aimed at Human Development and also the provision of economic service is aimed at Economic Development. Yildirim (2008) [1] was of the opinion that economic development improves the quality of life, which generally calls for higher incomes. But it involves much more, it

encompasses, as ends in themselves, better education, higher standard of health and nutrition, a cleaner environment, more equality of opportunity, greater individual freedom and a richer cultural life. It is believed that as a country develops economically, it is able to provide more for the basic needs of its citizens such as education, healthcare and a better quality of life. However, a casual observation suggest that the relationship between economic development and human development may be endogenous, that is, just as it is natural to expect Economic Development to affect Human Development, we should be able to observe various aspects of Human Development shaping the course of development in many developing countries. In fact, many developing countries such as India and Turkey performed better in measure of economic development due to their high level of educated citizens. For example, government expenditure on health and education raises the productivity of labour and increase the growth of national output. Similarly, expenditure on infrastructure such as roads, communications, power, etc, reduces production costs, increases private sector investment and profitability of firms, thus fostering economic growth. As such, Human Development leads to Economic Development due to the increase in the labour force, which in turn increases the revenue of government which helps in the Economic Development process and also the Human Development process.

Nigeria got her independent in the year 1960. From 1961 to 1970, government expenditure was a little stable, but from 1970 to date, government expenditure has continued to rise due to the huge receipts from production and sales of crude oil, and the increased demand for public (utilities) goods like roads, communication, power, education and health. Besides, there is increasing need to provide both internal and external security for the people and the nation. Available statistics show that total government expenditure (capital and recurrent) and its components have continued to rise in the last for decades. For instance, in CBN statistical bulleting (2017) [2], government total recurrent expenditure increased from N716.00 million in 1970 to N4, 805.20 million in 1980 and further to N36, 219.60 million in 1990. Recurrent expenditure was N461, 600.00 million and N2, 131, 900.00 million in 2000 and 2009, respectively. In the same manner, composition of government recurrent expenditure shows that expenditure on defense, internal security, education, health, agriculture, construction, and transport and communication increased during the period under review. Moreover, government capital expenditure rose from N187.80 million in 1970 to N10, 163.40 million in 1980 and further to N24, 048.60 million in 1990. The value of capital expenditure stood at N239, 450.90 million and N1152, 796.60 million in 2000

and 2009, respectively. Furthermore, the various components of capital expenditure (that is, defense, agriculture, transport and communication, education and health) also show a rising trend between 1970 and 2009. Unfortunately, rising government expenditure has not translated to meaningful growth and development, as Nigeria ranks among the poorest countries in the world. In addition, many Nigerians have continued to wallow in abject poverty, while more than 50 percent live on less than US\$2 per day. Couple with this, is dilapidated infrastructure (especially roads and power supply) that has led to the collapse of many industries, including high level of unemployment. Moreover, macroeconomic indicators like balance of payments, import obligations, inflation rate, exchange rate, and national savings reveal that Nigeria has not fared well in the last couple of years.

The main objective of this study is to employ Canonical Correlation to investigate the relationship between Nigeria Government's expenditure on economic and social services over the period of fifty-five (55) years (i.e. 1961 – 2016). The review of related Literatures are discussed in section 2. Section 3 presents the material and methods of the study. Section 4 presents the Analysis and results generated via Canonical Correlation, and finally, the conclusion and recommendations are presented in section 5.

## **2.0 Literature Review**

There vast literatures on the relationships between Nigeria Government expenditure and economic services and growth with little or no literature on the relationship between Nigeria Government expenditure and social services. Some of the past literatures on expenditure economic growth/development in Nigeria are;

Iheanacho E. (2016) [3] examines the long and short run relationship between public expenditure and economic growth in Nigeria over the period of 1986-2014, using Johansen co-integration and error correction approach. The result shows that, recurrent expenditure is the major driver of economic growth in Nigeria. Controlling for the influence of non-oil revenue, the study also shows a negative and significant long run relationship between economic growth (RGDPC) and recurrent expenditure coexists with a positive short run relationship, highlighting the dual effects of recurrent expenditure on economic growth in Nigeria. For the capital expenditure, the study documents negative and significant long run effect of capital expenditure on economic growth in Nigeria. Fajingbesi and Odusola (1999) [4] empirically investigated the relationship between

government expenditure and economic growth in Nigeria over the period 1970 to 1995. The econometric results indicated that real government capital expenditure has a significant positive influence on real output. However, the results showed that real government recurrent expenditure affects economic growth only by little. Ogiogio [5] revealed a long-term relationship between government expenditure and economic growth over the period 1970 to 1990 in Nigeria. Moreover, their findings showed that recurrent expenditure exerts more influence than capital expenditure on growth. Ighodaro and Okiakhi [6] used time series data for the period 1961 to 2007 and applied Co-integration Test and Granger Causality test to examine the relationship between government expenditure and economic growth in Nigeria. The results revealed negative impact of government expenditure on economic growth in Nigeria. Okoro [7] investigated the impact of public expenditure on economic growth in Nigeria (1981-2011). The study concluded that Government capital spending in industries and agriculture "if properly managed" will raise the nation's production capacity and employment, which in turn will increase economic growth in Nigeria. The study advised that Government should increase its expenditure on rural roads and electricity as this will accelerate the productive sectors as well as raise the standard of living of poor citizens in Nigeria. Chude and Chude [8] while studying the impact of government expenditure on economic growth in Nigeria (1977-2012) found that total government expenditure on education has significant effect on Gross Domestic Product (GDP). The study suggested that Government should direct its expenditure towards the productive sectors like education as it would reduce the cost of doing business as well as raise the standard living of poor ones in the country. Ebiringa and Charlse-Anyaogu [9] examined the impact of sectorial expenditure on the economic growth of Nigeria from 1977 to 2011. Their analysis viewed that government expenditure should spend more on health sector, education, Telecommunication and security since they are significant and have positive impact on the economic growth of the nation. Barro [10] observed that empirical evidence on the relationship between government spending and economic growth is diverse, mostly on cross section studies that include a sample of both advanced and developing countries.

The literatures reviewed above concentrated on Nigeria Government expenditure and economic growth and development alone without considering social development and growth. This paper will focus on the relationship between Government's expenditure and economic and social services as it affects its development and growth.

### 3.0 Materials and Methods

#### 3.1 Source of Data

The yearly Nigeria Federal Government's recurrent expenditure in Million Naira From 1961 – 2016 on education, health, agriculture, construction, transport, communication and Other economic services collected from the Central Bank of Nigeria Statistical Bulletin (2017) was used in this study.

#### 3.2 Canonical Correlation Analysis

Canonical Correlation Analysis (CCA) is one of the many statistical methods that allow studying the relationship between two sets of variables. It studies the correlation between two sets of variables and extract from these tables a set of canonical variables that are as much as possible correlated with both tables and orthogonal to each other. Discovered by Hotelling (1936) this method is used a lot in ecology but is has been supplanted by RDA (Redundancy Analysis) and by CCA (Canonical Correspondence Analysis).

#### 3.3 Assumptions of Canonical Correlation

The assumptions of canonical correlation are;

- (i) Linearity; linear relationship is assumed for all variables in each set and also between sets.
- (ii) Normality; assume that the variables are normally distributed but does not require that it must be strictly normal i.e the normality assumption is not strict for canonical correlation analysis.
- (iii) Multicollinearity; assume that there is no perfect multicollinearity in the set of each group.
- (iv) Homoskedasticity;  $var(\varepsilon) = E[\varepsilon_i - E(\varepsilon_i)]^2 = E(\varepsilon_i)^2 = \sigma_\varepsilon^2 = \text{constant}$  for all pair of variables within and between set.

#### 3.4 Formulation of Canonical Correlation

Let's consider two variables,  $Z_x$  and  $Z_y$ , the first a linear combination of p and the second a linear combination of q variables. That is

$$Z_x = u_1 X_1 + \dots + u_p X_p \quad (1)$$

and;

$$Z_y = v_1 Y_1 + \dots + v_q Y_q \quad (2)$$

Where;  $X$ 's = the  $p$  variables in one set,  $Y$ 's = the  $q$  variables in the other set and  $u$ 's and  $v$ 's are weights in the linear combination, considering  $Z_x$ , the mean is;

$$Z_x = u_1 X_1 + \dots + u_p X_p \quad (3)$$

We now define;

$$z_x = Z_x - \bar{Z}_x = u_1 X_1 + \dots + u_p X_p - u_1 \bar{X}_1 - \dots - u_p \bar{X}_p \quad \text{and} \quad (4)$$

the correlation coefficient  $r_{z_x z_y}$  is

$$r_{z_x z_y} = \frac{\sum z_x z_y}{\sqrt{\sum z_x^2 \sum z_y^2}} = \frac{u^t s_{xy} v}{\sqrt{(u^t S_{xx} u)(v^t S_{yy} v)}} \quad (5)$$

### 3.5 Computation of Canonical Correlation Coefficient

(i) Obtain the covariance matrix for the joint variable

(ii) Determine the matrix  $M = R_{yy}^{-1} R_{yx} R_{xx}^{-1} R_{xy}$

(iii) Obtain the Eigen value of  $M$

### 3.6 Test of Significance

A test for the statistical significance of canonical correlation can be carried out using Wilk's  $\Lambda$  criterion.

The hypothesis to be tested is

$H_0: \rho_{c_k} = \rho_{c_{k+1}} = \dots = \rho_{c_r} = 0$  against  $H_1: \rho_{c_k} \neq 0$  for at least one  $k$

The test statistics is;  $V_k = - \left[ n - 1 - \frac{1}{2}(p + q + 1) \right] \ln \Lambda_k \quad (6)$

Where;

$$\Lambda_k = \prod_{j=k}^r (1 - \lambda_j)$$

The test has an approximate chi-square distribution with  $(p - k + 1)(q - k + 1)$  degree of freedom

### 3.7 The Structure Vector

The structure vector is the vector of the correlation between each variable of a set and any one of the canonical variate of the set. The square of the elements of these vectors indicate the proportion of variance of each  $X$  or  $Y$  variable explained or accounted for by the canonical variate  $x_j$  or  $y_j$ . The  $i$ th individual's value on the  $j$ th canonical variates of the sets of  $X$ s and  $Y$ s as

$$x_{ij} = c_{j1} z_{x_1 i} + \dots + c_{jp} z_{x_p i} = c_{j1} z_{x_1 i} + \dots + c_{jp} z_{x_p i} \quad \text{and} \quad y_{ij} = d_{j1} z_{y_1 i} + \dots + d_{jq} z_{y_q i} \quad (7)$$

Where;  $x_{ij}$  and  $y_{ij}$  denote the standardized form of  $z_{x_{ij}}$  and  $z_{y_{ij}}$  respectively, the  $z_{x_{ij}}$ s and  $z_{y_{ij}}$ s are the standardized forms of the individual's values on the  $X$ s and  $Y$ s respectively. The  $s_{x_j}$  is defined

as the vector of the correlations between the  $X_s$  and  $x_j$ . The structure vector for the set of  $X_s$  is written as;

$$s_{Xj} = \frac{1}{n} \sum_{i=1}^n z_{x_i} x_{ij} \quad (8)$$

Where,  $z_{x_i}$  is the vector of standardized  $X$  values for individual  $i$  and  $x_{ij}$  is value of the  $j$ th canonical variate for individual  $i$ . Using the matrix notation, the above expressions for  $x_{ij}$  and  $y_{ij}$  may be written

$$x_{ij} = c_j' z_{x_i} \text{ and } y_{ij} = d_j' z_{x_i} \quad (9)$$

Now substituting for  $x_{ij}$  in equation (9), we have;

$$s_{Xj} = \frac{1}{n} \sum_{i=1}^n z_{x_i} c_j' z_{x_i} \quad (10)$$

Because;  $c_j' z_{x_i} = z_j' c_i$ , substituting yields

$$s_{Xj} = \frac{1}{n} \sum_{i=1}^n z_{x_i} z_j' c_i = R_{xx} c_j \quad (11)$$

Similarly,  $Y$  variable is

$$s_{Yj} = R_{yy} d_j \quad (12)$$

### 3.10 Redundancy Index

This is the degree to which the canonical variates of both the set  $X$  variables and the set  $Y$  variables can explain the standardized variability in the set  $X$  or set  $Y$ . For the first canonical variate, the redundancy index can be calculated using the formula

$$R_{dX_1} = \frac{s'_{X_1} s_{X_1}}{p} R_{c_1}^2 \text{ for set } X \text{ and } R_{dY_1} = \frac{s'_{Y_1} s_{Y_1}}{q} R_{c_1}^2 \text{ for set } Y \quad (13)$$

## 4.0 The Result

The correlations between the components show that strong positive relationships exist between national recurrent expenditure and economic service and social service.

**Table 4.1: Correlations between All Components**

|        | Edu.  | Health | OSS   | Agric. | Constr. | Trans. | OES |
|--------|-------|--------|-------|--------|---------|--------|-----|
| Edu.   | 1     |        |       |        |         |        |     |
| Health | 0.984 | 1      |       |        |         |        |     |
| OSS    | 0.824 | 0.833  | 1     |        |         |        |     |
| Agric. | 0.765 | 0.735  | 0.610 | 1      |         |        |     |

|         |       |       |       |       |       |       |   |
|---------|-------|-------|-------|-------|-------|-------|---|
| Constr. | 0.878 | 0.892 | 0.910 | 0.789 | 1     |       |   |
| Trans.  | 0.837 | 0.840 | 0.933 | 0.674 | 0.917 | 1     |   |
| OES     | 0.795 | 0.818 | 0.947 | 0.533 | 0.898 | 0.883 | 1 |

The Eigenvalues and Canonical Correlations table indicates that; the first eigenvalue,  $\lambda_1 = 19.2624$ , has a corresponding canonical correlation  $R_{c_1} = .97501$ , the second eigenvalue,  $\lambda_2 = .43586$ , has a corresponding canonical correlation  $R_{c_2} = .55096$  and the third eigenvalue,  $\lambda_3 = .12755$ , has a corresponding canonical correlation  $R_{c_3} = .33634$ . Canonical correlation of  $R_{c_1} = .97501$  implies that there is a strong positive relationship between the Economic service and the Social service. Also the proportion of the variation accounted for by the canonical variates of both the Economic and Social service is 95%. The Pct shows the proportion of explained variance in the canonical variates attributed to a given canonical correlation. The result indicated that; 97.16% of the variation in the first canonical variate was accounted for, 2.20% of the variation in the second canonical variate was accounted for in the second canonical correlation and 0.64% of the variation in the third canonical variate was accounted for by the third canonical correlation.

**Table 4.2 Eigenvalues and Canonical Correlations**

| Root NO | Eigenvalue | Pct.     | Cumulative Pct. | Canonical Corr. | Square Correlation |
|---------|------------|----------|-----------------|-----------------|--------------------|
| 1       | 19.26240   | 97.15818 | 97.15818        | 0.97501         | 0.95065            |
| 2       | 0.43586    | 2.19844  | 99.35662        | 0.55096         | 0.30355            |
| 3       | 0.12755    | .64338   | 100.            | 0.33634         | 0.11312            |

The hypothesis to be tested is;

$$H_0: \rho_{c_k} = \rho_{c_{k+1}} = \dots = \rho_{c_r} = 0 \text{ v.s } H_1: \rho_{c_k} \neq 0 \text{ for at least one } k$$

The decision rule is; reject  $H_0$  if  $p\text{-value} \leq \alpha = 0.05$ . Since all the  $p$ -values are less than the level of significance, there is a significant relationship between the economic and Social service of the Government recurrent expenditure.

**Table 4.3 Test of Significance for Canonical Correlation**

Multivariate Tests of Significance: S = 3, M = 0, N = 20

| Test Name | Value | Approx. | Hypoth. DF | Error DF | Sig. of F |
|-----------|-------|---------|------------|----------|-----------|
|-----------|-------|---------|------------|----------|-----------|



|            |          |          |       |        |       |
|------------|----------|----------|-------|--------|-------|
| Pillais    | 1.36733  | 9.21223  | 12.00 | 132.00 | 0.000 |
| Hotellings | 19.82581 | 6718747  | 12.00 | 122.00 | 0.000 |
| Wilks      | 0.03048  | 25.44730 | 12.00 | 111.41 | 0.000 |
| Roys       | 0.95065  |          |       |        |       |

Table 4.4 presents canonical coefficient for economic and social Services, the result indicates, a unit increase in the expenditure on health will leads to -0.00001 unit decrease in the first of the social service in the first canonical, similarly, a unit increase in the expenditure on construction will leads to -0.00001 unit decrease in the first canonical variate of the economic service.

**Table 4.4 Canonical Coefficient for Economic and Social Services**

| Coviates     | <u>Economic services</u> |         |         | Coviates   | <u>Social services</u> |         |         |
|--------------|--------------------------|---------|---------|------------|------------------------|---------|---------|
|              | 1                        | 2       | 3       |            | 1                      | 2       | 3       |
| Agriculture  | -.00001                  | .0001   | -.00009 | Education  | .00000                 | .00009  | -.00011 |
| Construction | -.00001                  | -.00002 | .00023  | Health     | -.00001                | -.00008 | .00022  |
| Transport    | -.00002                  | -.00001 | -.00012 | Other Soc. | -.00004                | -.00007 | -.00005 |
| Other econ.  | -.00002                  | -.00002 | -.00005 |            |                        |         |         |

Table 4.5 presents the standardized canonical coefficients, i.e. if the variables are rescaled to have a mean of zero and a standard deviation of 1, the coefficients generating the canonical variates would indicate how a unit standard deviation increase will change the variate. The relative size of these standardized canonical coefficient indicate the emphasis accorded to each variable in a set compared with other variables in canonical correlation table The result shows that; an increase of one standard deviation in Agriculture would lead to -0.06877 standard deviation decrease in the first variate of the economic service.  $R_{c_1}$ , between  $z_{x_1}$  and  $z_{y_1}$ , is the largest correlation between any pair of canonical variate and it is based on the sample data. Therefore the standardized canonical coefficient  $y_1$  of  $-.52706 z_{y_4}$  was accorded the highest emphasis, which implies that the highest government's expenditure was on the other economic services provided to the nation, followed by transport and communication with  $-.36210 z_{y_3}$ , then construction with  $-.09743 z_{y_2}$ , and finally, agriculture with  $-.06877 z_{y_1}$ .

For social service; an increase of one standard deviation in Health will lead to 0.06276 standard deviation decrease in the first variate of the social service. Therefore the standardized canonical coefficient  $X_1$  of  $-.80667 z_{x_3}$  implies that the highest Government's expenditure on other social services, followed by health with  $-.28484 z_{x_2}$  and finally education with  $0.06276 z_{x_1}$ .

**Table 4.5 Standardized Canonical Coefficient for Economic and Social Services**

| Coviates     | <u>Economic services</u> |         |         | Coviates   | <u>Social services</u> |          |          |
|--------------|--------------------------|---------|---------|------------|------------------------|----------|----------|
|              | 1                        | 2       | 3       |            | 1                      | 2        | 3        |
| Agriculture  | -.06877                  | 1.33768 | -1.2267 | Education  | .06276                 | 3.40452  | -4.36646 |
| Construction | -.09743                  | -.30088 | 4.10784 | Health     | -.28484                | -1.89034 | 5.34098  |
| Transport    | -.36210                  | -.17760 | -1.8078 | Other Soc. | -.80667                | -1.32086 | -.93679  |
| Other econ.  | -.52706                  | -.45097 | -1.4084 |            |                        |          |          |

Table 4.6 presents the structure vector for economic services which is the amount of variation accounted for at the first, second and third canonical variate in the Agriculture is 67%, 74%, and 4% respectively, in Construction is 96%, 18% and 22% respectively, in Transport and communication is 96%, 5% and 11% respectively and in Other economic service is 97%, 17% and 3% respectively.

For social services; the amount of the variation accounted for education are; 88%, 45% and 11% at the first, second and third canonical variate respectively, 90%, 36% and 27% for health and 99%, 91% and 8% for other social services.

The amount of the variation accounted for the first, second and third canonical variate in the education is 77%, 21% and 1% respectively, while in Health is 80%, 13% and 7% respectively and in Other social service is 98%, 00% and 00% respectively.

**Table 4.6 Structure Vector for Economic Service and Social services**

| Coviates     | <u>Economic services</u> |         |         | Coviates   | <u>Social services</u> |         |         |
|--------------|--------------------------|---------|---------|------------|------------------------|---------|---------|
|              | 1                        | 2       | 3       |            | 1                      | 2       | 3       |
| Agriculture  | -.67056                  | .74034  | .04468  | Education  | -.88193                | .45720  | .11478  |
| Construction | -.95712                  | .18644  | .21771  | Health     | -.89504                | .35785  | .26615  |
| Transport    | -.96334                  | .05032  | -.11375 | Other Soc. | -.99223                | -.09079 | -.08505 |
| Other econ.  | -.97107                  | -.16563 | .03208  |            |                        |         |         |

Table 4.7 presents the degree to which the canonical variates of both the dependent variables Economic Service and covariates Social Service can explain the standardized variability in the dependent variables. The result shows the 80.91%, 15.32% and 1.58% of the variation in the social variable was accounted for by the first, second and the third canonical variables of the

economic variables and also 85.44%, 11.51% and 3.04% of the variation in the economic variable was accounted for by the first, second and third canonical variables of the economic variables respectively.

Similarly; For the social services; the result shows the 81.23%, 3.49% and 0.34% of the variation in the social variable was accounted for by the first, second and the third canonical variables of the social variables respectively and also 85.44%, 11.51% and 3.04% of the variation in the economic variable was accounted for by the first, second and third canonical variables of the social variables respectively.

**Table 4.7 Redundancy Index for Economic and Social Service**

| Canonical Variance      | <u>Economic services</u> |         |         | <u>Social services</u> |         |         |
|-------------------------|--------------------------|---------|---------|------------------------|---------|---------|
|                         | 1                        | 2       | 3       | 1                      | 2       | 3       |
| Pct. Variance dep       | 80.9185                  | 15.3207 | 1.58412 | 81.2303                | 3.49422 | .34407  |
| Cumulative pct Dep      | 80.9185                  | 96.2392 | 97.8233 | 81.2303                | 84.7246 | 85.0686 |
| Pct Variance Covariate. | 76.9249                  | 4.65063 | 0.17920 | 85.4474                | 11.5111 | 3.04154 |
| Cumulative Pct COV      | 76.9249                  | 81.5756 | 81.7548 | 85.4474                | 96.9585 | 100.000 |

## 5.0 Conclusion and Recommendations

This study investigate the relationship between Nigeria Government's expenditure on economic and social services over the period of fifty-five (55) years (i.e. 1961 – 2016) using Canonical Correlation Analysis. The results from all the tests show that there exist a strong positive significant relationship between the economics and social service of the Nigeria Government recurrent expenditure.

It was also discovered that; Nigeria was retrogressing economically and socially because government placed more emphasis on other sectors that do not add much to the economic and social sectors of the country, because the finding discovered that; the highest government's expenditure was on the other economic and social services while Agriculture was the least in Government's expenditure for economics service and education was the least under social service, this findings were in agreement with Okoro [7] and Chude and Chude [8].

.Base on the findings in this study it is recommended that; Government should place more emphasis on education and more emphasis on Health. Government should also place more emphasis on Agriculture which will increase food production, raw materials and other agricultural produce, and will also provide more nutrition to its citizens and also serve as a

source of foreign exchange, this will help in the developing both the social and economic aspect of the economy.

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