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Determinant of Performance Efficiency in Non-Profit Organizations: Evidence from Nigerian Federal Universities

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Abstract
This study measured the performance efficiency of Nigerian non-profit making organizations with emphasis on federal universities and showed how some factors such as university funding, university assessment and ranking, university size, university technology status and university age are related to the performance efficiency of Nigerian federal universities. Data were collected from the National Universities Commission. Seventeen (17) federal universities out of a total of thirty-seven (37) were used in this study and there were selected based on their similarity of operations. The time frame for the study was 2006 – 2010. Regression results showed that funding, assessment and ranking, size and technology application were statistically but not significant in affecting the performance efficiency of non-profit making organizations in Nigeria. But, age was statistically significant in impacting the performance of federal universities in Nigeria. Finally, the study recommended that there is need for increased funding and monitoring of utilization of funds in federal universities, improved technology applications and infrastructural development in large and older universities in Nigeria, so as to improve their performance efficiency
Keywords: Non-profit organizations; Efficiency;Federal Universities

1.1 Introduction

Movements in the price of profit-making organization's stocks provide quick signals of how well a company is doing and allows unhappy investors to cast a vote of no confidence by selling their stocks. Although stakeholders of governmental and non-profit organizations have no comparable signals, their need for reliable, clear accounting information as a basis for making judgments about performance is even greater. This also justifies the need for and the relevance of a non-profit making organization performance measurement. (Anthony, 1995).

This systematic study will firstly involve performance measurement in federal universities with emphasis on how well financial and non-financial resources are efficiently utilized and then measure the directional impact of common industry factors such as funding, size, assessment and ranking, technology application and age on the performance efficiency of federal universities in Nigeria.

In line with the above, this study will help federal universities in Nigeria strengthen their outlook locally and even internationally by engaging in excellent performance management techniques such as carrying out performance evaluation and keeping stakeholders *properly* informed on how resources are managed and utilized. This will reflect commitment, professionalism and excellence.

Universities management will strategically focus attention on the determinants or factors that could improve their performance efficiency and competitiveness. For example, in this study, funding, technology application, age, size and ranking of federal universities are considered as factors that could influence the efficiencies of federal universities. Where a particular factor has been discovered to significantly or positively influence performance, then universities are advised to place emphasis on such a factor so as to improve their efficiency. This will reduce pressure on university administration.

Arising from these statements, the following research questions guided this study:

1. What type of relationship exists between funding and performance efficiency of Nigerian non-profit organizations?
2. How does assessment and ranking relate to the performance efficiency of Nigerian non-profit organizations?
3. What kind of relationship is there between size and the performance efficiency of Nigerian non-profit organizations?
4. What form of relationship does technology application have with the performance efficiency of Nigerian non-profit organizations?
5. What is the relationship between age and the performance efficiency of Nigerian non-profit organizations?

2.1 Literature Reviews

From the review of existing literature on federal universities which are non-profit organizations, the following gaps exist: most of the studies done in Nigeria involved measuring performance of staff (Popoola, Oyinloye & Oginni, 2011) or a particular section of university education for example webometric ranking (Utulu, 2007); no

study has been carried out to know the impact of some selected determinants (factors) on the performance efficiency of federal universities in Nigeria. That is determinants such as funding, assessment and ranking, size, technology application and age are yet to be researched upon to determine their effects on the performance efficiency of non-profit making organizations such as federal universities in Nigeria.

Following the above, the below section of this literature focus on the determinants of performance efficiency in the universities as a case of non-profit organization. Daghbashyan (2011), in his study on Swedish higher educational institutions, stated specific factors such as size, load, staff and student characteristics as well as government allocations (funding) to be the potential determinants of economic efficiency in higher institutions. In this study, we will examine how funding, technology status, age, size and ranking relate to their performance efficiencies.

2.1.1 Funding

Inadequate funding of public universities in Nigeria is a prime cause of other problems that have undermined quality in university education. The issue of poor funding has resulted in problems such as academic staff shortage, dearth of library books and journals, decline of reading culture among students, dilapidated buildings, obsolete equipment, the desire to obtain degrees by unorthodox means, and so on. The Nigerian university system lacks the financial resources to maintain educational quality because Nigeria's recent allocation for education diverges sharply from regional and international norms (Ayo-Sobowale and Akinyemi, 2011). In fact, Nigeria's funding efforts of education is low and its budgetary priority for the education sector is even lower.

The question, therefore, is "is funding related to performance in the educational sector?" According to Powell, Gilleland & Pearson (2012), there is insufficient research to determine if or how expenditures relate to quality outcomes. Bowen (1980) suggests that spending by higher educational institution is driven by the revenue theory of cost and proposed that educational costs per student are driven by the amount of revenue available that is, institutions raise as much revenue as possible and spend as much revenue as they are available. This is because institutions know little about the relationship between their expenditures and their educational outcomes.

This study measured non-profit organization's funding based on capital and recurrent grants from government.

2.1.2 Assessment and ranking

Uvah (2005) defines assessment as a programme of planned activities that includes tools and measurement devices which, when applied, evaluate student learning. Ranking, on the other hand, refers to the rating and ordering of higher educational institutions or programmes of study in a list that is based on different criteria which is also referred to as performance indicators. The main objective of ranking is to supply information to stakeholders, consumers and policy makers on measurable differences in the quality of service of several similar providers. Ranking of programmes, colleges and/or faculties therefore, provides information on the measurable quality of the programmes, colleges and faculties of a particular university relative to others (Uvah, 2005).

The importance of rankings seems to have grown exponentially (Rauhvargers, 2011).At the same time, the benefits of rankings are often stated especially, by ranking providers themselves. For example, rankings can inform a student's choice of an institution or promote a culture of transparency. Rankings strengthen competition among organizations and bring about policy change in organizations which strive to improve their status in the league tables. They provide simple and easily readable information and are, therefore, beginning to be used as a basis for funding allocations to universities as well as for developing national or higher educational policies. One problem of the negative impact of rankings is that both society and policy makers are tempted to judge all higher education in the world by the standards that ranking use to detect the top research universities. They do this rather than apply one of the core principles, of quality assurance — the 'fitness for purpose' principle (Uvah, 2005).

Ranking was measured based on popular ranking by NUC and other bodies and individuals. Those universities which are among the first 10 will be scored 1 while those which are not will be scored 0.

2.1.3 Size

Due to scale limitations, organizations face inefficiencies in the transformation of inputs into output. This gives rise to an unparalleled comparative disadvantage relative to those operating on larger scales (Winters and Alan, 2005). According to Kumar, Rajan and Zingales (2001), the determinants of the size of an organization (whether profit making or non-profit making) are output, value added and employees. The quantity of raw materials could serve as input and could also be used to determine the size of an organization. In a university setting, output can be referred to as the number of graduating students. Value added could mean the skills acquired by students during their stay in the institution and the number of undergraduate programmes or number of students admitted could serve as proxies for determining the size of a university. Employees of universities are the academic and non-academic staff. The inputs of universities are the students that have been admitted and are still in the system. Increase in the number of students in any institution will imply increase in revenue from payment of fees and dues which will increase the financial performance of the institution. Increase in financial performance will

ultimately lead to an increase in overall performance. On the other hand, increase in the number of students could bring about too much pressure on the available facilities in these institutions.

For the purpose of this study, the number of students admitted in these institutions will be used to determine the size of each university.

2.1.4 Technology application

Selected parameters for measuring the overall contributions of ICT to the university educational system in Nigeria are taken based on their support for quick access to information, improved response time, increased usefulness, greater reliability, availability and so on (Wescott, Pizarro & Schiaro-Campo, 2007; Okele, 1986). Such support could be in areas such as lecture delivery, private studies, information disseminations, programme (conferences and seminars) planning and execution, communication at different levels, and crises prevention and management. Iwasokun, et al (2012) reveal that ICT provides 'very good' support for students' course registration and processing of students' admission requests.

Technology status throughout the years under review was assigned scores between 0 and 2. Where 2 is high level technology, 1 is middle level technology while 0 is no technology.

2.1.5 Age

Aging is a process associated with a general decline in the physical functioning of the human body such as the ability to remember, react, move and hear. By analogy, organizations (in this case universities) weaken over time and lose their ability to compete (Loderer and Waelchli, 2009) and produce output. Age can have adverse effects on performance because of the organizational rigidities and inertia it brings about (Hannan and Freeman, 1984; Leonard-Barton, 1992) and because it impairs organizations' ability to perceive valuable signals. Loderer and Waelchi (2009) research on 10,930 listed organizations show that getting older slows down performance regardless of whether we measure the organisation' s age from the time of listing or the time of incorporation.

On the contrary, Jovanovic (1982); Ericson and Pakes (1995) and Arrow (1962) believe that age could actually help organizations became more efficient. Over time, organizations discover what they are good at and learn how to do things better.

3. Methods and Materials

This study adopted the ex post facto and longitudinal research design. The choice was premised on the non-controllability and non-manipulability of the independent variables which are non-profit making organization funding, assessment and ranking, size, technology application and age as well as the time frame of 2006 – 2010.

In this research, the population relates to all National Universities Commission (NUC) accredited federal universities in Nigeria (which are non-profit organizations). These federal universities are 37 (www.nuc.org.ng, 2012).

Following the above, the sample size for this study was drawn from the 37 federal universities in Nigeria which are presented in Appendix 1. In considering the sample size, Saunders, Lewis and Thornhill (2003) suggests that a minimum number of thirty (30) observations for statistical analyses provide a useful rule of thumb. Nevertheless, this study made use of 17 federal universities over a period of five years (2006-2010) which gives us 85 observations. 17 federal universities were used because the remaining 20 consists of specialized and new universities. For example, science and technology, agriculture, petroleum resources, defense academy, open university, police academy and the 9 new universities established in 2011 were exempted. These exemptions were made based on the fact that these specialized universities would differ from the universities used in the study in terms of structure, purpose, programmes and funding. The 9 new universities will not provide sufficient information for this study and they also do not fall within the period under study (2006-2010).

The 17 federal universities used in this study are University of Ibadan (IBADAN), University of Nigeria (NSUKKA), Obafemi Awolowo University (ILE-IFE), Ahmadu Bello University (ZARIA), University of Lagos (LAGOS), University of Benin (BENIN), Bayero University (KANO), University of Calabar (CALABAR), University of Ilorin (ILORIN), University of Jos (JOS), University of Maiduguri (MAIDUGURI), University of Sokoto (SOKOTO), University of Port Harcourt (P/HARCOURT), University of Abuja (ABUJA), Nnamdi Azikiwe University (AWKA), University of Uyo (UYO) and University of Bauchi (BAUCHI).

The data used for this study was gotten from a secondary source. The National Universities Commission (NUC) provided all the data used in this study. Visits were made to the NUC and the NUC website was also very useful in this study.

3.1 Model Specification

The study was subjected to two broad models categories. The first model focused on measuring non-profit making organization (federal universities) performance efficiency using DEA input-oriented CCR model, the second model examined how some factors could affect the generated DEA efficiency scores. The second model was based on the popular OLS multiple regression techniques and was decomposed into three based on the types of DEA efficiency scores generated . The following subsection provides detailed explanation of these two

models.

3.1.1 DEA input-oriented CCR model

The formulation developed by Charnes, Cooper and Rhodes (1978) uses linear programming to extend Farrell's (1957) single output/single input efficiency measures to the multi-output/multi input case. The focus is to optimize the ratio of outputs to inputs by solving for a group of weights that satisfy a system of linear equations (Rouse, 1997).

Maximize $Ø_i$

$Ø_i\lambda_j$ …… (1)

Subject to:

$Ø_i y_{rj} \geq \sum_{j=1}^{n} \lambda_{rj} + S_{ri} = 0$ …… (2)

r = 1, … s output of federal universities

$x_{ki} \geq \sum_{j=1}^{n} \lambda_j x_{kj} - e_{ki} = 0$ …… (3)

k =1, …, m input of federal universities

$\lambda_j \geq 0, S_{ri} \geq 0, e_{ki} \geq 0$ …… (4)

i,j = 1,…. n federal universities in the sample

where:

$Ø$ = proportional increase in outputs possible:

S_r = r-th output slack;

e_k, = k-th input slack;

λ_j = weight or intensity variable used to derive all possible linear combinations of the sample observations.

When the value of $Ø_i$, in equation (1) is 1,

$\lambda_i = 1$, and

$\lambda_i = 0$ for $j \neq i$,

the i-th federal university lies on the frontier and is technically efficient.

Furthermore, input and output slacks will always be zero for the efficient federal universities. For the inefficient universities, $Ø_i > 1$, $\lambda_i = 0$, and $\lambda_j \neq 0$ for $j \neq I$, where j denotes the efficient federal universities in the sample. Inefficient federal universities may also have some positive output or/and input slacks. The output based technical efficiency index of the i-th federal universities (Te_j) can be computed as follows:

$$Te_j = 1 - \frac{1}{Ø_i} \quad \text{……. (5)}$$

The frontier production of the r-th output of the i-th federal university can be computed as follows:

$$y_{rj} \geq \sum_{j=1}^{n} \lambda_{rj} y_{ri} \geq Ø_i y_{ri} + S_{ri} \quad \text{…… (6)}$$

Equation (6) shows that the projected output consists of two components, one representing the proportional increase in all output ($Ø_i y_{ri}$) and the other accounting for the non-proportional increase or output slack (S_{ri}). Besides estimating the maximum output from fixed inputs, the output-oriented DEA in equation (1) also estimates the input slacks (excess inputs) that need to be conserved for an inefficient federal university to be fully efficient. Mathematically, the projected amount of the k-th resource of the i-th federal university (x_{ki}) can be expressed as follows:

$$x_{ki} \geq \sum_{j=1}^{n} \lambda_j x_{kj} \geq x_{ri} - e_{ki} \quad \text{…… (7)}$$

k = 1, … m input

It should be noted that the federal universities DEA model given in equation (1) implies the constant returns to scale (CRS) technology. Following Banker, Charnes, and Cooper (1984), the corresponding model under variable returns to the scale (VRS) can be obtained by imposing an additional constraint, $\sum_{j=1}^{n} \lambda_j = 1$ on equation (3). The technical efficiency score obtained from the CRS model (TE_{CRS}) is often referred to as "overall" technical efficiency and that obtained from the VRS model is called "pure" technical efficiency (TE_{VRS}). The VRS frontier is more flexible and envelops the data in a tighter way than the CRS frontier. Under the VRS specification, dominance is weaker in the sense that a scale inefficient federal university may qualify as a 'best-practice' if it is technically efficient. Consequently, in general, federal universities will show a poorer

performance under the CRS model than in the VRS model (i.e., $TE_{VRS} \geq TE_{CRS} \Leftrightarrow \emptyset_{CRS} \geq \emptyset_{VRS}$). This relationship is often used to obtain a measure of scale efficiency (SE) as follows:

$$SE = \frac{Te_{CRS}}{Te_{VRS}} = \frac{\emptyset_{VRS}}{\emptyset_{CRS}} \quad \ldots\ldots\ldots\ldots\ldots (8)$$

where SE = 1 indicates scale efficiency and SE < 1 indicates output-based scale inefficiency. Scale inefficiency is due to the presence of either increasing (IRS) or decreasing returns to scale (DRS) which can be determined by solving a non-increasing returns to scale (NIRS) DEA model which is obtained by substituting the VRS constraint $\Sigma_{j=1} \lambda_j = 1$ with $\Sigma_{j=1} \lambda_j \leq 1$.

Let $\emptyset_{NIRS}$ represent the proportional increase in all outputs under the NIRS DEA model. For scale inefficient observations, $\emptyset_{CRS} = \emptyset_{NIRS}$ indicates inefficiently small scale or operation in the region of increasing returns to scale and $\emptyset_{CRS} = \emptyset_{NIRS}$ indicates inefficiency large scale or decreasing returns to scale (Fare, Grosskopf and Lovell, 1994).

This study made use of six inputs and four outputs to measure the relative performance efficiency of the selected 17 federal universities in Nigeria.

UNIVERSITY INPUT	UNIVERSITY OUTPUT
Number of academic staff; Number of non-academic staff; Number of admitted undergraduate students; Number of admitted postgraduate students; Capital Grants; Recurrent Grants.	Number of graduating undergraduate students; Number of graduating Postgraduate Diploma students; Number of graduating Masters students; Number of graduating Doctorate students.

3.1.2 Regression model

Following the review of literature, the stated research hypotheses were analysed using the regression models below to evaluate the extent and directional impact of funding, size, ranking, age and technological status on three generated DEA performance efficiency scores;

MODEL 1:

$$CRS\text{-}EFFICIENCY_i = \beta_0 + \beta_1 FUNDING_i + \beta_2 RATING_i + \beta_3 SIZE_i + \beta_4 TECHNOLOGY_i + \beta_5 AGE_i + \varepsilon i_1 \ldots(9)$$

MODEL 2:

$$VRS\text{-}EFFICIENCY_i = \partial_0 + \partial_1 FUNDING_i + \partial_2 RATING_i + \partial_3 SIZE_i + \partial_4 TECHNOLOGY_i + \partial_5 AGE_i + \varepsilon i_2 \ldots(10)$$

MODEL 3:

$$SCALE\text{-}EFFICIENCY_i = \eta_0 + \eta_1 FUNDING_i + \eta_2 RANKING_i + \eta_3 SIZE_i + \eta_4 TECHNOLOGY_i + \eta_5 AGE_i + \varepsilon i_3 \ldots(11)$$

Where

CRS-EFFICIENCY = the efficiency score based on the Constant Return to Scale
VRS-EFFICIENCY = the efficiency score based on the Variable Return to Scale
SCALE-EFFICIENCY = the efficiency score based on the ratio between the CRS and the VRS
FUNDING= Funding of universities
RANKING = University assessment and ranking
SIZE = University size
TECHNOLOGY = University technology status
AGE = University age

The study made use of data analyses techniques such as the DEA, descriptive statistics, Correlation matrix and OLS multiple regression. In this study, the performance efficiency scores of federal universities was computed by the DEA and the DEA Frontier Software was used to perform the calculation. The multiple OLS regression analysis was used to examine the causal relationship between the dependent variable (DEA efficiency scores of the public universities) and the predictor variables which can be either quantitative or qualitative. The OLS cross-section regression is based on the assumption of linearity, normality and homoskedaticity. The choice of OLS regression models is based on the non-restricted nature of the dependent variables.

Finally, the data collected and the DEA scores generated were subjected to descriptive statistical analyses, correlation matrix, regression and other diagnostic tests using EViews 7.0.

4.0 Results and Discussion

This study measured and examined the determinants of performance efficiency of Nigerian federal universities (which are non-profit organizations) over a period of five years (2006-2010). The choice of these federal universities is based on the availability of data compared to other non-profit making organizations and the need to avoid comparability problems that may arise due to difference in state, private, open and technology based

universities. The federal universities in Nigeria run almost similar faculties, experience similar funding problems and also have similar structure; therefore comparing their efficiency performance relatively would be more reliable than comparing all universities in Nigeria. In measuring the federal universities efficiency score and in identifying how the selected determinant relates to their efficiency score, the study conducted DEA analysis, descriptive statistics, correlation matrix and pooled regressions analysis.

Added to the above, in the DEA model is the input (*number of academic staff, non-academic staff, undergraduate enrolment, Postgraduate enrolment, recurrent grants and capital grants*) and the output (*Graduating undergraduate, postgraduate diploma, master and PhD degree students*). This study clearly shows that the focus is on the performance efficiency of Nigerian federal universities in terms of how well the universities can convert the above specific input into output. The choice of the above inputs and outputs was based on the assumptions that they are data that are readily available for all Nigerian federal universities.

In the light of the above, it was difficult to ascertain the efficiency of these Nigerian federal universities in terms how well they have used their sets of input to generate sets of outputs. This single problem necessitated the need for DEA analysis since simple output to input ratios statistics cannot show their relative performance in the context of weighted inputs and outputs.

The performance efficiency scores that were generated from the DEA methodology was based on the three efficiency measures; (1) **DEA Overall technical efficiency score (CRS):** This was obtained when the study assumed a constant return to scale for all the federal universities. This implies increase in university input by 1% would lead to a corresponding 1% increase in its output. This did not consider university management skill in converting small inputs to large outputs. (2) **DEA Pure technical efficiency score (VRS):** This was obtained when the study assumed a variable return to scale for all the universities. This implies increase in university input by 1% would lead to more than 1% increase in its output. This focus on measuring the extent to which management accounting skill was relevant in converting small inputs to large outputs and (3) **Scale efficiency score (SCALE):** This is the ratio of constant return to scale to variable return to scale (CRSE/VRSE). In all three measures of efficiency the rule is that a university is classified as efficient when it has a score of "1" and inefficient when it has a score less than 1.

In line with the discussion above, the results obtained are analyzed and presented below; firstly the study presented the DEA analysis for CRS, VRS and SCALE efficiency. Secondly, the study provided the descriptive statistics and correlation matrix and finally presented and analyzed the pooled regression results.

Before analyzing the pooled regression results, the study provided a descriptive statistics of the variables. The variable for this study include three dependent variables which are the efficiency scores of the universities (CRS efficiency, VRS efficiency and SCALE efficiency). The independent variables - University funding (FUNDING), University Technology profile (TECHNOLOGY), University ranking (RANKING), University Age (AGE) and University Size (SIZE). Below is the mean and standard deviation descriptive statistics for the 85 observations from pooling the 17 selected federal universities over a five years period.

TABLE 4.1: DESCRIPTIVE STATISTICS.

Variables	Mean	Std.Dev
CRSEFFICIENCY (Y1)	0.84	0.20
VRSEFFICIENCY(Y2)	0.94	0.11
SCALEEFFICIENCY(Y3)	0.89	0.19
FUNDING(X1)	1,500,000,000	91,000,000
TECHNOLOGY(X2)	0.76	0.37
RANKING(X3)	0.52	0.50
AGE(X4)	38	11.86
SIZE(X5)	2,104	9722.8
N	160	160

Table 4.1, shows the mean (average) for each of the variable and their standard deviation (degree of dispersion). The results in Table 4.1, provides some insight into the nature of the selected universities that was used in this study. Firstly, the large standard deviation of University size (SIZE=9722.8) shows that the sampled federal universities is not dominated by either large or small universities. Secondly, it was also observed that about 52% of the sampled federal universities have been on NUC top ten rating. Thirdly, we also find out that; about 76% of the universities selected had claims for average ICT applications while the average funding of Nigerian universities stood at N1.5billion. Fourthly, there was also evidence from the efficiency scores that most federal universities in Nigeria are on the average utilizing their limited resources to produce graduate output.

In examining the relationship among the variables we employed the Pearson correlation coefficients (correlation matrix) and the results are presented in Table 4.1.

TABLE 4.2: CORRELATION MATRIX

	CRSEFF	*VRSEFF*	*SCALEEFF*	*AGE*	*SIZE*	*FUNDING*	*TECHNOLOGY*	*NUCRATING*
CRSEFFICENCY	1.00	0.51	0.84	-0.40	0.09	-0.23	-0.50	-0.51
VRSEFFICIENCY	0.51	1.00	-0.02	-0.47	-0.23	-0.14	-0.36	-0.45
SCALEEFFICIENCY	0.84	-0.02	1.00	-0.16	0.26	-0.17	-0.37	-0.31

SOURCE: AUTHOR (2013)

In Table 4.2, the study focused on the correlation between the three dependent variables and the explanatory variables. Firstly, our results show that the three measures of performance efficiency (CRS, VRS and SCALE efficiency) are not strongly related. This means they represent different measures of performance efficiency and further justified our decomposition of efficiency scores measurement into three in this study. The correlation result shows that performance efficiency scores based on CRS assumption was negatively associated with university Funding (-0.23), technology (-0.50), ranking (-0.51) and Age (-0.40) but weakly and positively related to University size (0.09). In the case of performance efficiency scores based on VRS assumption, we observed that the performances scores were negatively associated with university Funding (-0.14), technology (-0.36), ranking (-0.45), Age (-0.47) and size (-0.23). On the basis of SCALE assumptions, we observed that the performances scores were negatively associated with university Funding (-0.17), technology (-0.37), ranking (-0.31), Age (-0.16) and positively related to size (0.26). A close look at the value of the Pearson correlation coefficient results revealed that none of the variables is strongly associated with any of the three measures of performance efficiency scores for the sampled Nigeria federal universities. These correlation results are not necessary for our hypotheses testing since they only measure association and not causality (impact). The full correlation matrix also revealed that no two explanatory variables were perfectly correlated. This means that there is the absence of perfect multicolinearity problem in our regression models.

However, to examine the causal (cause and effect) relationship between the dependent variable and independent variables and to test our formulated hypotheses we used pooled regression analysis since correlation cannot reveal how the independent variables affects the efficiency scores. The pooled regression results obtained are presented in Table 4.3.

Table 4.3: Pooled regression results

	Expected Sign	**CRS EFFICIENCY Model 1**	**VRS EFFICIENCY Model 2**	**SCALE EFFICIENCY Model 3**
C		1.004 (8.5)*	1.14 (20.3)*	0.86 (7.9)*
FUNDING	+	3.02E (0.12)	2.25E (1.51)	-1.57E (-0.60)
RANKING	+	-0.07 (-0.84)	-0.010 (-0.2)	-0.07 (-0.89)
SIZE	+	3.89E (1.4)	-1.83E (-1.4)	6.04E (2.73)*
TECHNOLOGY	+	-0.09 (-2.02)*	-0.04 (-1.64)	-0.06 (-1.5)
AGE	+	-0.004 (-1.2)*	-0.004 (-2.99)*	0.0004 (0.14)
R-Squared		0.36	0.32	0.24
Adj-R squared		0.30	0.26	0.18
F-Statistic		6.86(0.00)	5.73(0.00)	3.92(0.00)
Durbin Watson		1.9	1.8	1.9
N		85	85	85

Note: (1) Parentheses ( ) are t-statistic
(2) * 5% level of significance respective

Regression equations:

$CRS\text{-}EFFICIENCY_i = \beta_0 + \beta_1 FUNDING_i + \beta_2 RANKING_i + \beta_3 SIZE_i + \beta_4 TECHNOLOGY_i + \beta_5 AGE_i + \varepsilon i_1$

$VRS\text{-}EFFICIENCY_i = \partial_0 + \partial_1 FUNDING_i + \partial_2 RANKING_i + \partial_3 SIZE_i + \partial_4 TECHNOLOGY_i + \partial_5 AGE_i + \varepsilon i_2$

$SCALE\text{-}EFFICIENCY_i = \eta_0 + \eta_1 FUNDING_i + \eta_2 RANKING_i + \eta_3 SIZE_i + \eta_4 TECHNOLOGY_i + \eta_5 AGE_i + \varepsilon i_3$

This study adopted the three measures of performance efficiency in our regression analysis. The

difference in these models is based on the type of assumption of the dependent variables in measuring efficiency scores.

From the pooled regression result, 30% of the systematic variation in the dependent variable CRS were accounted for by the independent variables used in this study. The fitness of the model is confirmed by the F-statistics of 6.86. Meanwhile, results further indicate that out of the variables used in this study, TECHNOLOGY and AGE were negatively related and statistically significant to the CRS efficiency score indicating that TECHNOLOGY and AGE accounted for decreased CRS efficiency. Variables such as FUNDING, RANKING and SIZE were statistically insignificant to CRS; while FUNDING and SIZE were positively related to CRS efficiency, RANKING was negatively related but statistically insignificant. These suggest that RANKING, TECHNOLOGY and AGE do not have any positive impact on CRS efficiency.

26% of the systematic variation in the dependent variable VRS were accounted for by the independent variables used in this study. The fitness of the model is confirmed by the F-statistics of 5.73. Results indicate that only FUNDING was positively but not significantly related to the VRS efficiency while RANKING, SIZE, TECHNOLOGY and AGE were negatively related though only AGE was statistically significant. These results indicate that RANKING, SIZE, TECHNOLOGY and AGE do not have any positive impact on VRS efficiency.

The regression results also revealed that 18% of the systematic variation in the dependent variable is accounted for by the independent variables. The fitness of the model is confirmed by the F-statistics of 3.92. results further indicate that FUNDING, RANKING and TECHNOLOGY were negatively related to SCALE efficiency; while SIZE was positively related to SCALE efficiency and statistically significant, AGE was positively related but not statistically significant.

The F-value statistic for all three models revealed that they were all statistically significant and valid in explaining the efficiency scores of the selected Nigerian federal universities. The reported results of all three Pooled regression models were based on heteroskedasticity-consistent standard errors and covariance, so as to avoid the problem of heteroskedaticity.

Funding appears to be a positively but not significantly related to performance efficiency of the selected federal universities over the period of study for all models except for SCALE efficiency. This result necessitates our acceptance of the first hypothesis, which suggests that funding has no significant relationship with the performance efficiency of Nigerian non-profit organizations.

Assessment and ranking appears to be negatively and not significantly related to performance efficiency of the selected federal universities over the period of study for all models. This result supports the second hypothesis which suggests that ranking has no significant relationship with the performance efficiency of Nigerian non-profit organizations.

Size appears to be positively related to performance efficiency of the selected federal universities over the period of study for all models except for the VRS efficiency performance model. The positive relationship was only significant with the SCALE efficiency model. This result therefore provides some evidence to accept the third hypothesis since CRS and VRS results were not significant, which suggests that size has no significant relationship with the performance efficiency of Nigerian non-profit organizations.

Technology Application appears to be negatively related to performance efficiency of the selected federal universities over the period of study for all models. Technology application was significant with the CRS model. These results therefore necessitate our acceptance of the fourth hypothesis which suggests that technology application has no significant relationship with the performance efficiency of Nigerian non-profit organizations since results show that VRS and SCALE efficiency were statistically not significant. .

Age appears to be negatively related to the performance efficiency of the selected federal universities over the period of study for all models and statistically significant for all models except for SCALE efficiency. This study therefore rejects the fifth hypothesis that states that age is not significantly related to the performance efficiency of Nigerian non-profit organizations.

5.0 Conclusion and Recommendations

This study was designed to measure the performance efficiency scores of non-profit making organizations. 17 federal universities were chosen over a period of five years (2006-2010). This study also sought to determine what kind of relationship exists between performance determinants such as funding, size, ranking, technology application and age and the three performance efficiency scores generated by the DEA (CRS, VRS and SCALE). Based on the findings it is therefore concluded that though the efficiency of Nigerian federal universities is negatively related to rating, technology application and age while the efficiency of Nigerian federal universities is positively related to funding and size; funding, assessment and ranking, size and technology application do not have any significant relationship with the performance efficiency of non-profit making organizations while age has a significant relationship with the performance efficiency of Nigerian non-profit making organizations, the Nigerian university system may not be suffering from funding and human resources problem as such but lacks close monitoring of activities and constant performance efficiency measurements to ensure proper utilization of

resources.

In the light of the above findings, it was recommended that:

1. Technology providers and university administration should ensure that any technology provided is user-friendly and meets the demands of students.
2. Funds should not just be released to universities, but there should be checks and control on the use of such funds.
3. Older universities should ensure wake up to the clarion call for efficient utilization of resources. Ideas should be borrowed from newer universities.

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