

The Interactive Effect Of Finance (Funding) And Academic Staff (Human Resources) On Economies Of Scale In Nigerian Universities

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ABSTRACT:

The study examines the effect of finance and Human resource (academic staff) on Nigerian Higher Education enrolment and economies of scale (from economics perspective). Over the years, the problem of inadequate finance (underfunding) for education had been generating a lot of strife between Academic Staff Union of Universities (ASUU) and Nigerian government. The privatisation of the Nigerian university system was a step geared toward solving problems facing the university system due to increasing enrolment. The privatisation increased enrolment and number of universities but despite the increase in enrolment the new Private Universities(41) which outnumbered the Federal(27) and State(36) Universities have less enrolment than those Public Universities. Also, the average enrolment per university shows the enrolment figures were small on the average, ranging between 4,094 and 13,018 compared with University College London which had 21,620 students in 2009 (with 4000 academic staff and 648 Professors) and was ranked the 4th university in the world (2nd in Europe) in 2010 world universities ranking (Wikipedia). Thus, Nigeria could not enjoy economies of scale despite the increase in number of universities. If Nigeria will enjoy economies of scale the enrolment must be increased but the facilities on ground could not allow for it. As Nigeria budgetary allocation to education did not meet the UNESCO recommended 26% of budgetary allocation, the apparent shortage of finance available to the university system has been responsible for shortage of all resources. The results revealed that the interactive effect had very important impact on enrolment in Nigerian Universities. The study therefore gave some recommendations for improvement.

Keywords: finance, Academic-staff, Universities, enrolment, economies- of-scale

1. INTRODUCTION

Finance is a branch of economics concerned with resource allocation as well as resource management, acquisition and investment. Simply, finance deals with matters related to money and the investment market, while financing is the obtaining of funds or capital

The university system provides the much needed human resources for the accelerated growth and development of a country (Abdulkareem;2001). The belief in the efficacy of education as a powerful instrument of development has led many nations to commit much of their wealth to the establishment of educational institutions at various levels. Until 1999, the establishment, ownership, management and funding of universities in Nigeria remained the exclusive reserve of federal, regional and state governments until 1999 when private sector was allowed(Akpotu and Akpochafo,

2009). In the last thirty years the demand for university education had increased astronomically, resulting in a very high percentage of unsatisfied demand every year. The supply of university education in Nigeria however, has always been limited by the finance the owners (governments) have been willing and able to give to the universities as grants. In developed countries, the shift in higher education is reflected in direct public expenditure on higher education institutions whereas in developing countries like Nigeria it is not usually so (Fabiya & Uzoka, 2009). So, over the years, the problem of inadequate finance (underfunding) of education had been generating a lot of strife between the Academic Staff Union of Universities (ASUU) and the Nigerian government.

The privatisation of the Nigerian university system was a step geared toward solving problems facing the university system due to increasing enrolment. In contrast, the

increasing demand for university education remained unmet as less than 40% of candidates seeking university admission were admitted (ERC, 2006). This has called for this study to examine the effect of finance and Human resource (academic staff) on Nigerian Higher Education enrolment and from economics side: economics of production. (Economies of scale)

Human resource (HR) is crucial but needs adequate funding to get the needed quantity, quality and mix. Therefore staffing and funding go hand in hand. So, the problem for human resource managers in the university system is issue of meeting the HR mix due to inadequate fund. Therefore, most of the earlier research works on Nigerian Universities by, Nwadiani and Akpotu (2002), Akutson (2005), Ajayi and Ekundayo (2007) were on the identified problems which were treated in isolation. This study therefore, tries to knit the two critical variables (funding and human resource) together and examine their interactive effect on enrolment trend and economics of production (economies of scale).

Hence, this study provides answers to the following **questions**: What are the relative and the joint effects of funding and human resource on the enrolment trend in the Nigerian university system? And how is finance affecting the economics of production (Economies of scale) with the expansion in the Nigerian university system?

The specific **objectives** are to: highlight the trends of enrolment, staffing and funding in Nigerian universities; assess the joint and relative effects of funding and human resource (academic staff) on the **Economies of Scale** with enrolment trend as an example in the Nigerian university system and examine the economic effects of the conditions in Nigerian universities on economies of scale in the system?

The study covered a period of thirty years from 1980 to 2010. This period was selected because it covered the changes in the Nigerian University system and the year 2010 marked a decade after the privatisation of universities.

2. LITERATURE REVIEW:

(a). CONCEPTUAL CLARIFICATION

Human resource is used to describe the labour force or that portion of a nation's population which is capable of engaging in productive employment. This is in line with the definition by Tracey (2004) who defined Human Resources as the people that staff and operate an organization as contrasted with the financial and material resources of an organisation. The various definitions revealed human resource as a modern concept that could be applied to staff, workers, manpower and what economists referred to as 'labour' which is one of the factors of production.

According to Jones and Creese (2000), the workforce or human resource of a university consisted of very large group (academics) who carry out the core work of teaching and research, plus many smaller groups (non-academics) who carry out the range of corporate and support functions needed for the core work to continue labelled, 'the general staff'. This study is using only the academic staff.

Finance: Finance is defined in numerous ways by different groups of people.

From Wikipedia, the free encyclopedia: **Finance** is a field that deals with the allocation of assets and liabilities over time under conditions of certainty and uncertainty. Finance also applies and uses the theories of economics at some level. Finance can also be defined as the science of money while **financing** is the act of providing money for a project

Economies of Scale: The cost advantage that arises with increased output of a product. The simple meaning of economies of scale is doing things more efficiently with increasing size or speed of operation (Silvestre, 1987). Economies of scale arise because of the inverse relationship between the quantity produced and per-unit fixed costs; i.e. the greater the quantity of a good produced, the lower the per-unit fixed cost because these costs are shared over a larger number of goods. Economies of scale may also reduce variable costs per unit because of operational efficiencies and synergies (Gelles, 1996). The exploitation of economies of scale helps explain why

companies grow large in some industries (Silvestre, 1987). Economies of scale can arise in several areas within a large enterprise like expansion in Nigeria university system admission could increase so that cost per unit will equally reduce. While the benefits of this concept in areas such as production and purchasing are obvious, economies of scale can also impact areas like finance (Gelles, 1996). Joe (2007) refers to Economies of scale as the decrease in the long run average cost of a firm as production capacity is expanded in the long run.

(b). Funding or Finance situation in Nigerian Universities

Ekundayo and Ajayi (2009) identified inadequate funding as the major challenge facing the management of university system in Nigeria. Meanwhile, Ajayi and Ayodele (2002) argued that there was an increase in the proportion of total expenditure devoted to education, but this had been considered to be rather grossly inadequate considering the phenomenal increase in student enrolment and increasing cost, which had been aggravated by inflation. They further confirmed that when the first generation universities were well-funded in the 1970s, it helped the 6 universities to maintain international reputation. Reports from the University of Ibadan were also discouraging: "everything in the University today points to an agonizing decline" (Abebe, 2001).

Also, Ajayi and Ekundayo (2006) remarked that the Nigerian government over the years had not been meeting the United Nations Educational Scientific and Cultural Organisation (UNESCO) recommendation of 26% of the total budget allocation to education sector. Aina (2007) posited that government priority to education was still very low. The apparent shortage of fund available to the university system had been responsible for declining library, social and laboratory facilities in Nigerian Universities in recent years thereby making the governance of the university system a huge task (Ajayi and Ekundayo, 2006).

Ekundayo and Ajayi (2009) were bothered about the deteriorated infrastructure which was leading to fast

decaying of Nigerian Universities as almost all the resources required for education production process were in short supply. Lecture halls, laboratories, students' hostels, library space, books and journals and office spaces are all grossly inadequate. Moreover, according to the NUC (2004), the Presidential Visitation Panels which looked into the operations of all federal universities between 1999 and 2003 reported that physical facilities in the universities were in deplorable condition. Meanwhile, this condition of resource inadequacy was described as an offshoot of endemic financial crises in the sector (Ajayi & Ayodele, 2002).

(C) Sources of University Finance in Nigeria:

Aina (2002) identified under-funding and over-reliance on government funds as major problems in university governance in Nigeria using descriptive analysis. The study argued that the effects of inadequate funding on teaching and research had forced the Nigerian Universities to embark on income generating projects in order to source more funds. The paper identified the major sources of university revenues as grants from government, internally generated funds (incomes from investment and endowment/ gifts) and grants from sources outside usually for specific research and development projects.

Aina (2002) further indicated that the government funds allocation to universities when it was based on student enrolment, forced many universities to increase enrolment figures to qualify for more funds making many Nigerian Universities to be over-crowded yet with dwindling structural facilities.

Theoretical Framework: The study is based on production theory involving input and output. The inputs are the physical, human and financial resources while the outputs are the students referred to as enrolment.

3. METHODOLOGY

The research techniques used to achieve the objectives of this study were a combination of both descriptive and quantitative analyses. The descriptive analysis involved the use of secondary data obtained from National Universities

Commission (NUC), published documents of the National Bureau of Statistics (NBS) and the internet facilities. It is an empirical research.

The quantitative aspect of the study involved interactive or stepwise regression analysis of time series data of Nigerian Universities. It was meant to find out the interactive effect of funding and human resource on enrolment in Nigerian Universities over the study period. For the purpose of this study, the basic variables were human resources (HR) considering the academic staff (L_1) alone, financial capital or funding for universities (K) taken to be the addition of capital and recurrent fund allocated to the University system and enrolment (E) used as the number of students (students' population) being the potential output within the university system.

The interactive effect of funding and academic staff (human resource) was confirmed using linear interactive regression based on equations 1 and 2. An "interaction variable" (KL) was constructed from an original set of variables to represent the interaction present in this situation where there were two independent variables, funding (K) and academic staff (L_1) with enrolment (enr) as the dependent variable and *additive* model comprising enr, interactive variable and the two variables K and L_1 were used .

$$Enr = C + \beta K + \alpha L_1 + \varepsilon \text{ -----(1)}$$

$$Enr = c + \beta K + \alpha L_1 + b(KL) + \varepsilon \text{ -----(2)}$$

Equation (2) is the model with an *interaction* between variables K and L_1 meaning the effects of k depend on L_1 , that is, k vary with, the value of L_1 (ε is the error term). B measured the partial elasticity of output with respect to

capital. α , b and β measured the responsiveness of the dependent variable (students' enrolment) to change in the quantity of academic staff, non-academic staff and funding. The intercept C was the predicted enrolment for the non-existence of funding and academic staff which was not relevant to the analysis here as no university could operate such.

In an interactive model, interactive effect suggests that the effect of variable K on Enr depends on L_1 which logically implied that K had different effects on Enr, depending on the specific values of L_1 . In the interactive case, the effects of K on Enr are therefore not a single constant, like the coefficient is in the simple linear additive model but instead; the effects of K on L_1 varied depending on the coefficients of K and KL, as well as the value of L_1 . The coefficient of K is just one effect K may have at $L_1=0$, it therefore indicated the estimated effect of a unit change in K, holding L_1 fixed at zero. Since L_1 could not be zero in any university, coefficient could not be used to interpret interactive effect in this case.

In accordance with Hatice and Bent (2010), this study used *F*-statistics and first derivatives to examine the interaction. When using *F*-test, the condition that would render K and L_1 wholly irrelevant to Enr would be when all three coefficients involved in the interaction, were zero. However, high value of *F*-statistic would suggest a significant relationship between the dependent and the independent variables.

The unit root test was carried out on all the variables to test for their stationarity and determine their order of integration. This is because the presence of non-stationary in particular can often lead to spurious or unacceptable results.

4. PRESENTATION OF RESULT: (a)Quantitative Analysis of Data

Table1.1: Number of Universities and Human Resource trends in Nigerian Universities

Academic Session	Universities		Academic (L1)		Enrolment		Average Enrolment per University
	Number	Growth rate	Number	Growth rate	Number	Growth rate	
1980/81	19	4.7	6,666	6.4	77,791	8.7	4,094
1981/82	23		8,470		90,751		3,946
1982/83	24		8,736		104,774		4,366
1983/84	24		9,785		116,822		4,868
1984/85	25		10,038		126,285		5,051
1985/86	25		11,016		135,783		5,431
1986/87	25		11,237		159,394		6,376
1987/88	29		11,521		160,767		5,544
1988/89	29		12,118		174,133		6,005
1989/90	30		12,362		179,488		5,983
1990/91	31	3.8	13,645	3.5	200,774	8.4	6,477
1991/92	36		12,927		232,482		6,458
1992/93	36		13,815		264,684		7,352
1993/94	36		14,712		292,097		8,114
1994/95	36		14,712		222,517		6,181
1995/96	36		15,509		335,790		9,328
1996/97	36		16,297		345,699		9,603
1997/98	36		16,624		376,494		10,458
1998/99	41		17,478		399,812		9,752
1999/2000	45		19,309		448,230		9,961
2000/01	46	9.5	18,867	4.6	481,800	10.7	10,474
2001/02	52		18,426		518,000		10,163
2002/03	53		22,046		627,609		11,842
2003/04	56		23,359		728,980		13,018
2004/05	75		27,482		758,354		10,111
2005/06	80		27,384		807,686		10,096
2006/07	91		27,394		1,096,312		12,047
2007/08	94		30,817		942,541		10,027
2008/09	104		30,309		1,200,000		11,538

Source: Prepared from NUC (2010) University Statistics

Table 1.2: Average Total Enrolments in Nigerian Universities by Ownership (Proprietorships and Student Populations)

Year	Federal(27) %		State(36) %		Private(41) %		Total
1980-89	107,204	84.2	20,185	15.8	-	-	127,389
1990-1999	215,102	75.5	69,882	24.5	-	-	284,984
2000-09	458,093	60.2	277,747	36.5	25,111	3.3	760,951

Source: Compiled from NUC, (2010) University statistics

Table 2.1: Finance of Education as a Percentage of Federal Government Expenditure: 1992 to 2010

YEAR	Allocation to Education as % of Total Budget
1992	6.3
1993	7.3
1994	14.9
1995	13.0
1996	10.8
1997	11.6
1998	10.3
1999	11.12
2000	8.36
2001	7.0
2002	5.9
2003	1.83
2004	10.5
2008	5.7
2009/10	6.3

Source: Akpotu & Akpochafo (2009), Ote et al (2009) & Hassan & Chiinedu (2010)

Table 2.3: Funding of Nigerian Universities (Growth Rate)

Academic Session	Funding in Millior ₦	Annual growth Rate (%)	Funding in ₦	Annual growth Rate (%)
	Nominal Value		Real Value	
1980-89	525.70	5.3	6,606,575	-12.62
1990-99	4,443.19	30.2	3,600,258	2.06
2000-09	53,826.42	13.5	9,636,046	4.87

Source: Produced from NUC (2010) University Statistics

- The Real values are obtained by deflating the nominal value by the composite Consumer Price index (1985=100) from Central Bank Statistical Bulletin

(b) Descriptive Analysis of Resource Trends and Effects on Enrolment and Economies of Scale

The literature review confirms the funding problem in Nigerian Universities. The privatisation of the Nigerian university system was a step geared toward solving problems of providing needed resources and the enrolment through expansion of the university system from 19 universities in 1980/81 to 104 at the end of 2008/2009(Table1.1). The rapid expansion has greatly increased students enrolments in both public and private universities from 77,568 in 1980/81 to about 1,200,000 in 2008/2009 session (Table1.1).

Academic Staff Trend: From Table1.1 although there is a line of causality between enrolment and staffing in the Nigerian University system, but the increase in academic

staff (6.4%,3.5% & 4.6%)is not commensurate with increase in enrolment(8.7%,8.4% & 10.7%) over the study period.

The main findings from the trends are that: despite the increase in enrolment, the new Private Universities (41) which outnumbered the Federal (27) and State Universities(36) have less enrolment than those Public Universities(table 1.2). Also, the average enrolment per university in column 8 of table 1.1 provided a better view of enrolment figures in Nigerian Universities. That shows the enrolment figures were small on the average, if it had been distributed equally among the universities as in the last column, ranging between 4,094 and 13,018 compared with University College London which had 21,620 students in 2009 (with 4000 academic and research staff and 648 Professors) and was ranked the 4th university in the world

(2nd in Europe) in 2010 world universities ranking (Wikipedia). This shows that the country is not deriving economies of scale as a result of the inability of the university system to have better enrolment per university based on the theory of production.

It could be observed that despite the fact that most of the universities are overcrowded based on the resources made available due to underfunding (Table 2.1) the enrolment is small thus, Nigeria could not enjoy economies of scale. So, despite the increase in number of universities, less than 40% of the students could secure admission into Nigerian universities. However, If Nigeria will enjoy economies of scale there will be need to even increase the enrolment but the facilities on ground could not allow for this. If the resources are up to date all the universities could admit more students on the average for cost effectiveness based on the theory of production. Note that, enrolment ratios have a direct impact on economic growth, by increase in income per capita.

Finance: Increased government expenditure lead to improved education quality as a quality variable. There is an important interaction effect between government expenditure and education quality in that as more expenditure is devoted to education it leads to an improvement in quality which in turn improves economic growth as confirmed from the study by Arusha, (2009) .

Over the past three decades Nigeria has been lagging behind in the success story of tackling enrolment problem and the subsequent human resource needs especially meeting the specified skill mix (ERC, 2006). In developed countries, the shift in higher education is reflected in direct public expenditure on higher education institutions but this is not usually the case in developing countries like Nigeria where budgetary allocation to education fluctuates year in year out (Table 2.2). None of the Nigeria budgetary allocation to education met the UNESCO recommended 26% of budgetary allocation (Table 2.1). For example, allocation between 1981 and 2007 ranges from 6.75% to

7.61% of total government expenditure (CBN Bulletin, 2005, 2008).

There was an increase in the proportion of total expenditure devoted to education in nominal value as in table 2.2, but this has been considered to be rather grossly inadequate considering the phenomenon increase in student enrolment and increasing cost, which has been aggravated by inflation. In table 2.3 the value (5.3%) considered to be increase in 1980s was even negative (-12.62%) when the real value was considered. The annual increase in the other two decades also reduced from nominal values of 30.2% and 13.5% to 2.06% and 4.87% (Table 2.2). The apparent shortage of finance available to the university system has been responsible for declining library, social and laboratory facilities in Nigerian Universities in recent years. All the resources required for education production process are in short supply. Lecture halls, laboratories, students' hostels, library space, books and journals and office spaces are all seriously inadequate.

Interactive Effect

The correlation matrix as presented in second panel of Table 3.1 showed positive relationships between all the variables, funding, academic staff, and enrolment. These were in line with previous study by Akutson (2005). However, the correlation matrix suggested close relationship between funding, enrolment and academic staff that is they were strongly correlated (0.97).

Table 3.1: Correlation Matrix (at level)

Variables	ENR	K	L1
ENR	1.00	0.97	0.97
K	0.97	1.00	0.92
L1	0.97	0.92	1.00
L2	0.67	0.54	0.77

Source: Computed by the Author using Eviews
Where: ENR=Enrolment, K=Funding, L1=Academic Staff,

The interactive effect of Academic Staff and Funding on Enrolment in Nigerian Universities from Linear interactive or Stepwise Regression Results

In this section, the interactive or joint effect of funding and academic staff on enrolment was investigated using equations 1 and 2 stated in the methodology. The various tests were outlined in Table 3.2.

First difference of all the variables were used in Table 3.2 because they were all in first order of integration I(1). The results of the estimated stepwise regressions or the standard linear-interactive regression-model: were presented in Table 3.2 Once interactive variable was added, the more critical thing was the significance of the interaction term.

Before the introduction of the interactive variable, each unit increase in academic staff results to increase in enrolment. That is, each university with increase in academic staff tend to increase enrolment. When the interactive effect was added in table 4 the main effect was interesting because all

the models and interactive variable were significant with high F-statistics. The high value of F-statistic in table 3.2 suggests a significant relationship between the dependent and the interactive variables. The results therefore implied that the interactive effect had very important impact on enrolment in Nigerian Universities. The interactive effect of the two variables (K and L1) was more important than their individual effect as evident from the results, funding accounted for 4%, academic staff 5% while interactive effect accounted for 25% changes in enrolment (R^2 in Table 3.2). Thus, interaction of funding and academic staff was a very important determinant of enrolment because, funding would affect the quantity of academic staff available while the academic staff would impact on funding. The quantity of academic staff available will determine the enrolment in the universities.

Table 3.2: Linear-Interactive or Step-wise Regression Using OLS

Variables	Regressions (Dependent Variable: D(ENR))				
	1	2	3	4	5
Constant	0.1069 (2.97)	0.0650 (1.59)	0.0321 (1.16)	33,779.82 (2.00)	41,992.58 (2.68)
Dumenr	-0.0119 (0.21)	0.0116 (0.203)	-0.0160 (-0.32)	39,008.05 (1.10)	11,796.97 (0.35)
D(K)	-0.0877 (-1.09)	—	—	3.00644 (1.22)	10.84022 (1.81)
D(L1)	—	0.4848(1.14)	—	23.860(2.67)	33.6903 (3.73)
D(KL)	—	—	0.0150(2.97)	—	0.000539 (2.50)
R-squared	0.04	0.05	0.25	0.37	0.50
Durbin-Watson stat	2.89	2.97	2.43	2.87	2.76
F-statistic	2.60	2.66	4.43	4.87	5.98

Source: Author's Computation using Eviews

Note: log of all the variables were used except dummy variable DUMENR;

- ENR = Enrolment; KL= interaction of Funding and Academic Staff; K= Funding
- L1 = Academic Staff; Dumenr= dummy variable

This pointed to the fact that academic staff could not be viewed all alone as affecting enrolment also, funding alone could not explain the changes in enrolment while but their joint effect.

From this result we should note that, enrolment ratios have a direct impact on economic growth/development by affecting

economies of scale and thus, increase in income per capita. Increased government expenditure would lead to improved education quality as a quality variable. There is an important interaction effect between government expenditure and education quality on economic growth, as more expenditure is devoted to education it leads to an improvement in quality by improving the number of trained teachers, thereby reducing student-teacher ratios, schooling life expectancy and performance levels which based on this study, will promote economic growth and development. This was also confirmed from the study by Arusha Cooray,(2009) and according to him the policy implications that stem from

these results are important because it in turn improves economic growth.

5. Conclusion and Recommendations

The growth rate of output per capita depends on the accumulation of physical capital, human capital and education quality (This was also confirmed from the study by Arusha,2009) In conclusion, the interaction of funding and availability of academic staff had continued to constrain students' intake into Nigerian universities in a manner as to prevent them from deriving economies of scale. There is therefore need for adequate finance to provide needed resources to be able to increase enrolment and derived economies of scale.

Policy Recommendations

This country should increase government expenditure on education with a view to increasing education quality as Education policy that focuses on the provision of facilities aimed at those specifications above: improving the number of trained teachers, thereby reducing student-teacher ratios, schooling life expectancy and performance levels based on this study will promote economic growth and development. In conclusion, it can be argued that the interaction effect of government expenditure on education quality is significant in meeting human resource needs for economic growth and development.

The findings of this study required those involved in the planning and management of Nigerian Universities to play important role in solving the interactive effect of funding and academic human resource on enrolment through careful planning. The solution needs the government and NUC to put appropriate policies in place rather than ad-hoc decision making. In essence, there is need to do the following:

(i) Adequate Funding: government should increase its total expenditure on education to meet up with the UNESCO specification so as to fulfil the dream of becoming one of the superpowers by 2015. Since the interaction of funding and academic staff is exercising constraining influence on enrolment adequate funding will provide necessary finance for meeting the resource needs of the universities.

(ii) In order to increase Supply of Academic Staff and as well enforce staff training and development, NUC should check and monitor continuously the finance for universities to take care of staff shortage in universities.

(iii) Also, the Nigerian Universities should be innovative in sourcing for non-government or stakeholders funds and should learn from success stories of sister universities. So, the universities should be more pragmatic in handling financial problems and should devise a way of reducing administrative costs and also the universities should enlighten the public (parents, alumni, industrialists etc) who may provide funds for endowment.

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