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Research Outputs from Nigerian Tertiary Institutions: An Empirical Appraisal

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Introduction

The adequacy of Nigerian university and polytechnic graduates remains hotly debated. It is a question of particular concern to graduates who are seeking employment and to employers who consider hiring them. The situation is of such concern that hundreds of unemployed university graduates mounted a demonstration in front of the presidential offices in Abuja in 2000, demanding that government provide them with jobs. Employers complain that graduates are poorly prepared for work. They believe that academic standards have fallen considerably over the past decade and that a university degree or a polytechnic diploma is no longer a guarantee of communication skills or technical competence.

According to Andrew, Bankole, and Olatunde (2000), a large mismatch appears to exist between university output and labor market demand. At the same time, their findings show that the employment prospects of recent graduates have clearly deteriorated, the primarily because of the weak Nigerian economy, the policy environment, and inadequate level of skilled human resources, especially the quality of the university- trained portion of the work force.

Deteriorating quality perception is supported by results from empirical research. Anyawu and Iloeje (1996) reported a lower rating on the "reputation" of first generation Nigerian university graduates. They expressed a belief that the quality of university education has fallen. A similar study conducted by

Ugwuonah and Omeje (1998) on another Nigerian university reported that those who graduated in the 1980s gave more favorable ratings to questions regarding availability of study resources than those who graduated in the 1990s.

A *This Day Newspaper* report (*This Day Newspaper*, 2005) shows that older cohorts awarded higher scores to questions on opportunities to undertake research, participate in supervised work experience, and have access to technical and laboratory resources. In another tracer study, Omoifo, Badmus, and Awanbor (1997) found that graduates of Nigerian universities rated supervised practical work and quality of academic advice received as very poor. Among graduates of medicine and sciences, only 29 percent rated equipment, laboratories, and workshops as very good. On the whole, graduates felt that teaching facilities and infrastructure were the worst aspects of the university environment, followed by staff qualifications and living conditions.

Human Resources

A casual interview of graduates in engineering, management and the sciences shows that only few find most of the theories they learn in schools applicable in their daily work. In particular, graduates rated the practical aspects of their education very poorly (*This Day Newspaper*, 2005). These findings illustrate the wide gap that exists between what is taught in the universities and what the world of work requires. Focusing on computing and information technology training, Longe, Uwadia, and Longe (2005) opined that it is the responsibility of our educational system to provide graduates with the background and skills necessary to be successful in their chosen fields of endeavor. For this reason, when employers recruit graduates, they look for graduates from institutions with curricula that use new technology and emphasize current practices. One of the means to this end is a serious academic research orientation among the academic staffs in Nigerian institutions of higher learning.

The decline of staff quality is a consequence of obsolete research facilities, especially in our public institutions. Laboratories are not well-equipped or are practically non-existent. Universities and polytechnics offer computer science courses without computer laboratories, let alone Internet connectivity. Libraries have become archives of stale, archaic, and irrelevant materials. Hence, the poor quality of graduates is also caused by a shortage of learning resources. Most university and polytechnic libraries are reported to hold out-of-date collections. Andrew, Bankole, and Olatunde (2000) report that a respondent from a manufacturing firm noted that instructors from some of the local universities do not have copies of basic texts that are available in the corporate library and are essential reading for the engineering processes used by the firm.

Motivation to do research and publication is very low. Research grants, though available, are not sought, since nothing new is being baked in most of our academic ovens. Adeyemi and Uko (2004) posit that, "there is no gainsaying that curriculum planning and physical expansion without adequate and sustainable human and material resources would definitely fail to produce the desired results." The ability of polytechnics to produce quality graduates depends largely on the quantity and quality of teachers available. Ayodeji (2002) says that, "teacher adequacy is a function of many factors, which include funding, student enrollment over time, and staff turnover."

Ephraim (2004) reiterates that Nigerian public institutions have high enrollments without enough qualified instructors. As a result, staff/student ratios have worsened to the detriment of student learning and academic research. Several international agencies have provided specific scientific and technological research and development support. These include the International Development and Research Centre (IDRC) of Canada and the Overseas Development Agency of the United Kingdom, UNESCO, among others. Such supports have generally been channeled through the Federal Ministry of Science and Technology, which maintains strong links with a large number of international organisations. The Nigerian government has an annual budget of more than \$230,000 and \$960,000, for some of these agencies, but to what extent have Nigerian academics taken advantage of grants and research collaboration with these agencies?

Although most employers are unhappy with the quality of graduates, they are well aware of the causes. Many employers are quick to state that the quality of the graduates is simply a reflection of the quality of academic staff, learning resources (libraries, laboratories, etc.), and funding limitations. A solution to the problems of staff quality is critical to any improvement in the quality of university graduates. The decline of staff quality is reflected in high rates of “brain drain,” the declining numbers of professors and assistant professors within the university system, and their falling levels of post-graduate preparation. Andrew, et al. (2000) view the financial stability of the universities as tied to the fiscal fortunes of the state. In the last two decades the federal budget has not been stable. It is tied closely to oil revenues, which have been unstable. The consequences of unstable funding are reflected in poorly-equipped laboratories, outdated libraries, poorly- remunerated staff, crumbling academic facilities, and low research output.

Ranking Academic Productivity

Academic productivity can be gained from capacity building (ILO, 1999). Nigeria has yet to embark on creating data on productivity. Productivity measurement and records have been nearly the exclusive preserve of developed countries such as US, Europe, some Asian and Latin American Countries. The main criteria for ranking “world class universities” is not so much the volume of teaching, student population, or community services, but research output. Knowledge accumulation places the advanced countries at the top, by their control of social and human capital formation, economic development, and improved living conditions (Sabo, 2005).

Cetto (1998) posits that one index for measuring research output is the number and quality of published works by Nigerians international journals, and by the world distribution of active serial titles emanating from the universities, which contribute to the generation, dissemination, and application of scientific knowledge for development in Nigeria and beyond.

Statement of the Problem

A gradual decline in research output in higher education became noticeable in the late 1980s. The National University Commission (NUC) noted that in terms of quality and quantity, the research output of tertiary institutions in Nigeria was about the best in sub-Saharan Africa up to the late 1980s (Karani, 1997). The foundations for research are good research training and motivation, availability of equipment, and good library facilities. At the onset and acceleration of the decay in the system, these ingredients faded away. By 1996, the quantity and quality of research had declined to an all-time low (Okebukola & Solowu, 2001).

Summarizing the factors that contributed to this decline from late 1988 to 1996, and subsequent collapse from 1997 to date, Okebukola (2002) lists the following:

- Lack of research skills in modern methods.
- Lack of equipment for carrying out state-of-the art research.
- Overloaded teaching and administration schedules which leave little time for research
- Difficulty in accessing research funds.
- Diminishing ability of seasoned and senior researchers to mentor junior researchers due to brain drain.

There was consternation when the NUC reported that no Nigerian university (or other tertiary institution) was listed among the top 1,000 schools around the world in terms of publication of research output. The panacea proposed is for institutions to begin to develop websites and migrate their research reports online for the world to see. Based on the foregoing, this paper is premised on the contention that there is need to actually study the research activity and output from Nigerian institutions.

Research Questions

- Are there research outputs or publications that can be migrated online?
- What is the level of productivity and capacity building emanating from the Nigerian academic community?
- How much and to what extent have we been able to impact the world (or at least Africa for a start).

Methodology

Nine journals were randomly selected from African Journals Online (AJOL) (<http://www.ajol.info>). The selection included different countries in Africa, subject areas, and dates of publication (1999-2005). The journals were analysed to determine the following:

1. The volume of research papers from Nigeria.
2. The volume of research papers from Nigerian universities
3. The volume of research papers from Nigerian polytechnics.
4. The consistency of research output
5. The performance level of research output.

T-tests for comparative pair treatment and Cochran's test were used to analyze the decision variables.

Data Analysis and Results

The analysis and results are presented below:

Table 1: Selected Journals by Volume, Year, Country Of Origin.

Journal	University	Polytechnic	Total	Total in journal volume	Origin	Volume	year
African Journal of Library and Archives Information			5	9	Botswana	10:1	2000
			2	7		11:1	2001
			5	10			
	2	1	3	6			
	1		1	11			
Journal of Cameroon Academy of Science				13	Cameroon	1:2	2000
				9		9:1	2001
				8		3:1	2003
				11		4:1	2004
			1	9		5:1	2005
	6		6	18		4:1 suppl	2004
African Journal of Neurological Science	1		1	7	Cote d'Ivoire	20:1	2001
				7		21:1	2002
				7		22:1	2003
	1		1	7		23:1	2004
	2		2	9		23:2	2005
African Educational Journal Research Network	6	2	7	8	Africa	5:1	2005
	7	1	7	9		5:3	2005
	6		6	9		4:1	2004
	8		8	12		4:2	2004
	5		5	17		4:3	2004
Ethiopian Journal of Social Science and Humanities				5	Ethiopia	1:1	2003
				8		2:1	2002
Ghana Journal of Agricultural Science				14	Ghana	32:2	1999
	6	1	7	16		33:1	2000
	2		2	16		33:2	2000
	4		4	17		34:1	2001
				23		35:2	2002
Journal of Tropical Microbiology and Biotechnology	1		1	7	Africa	1:1	2005
Global Journal of Engineering Research	10		10	10	Nigeria	1:1	2002
	11		11	11		4:1/2	2005
	9		9	9		3:1/2	2004
	13		13	13		2:1	2003
Journal of Environmental Science	9		9	9	Africa	1:1	2002
	10		10	10		2:1	2003
	13		13	13		3:1/2	2004
	8		8	15		4:1	2005

Table 2: Selected Journals by Comparison between Nigeria and Other Countries

Journal	Total Output	Papers from Nigeria	Papers from Other Countries
African Journal of Library and Archives Information	43	16	27
Journal of Cameroon Academy of Science	68	7	61
African Journal of Neurological Science	37	3	34
African Educational Journal Research Network	55	33	22
Ethiopia Journal of Social Science and Humanities	13		13
Ghana Journal of Agricultural Science	86	13	73
Journal of Tropical Microbiology and Biotechnology	7	1	6
Global Journal of Engineering Research	43	43	
Journal of Environmental Science	47	40	7
Total	399	156	243
Percent	100	39.1	60.9

From the table above, publications from Nigeria in the Journals analysed amounted to 39.10% of the total number of publications appraised. This is a good standing in comparison with articles from all other parts of the world.

Hypotheses

H_0 : There is no significant difference between research output from Nigeria and other countries publishing in the African Journals Online

H_1 : There is significant difference between research output from Nigeria and other countries publishing in the African Journals Online

Test-Statistics

$$t_{\alpha, n-1} = t_{0.05, 9-1} = t_{0.05, 8} = 1.86$$

If $t_{cal.} \leq t_{tab.}$ Accept H_0 otherwise accept H_1

Where n = sample size

When $n < 10$, t-test is used for single mean difference hence the choice of t-test for pair comparison.

Table 3: t-Test for Pair Treatment

Nigerian Research Output (N)	International Research Output (O)	D=N-O	D-D	(D-D) ²
16	27	-11	-1.33	1.769
7	61	-54	-44.22	1965.1489
3	34	-31	-21.33	454.9689
33	22	11	20.67	427.2489
	13	-13	-3.33	11.0889
13	73	-60	-50.33	2533.1089
1	6	-5	4.67	21.9089
43		43	52.67	2774.1289
40	7	33	42.67	1820.7289
ΣN=156	ΣO=243	ΣD=-87		Σ(D-D) ² =10010.001

$$D = \Sigma D / N = -87 / 9 = -9.67$$

$$SD = \sqrt{\Sigma(D-D)^2 / n - 1}$$

$$= \sqrt{10010.001 / 8}$$

$$= \sqrt{1251.25}$$

$$SD = 35.37$$

$$t_{cal} = D / SD \sqrt{n}$$

$$= -9.67 / 11.79$$

$$= -0.820186$$

Decision Rule

If $t_{cal.} = t_{tab.}$. Accept H_0 otherwise reject H_1 Therefore $t_{cal.} = -0.82$ while $t_{tab.} = 1.86$

Decision: We accept H_0 and conclude that there is no significant difference between Nigerian research output and those from other countries in the African Journals Online. The data is generated by classifying publication in the respective journals by institutions in Nigeria (University & Polytechnic) as variables. One is assigned for research output (publication) and variable zero is assigned for no research output. These variables are called binary. The table below shows the number of journals, institution and binary treatments. The block is the number of journal while treatments are the institutions. The statistical technique used is Cochran Test which measures the degree of effectiveness in the research output between polytechnics and universities in Nigeria in the various journals sampled at random

Table 4: Cochran's Test Analysis

Institution publication journals	University	Polytechnic
1	1	1
2	1	0
3	1	0
4	1	1
5	0	0
6	1	1
7	1	0
8	1	0
9	1	0

Decision: $i, j = 1$, research output

$i, j = 0$, no research output

because $i, j = 0$ or 1 is binary

H_0 :

The research output from Nigerian Polytechnics and Universities in the journals selected is ineffective.

H_1 :

The research output from Nigerian Polytechnics and Universities in the journals selected is effective.

Test –Statistics: $X^2_{\alpha, t-1} = 3.841$ at 95 percent with 1 df, where t is the number of treatments.

If $C \leq X^2_{\alpha, t-1}$ tab. Accept H_0 , otherwise accept H_1 .

Institution publication journals	University	Polytechnic	Block total B_j
1	1	1	2
2	1	0	1
3	1	0	1
4	1	1	2
5	0	0	0
6	1	1	2
7	1	0	1
8	1	0	1
9	1	0	1
Treatment total T_i	8	3	11

Using Cochran Test

$$C = t(t-1)\sum T_i^2 - (t-1)G^2/tG - t\sigma B_j^2 = X^2_{\alpha, t-1}$$

$$G \text{ (Grand total of treatment)} = 11; G^2 = 11^2 = 121; t = 2; \sum T_i = 8^2 + 3^2 = 64 + 9 = 73;$$

$$\sum B_j = 2^2 + 1^2 + 1^2 + 2^2 + 0^2 + 2^2 + 1^2 + 1^2 + 1^2 = 17$$

$$C = 2(2-1)73 - (2-1)121/2(11) - 2(17) = -24./12 = -2.083.$$

$$C = -2.083$$

$$\chi^2_{0.05,1} = 3.841$$

Decision: Since C value is less than the tabulated Chi-squares value then, we accept H_0 .

We conclude that the research output from Nigerian Polytechnics is not effective while those from the Universities are effective.

Conclusion

The discussions of declining research output from Nigerian universities lack empirical evidence and construct validity. Many authors have spoken out of subjective perception rather than objective appraisal. Research and publication remains a yardstick for promotion in academia in Nigeria. The major area of concern remains the polytechnics, where results from this research have revealed poor research output. Sabo (2005) reports on the NUC list of the top twenty universities among the then 65 universities in the country. While the Commission is to be commended for its evaluation of the nation's universities, the publication does not show how they compared with Europe, North America, Asia, and South America. More will have to be done to compare the quality of our research output with those from other parts of the world.

Recommendations

It is not enough to publish. Research output and findings from the nation's tertiary institutions must have an impact on industrial, commercial, and administrative processes on all fronts. By implication, graduates from our institutions must be able to use modern techniques to get jobs done. It remains the responsibility of the NUC and the National Board for Technical Education (NBTE) to encourage researchers with grants and collaboration with other researchers across the world. The NBTE will have to review the promotion criteria in Nigerian polytechnics. Research output is an essential aspect of assessment for academic positions. These recommendations will ameliorate the dwindling research output from Nigerian polytechnics and further encourage active research practices among Nigerian universities.

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