TRACKING THE IMPACT OF RESEARCH IN NIGERIA

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FOREWORD

A university is first and foremost a knowledge generating institution. Research is therefore central to the activities of an academic. One acid test of any research is publication in a medium where it can become accessible to other workers in the same field. Publications can earn the individual researcher promotion, self-esteem and peer recognition. Publications are also useful in attracting funding from granting agencies. Moreover, a major criterion used in ranking universities is the quality of the research carried out in such institutions, as evidenced by research publications. Since it is generally appreciated that quantity is not synonymous with quality, the impact of published works is regarded as more important than the quantity. In this regard, a research paper has to be noticed and cited by others to be of much relevance. Studies have shown that whether a paper will be read and subsequently cited is strongly dependent on where it is published.

It would appear that research is not a priority in Nigeria as is manifested in the absence of crucial outfits like national research foundations to support mission-oriented research. The political and economic crises of the last 20 years or so have caused social dislocations, resulting in inadequate funding, inadequate human resources and a loss of the academic ideals, ethics and transparency. The country has failed to understand the nature of the research enterprise, the long gestation periods of many research activities, the expensive nature of research, the speculative nature of research and the need for continual and uninterrupted research engagement, as a strategy for sustainable development. Lack of facilities for meaningful research, poor level of remuneration, the brain drain syndrome, inadequate mentoring, and limited linkages between the universities, government and industry have combined to lead to the unenviable position of research in the country, even in comparison with other developing countries. There is a poor state of research infra-structure in the form of libraries, laboratories, facilities/funds for field trips, surveys, etc, and ICT, hindering connectivity to the global information pool. International experience is inadequate or vanishing because of

lack of funds for conferences, fellowships and staff training and development. There are limited outlets for research works because escalating international standards means that many young researchers find it difficult to publish in reputable journals. The cost of publishing in some journals may be high, and unaffordable by many researchers. Local journals are often obscure and hardly widely distributed, have high mortality rates and many of such journals have poor scholastic quality. Moreover, the cost of publishing in local journals is also escalating. On account of these, it is perhaps not surprising that Nigeria has not featured well in any of the measures of research productivity.

In this paper, the authors have presented some quantitative and verifiable means of measuring research productivity. In particular, the authors have shown that articles published in high impact journals have an advantage of visibility and therefore a high potential to influence the work of other researchers. The authors have given very detailed recommendations on ways of improving Nigeria's current poor research standing. If these are faithfully implemented by all the parties concerned, it should be possible to turn things around, for the better.

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April 2006.

CONTENTS

CHAPTER ONE

INTRODUCTION

Knowledge, especially scientific knowledge, grows in small installments (Cozzens, 1997). Except in a few instances in history where, either by fortuitous circumstance or through unusual inspirational instinct, giant leaps in knowledge have been made, the typical story of human scientific development is that of gradual step by step progression. Such pattern of growth requires several conditions for its maximization. One, the rate of growth will be very much improved if as many capable hands as possible are on deck. Second, those involved in related activities need to know what each other is doing. That way, building on each other's efforts, rather than going round in circles and dissipating energies on tasks already accomplished by others, can be assured.

It is commonly known that developing countries are contributing less than their proportionate part to scientific growth. Even within the "developing world" category, countries in sub-Saharan Africa are particularly far short in their contribution to global research efforts. For example, an assessment of research productivity in the period between 1989 and 2001 in terms of scientific publications emanating from different parts of the world shows a dismal picture of under-representation of developing countries in general, and African nations in particular (Box 1) (Perez-Iratxeta and Andrade, 2002).

BOX 1

- Publications per million inhabitants in 1989 – 2001:
  - 10,000 in many developed countries
  - 100 in many developing countries
  - Less than 10 in most Sub-Sahara African countries

Between 1990 and 1998, the population-adjusted average number of biomedical research publications was 1.335 for developed countries but only 0.053 for developing countries (Rosselli, 1999). The same author estimates that in that period, the developing countries of the world with five times the population of the developed countries and with about 88% of the global burden of disease were consequently the subject of less than a fifth of geographically linked biomedical research. The fact that lack of attention to research may be affecting areas of critical need is exemplified by the observation that in the period between 1989 and 1990, Africa contributed only about 3.1% of epidemiological articles in journals that typically address the HIV/AIDS problem (Yach and Kenya 1990). The imbalance between research focus and disease burden has now been aptly described as a 10/90 problem (Canadian Medical Association Journal, 2004): with less than 10% research effort addressing about 90% of health burden.

The low level of scientific research in developing countries reflects, in part, the inadequate number of researchers. Even though correct data are hard to come by, estimates of human resources for different regions commonly show developing countries in general, and sub-Saharan Africa in particular, as being poorly endowed with scientists (Nchinda, 2002). UNESCO has estimated that about four-fifths of working scientists in all disciplines are based in Western industrialized countries, Japan, and a few Asian countries. While Japan has 4.0 research and development scientists per 1000 population and US has 2.7, Sub-Saharan African countries have 0.4 (UNESCO, 1996).

More disturbing is the widening, rather than closing gap between developed and developing countries in research activities (Paraje et al., 2005; Saxena et. al. 2006). As shown by Perez-Iratxeta and Andrade, countries with low levels of publication in the period between 1989 and 2001 also showed a negative publication trend (Perez-Iratxeta and Andrade, 2002). Nigeria provides an example of

this constriction. Between 1981 and 1993, it not only suffered a drop in its global position in regard to academic publications, its proportion of articles contributed from Sub-Saharan Africa to international science and social sciences literature shrank to almost half (IBRD/The World Bank, 2000; Babalola, 2005).

Research productivity as indicated by the number of published articles in academic journals is an important way of tracking the level of research in a country or institution. In recent years, several authors have carried out such exercise to highlight funding practices as well as variations between countries (Hefler et. al., 1999; Thompson, 1999). There is however the general appreciation that quantity is not synonymous with quality (Takei, 1999; Thompson, 1999). Given that progress in science relates very strongly to the level of communication within the scientific community, the impact of the published works is regarded as more important than the quantity. Except a research paper is noticed and cited by others, there is very little evidence that it has done much more than help the author add one more publication to his or her list of publications. In this day of the existence of thousands of journals, it is probably not difficult to find one outlet or the other for an article irrespective of its potential value as a piece of scientific information. Whether that article will be read and subsequently cited is partly but essentially dependent on where it is published (Opthof, 1997). As noted by Thompson, the number of publications do not reflect the quality or usefulness of the published data (Thompson, 1999). Alluding to this important point, Takei (1999) notes that of the 5384 journals listed in Science Citation Index Journal Citation Reports for 1997, only1848 (or 34%) have an impact factor equal to or above 1.0 and that most are therefore hardly ever cited by other researchers. As a result of the fact that science progresses by previous work thereby influencing subsequent ones, papers that are not read and therefore not cited are hardly contributing to the progression of science.

The remaining part of this paper is divided into five chapters. Chapter 2 discusses methods for tracking the impact of research. In particular, the journal impact factor and citation counts are described in details, as well as tools for monitoring and ranking citation counts. The status of Nigeria's scientific research in the world is highlighted in Chapter 3 by examining the world ranking of the country's research efforts in medicine, science and engineering, and social science. Chapter 4 outlines the institutional profile of research in Nigeria. In Chapter 5 the authors present reasons why it is important to track the impact of research, especially in the ranking of universities. Recommendations for improving the current standing of research in Nigeria are given in the concluding chapter.

CHAPTER TWO

HOW TO TRACK THE IMPACT OF RESEARCH

THE JOURNAL IMPACT FACTOR

The impact of a research product, or at least its potential impact, can often be assessed by the medium of its communication. Journals differ considerably in the likelihood that what they publish will be read or cited. Articles that are published in high-impact journals have a greater advantage of visibility and therefore potential to influence the work of other researchers. Indeed, it has been estimated that journal visibility increases the chances of a work being cited by about 80% (Opthof, 1997). It has been shown that for physiology and nuclear medicine, there is a good agreement between the journal impact factor and the cumulative citation frequencies of papers (Hansen and Henriksen, 1997), emphasizing the link between the influence of research papers and the impact of the journals in which they are published. While this link may not be uniformly true across all fields, it nevertheless points to the importance of the medium in which research is disseminated.

The Journal Impact Factor (JIF) is the most recognized measure of a journal's visibility and influence. The most prestigious journals tend to be those with high impact factors (Garfield, 2006). First proposed by Garfield in 1955 as "a bibliographic system for science literature that can eliminate the uncritical citation of fraudulent, incomplete, or obsolete data by making it possible for the conscientious scholar to be aware of criticisms of earlier papers" (Garfield, 1955), the JIF is published annually by the Institute of Scientific Information

in its Journal Citation Reports (JCR) (Institute for Scientific Information, 1999).

The JIF measures the average number of times articles published within the previous two years by a journal are cited in the current year covered by the JCR. For example, the JIF of a journal in 2004 equals the number of citations in 2004 to articles published in that journal in 2002 and 2003 divided by the number of articles published by the journal in those two years. The denominator includes original articles, review articles, technical notes. The numerator consists of all of the variables in the denominator as well as editorials, letters and abstracts. The way the JIF is calculated allows for the comparison of journals with large or small numbers of publications (Garfield, 2006). If only total citations are used, small journals (which may nevertheless be influential) will be disadvantaged.

Today, the JCR is composed of three indexes: the Science Citation Index-expanded (SCI), the Social Science Citation Index (SSCI), and the Arts and Humanities Citation Index (A&HCI), the newest addition to the suite. Together, the coverage is huge, with the SCI and SSCI covering about 6800 journals in science and social science. The SCI data is derived from about 15 million citations from 1 million source items per year (Garfield, 2006).

The original function of JIF was to help libraries decide what journals to purchase. Later, authors began using it to decide where to submit manuscripts. Currently, JIF has blossomed to become a veritable tool for editorial boards wishing to monitor how their publication is growing, for academic boards deciding on appointment and promotions, and grants organizations making decisions on resource allocation (Garfield, 2006).

The JIF has also been used for other purposes. For example, Hetch and colleagues noted its use as an objective system of review to help stem the tide of "favouritism, nepotism, and social-rank privileges" in Western Europe (Hecht et al. 1998). Benitez-Bribiesca (1999) suggested that its popularity in some developing countries might be as

a way of ensuring that their research committees use rigorous standards comparable to those found in developed countries.

Critics have drawn attention to the imperfection of the JIF as a global measure of journal influence (Hansson, 1995; Hecht et al., 1998; Benitez-Bribiesca, 1999; Morgan and Janca, 2000). Criticisms have included the predominance of journals in English and published in North America on the SCI list. In this regard, the relatively small coverage of journals from developing countries is a particular disadvantage for authors in those countries. Another criticism is that the JIF favours journals reporting basic (rather than clinical) sciences and those reporting reviews. Papers published in these types of journals tend to be more frequently cited, thus giving the journals an advantage over others. Indeed, it has been observed that editors have sometimes attempted to make editorial decisions perceived to help boost their rating on the JIF. Self-citations and reclassifying items so that they become numerators rather than denominators in the JIF calculation are some of the steps that have been noted (Gowrishankar and Divakar, 1999).

JIF is also used to evaluate the impact of individuals. As earlier indicated, the chances of a work being cited are significantly increased by publication in journals with high impact. Even though the best measure of an individual's work is the actual count of citations to the work, JIF is sometimes used as a short cut (Garfield, 2006). Citations do take some time to build up and recent articles that may eventually become very well cited may suffer that initial time lag. The JIF may be thought of as a ready measure in that sort of situation. The assumption is that the acceptance of a paper for publication in a high impact journal implies that the work is potentially influential. There is controversy about this approach. Given the well-known fact that citation rates are very skewed with a suggestion that only about 20% of all published works account for about 80% of all citations (Garfield, 2006), this assumption may not always be correct. As emphasized by some

others, the quality of a published research is not synonymous with the "wrapping", but only with its "contents" (Seglen, 1997).

In this day of the Worldwide Web, there may be a temptation to suppose that "sitations" (as they have been described (Garfield, 2006)) to an individual's work on the internet is the equivalent of citations. This certainly is not the case. While it is true that web "sitations" may foretell the future citation of an article (Lawrence, 2001; Antelman, 2004; Perneger, 2004), the two are not the same(Vaughan and Shaw, 2003). While the former indicates readership or downloading, the latter reflects actual citation in new published papers(Garfield, 2006). It is citation (rather than sitation on the Web) that indicates that a published work is influencing subsequent work and is therefore the true reflection of an author's or a journal's impact.

Recent developments aim to address some of the criticisms of JIF as a measure of journals' impact. A new database in the Thomson Scientific suite, the Journal Performance Indicators (JIP), has been developed to provide more precise impact calculations (Thomson Scientific Journal Performance Indicators, 2005; Garfield, 2006). Its long term utility and acceptability, however, remains to be determined. In the meantime, the JIF remains a widely used tool for judging the current influence of journals. In spite of some of the shortcomings that have been noted by commentators, it would appear that the JIF is still the most acceptable way of evaluating the influence of a journal, probably much less so of a particular individual. As noted by Hoeffel (1998):

> Impact Factor is not a perfect tool to measure the quality of articles but there is nothing better and it has the advantage of already being in existence and is, therefore, a good technique for scientific evaluation. Experience has shown that in each specialty the best journals are those in which it is most difficult to have articles

the impact factor was devised. The use of impact factor as a measure of quality is widespread because it fits well with the opinion we have in each field of the best journals in our specialty.

Some important points need to be considered when using JIF (Garfield, 2006). Two such factors are citation density and specialty. Specialties vary in the likelihood that a particular paper will be cited several times. They also vary in the number of references that a source article will cite, that is, the citation density. Both of these factors will affect the profile of JIF in a particular specialty. As shown in the Tables 1 – 3, the 10 highest ranking journals in Economics have impact factors ranging from 2.3 to 4.4 while those in Education ranged from 1.2 to 2.2. Neither of these could be compared to the highest 10 in General Medicine with their impact factors ranging from 4.4 to 34.8.

Table 1: TEN TOPMOST JOURNALS IN ECONOMICS IN 2005

Rank	Abbreviated Journal Title	Total Cites	Impact Factor	Articles	Cited Half-life
1	Q J ECON	6617	4.412	40	>10.0
2	J ECON LIT	2422	4.400	16	8.3
3	J ECON GEOGR	207	3.139	27	2.3
4	J ECON PERSPECT	2531	2.951	45	7.9
5	J POLIT ECON	8546	2.622	56	>10.0
6	J FINANC ECON	4529	2.551	75	>10.0
7	J HEALTH ECON	1693	2.495	60	6.9
8	J ECON GROWTH	380	2.379	13	5.7
9	NBER MACROECON ANN	426	2.333		8.0
10	ECON GEOGR	625	2.325	18	8.5

Table 2: TEN TOPMOST JOURNALS IN EDUCATION IN 2005

Rank	Abbreviated Journal Title	Total Cites	Impact Factor	Articles	Cited Half-life
1	J LEAN SCI	443	2.280	12	7.8
2	REV EDUC RES	1395	1.960	14	10.0
3	J AM COLL HEALTH	733	1.625	29	6.3
4	LEARN INSTR	447	1.617	30	6.0
5	HEALTH EDU RES	1178	1.405	66	6.3
6	EDUC EVAL POLICY AN	400	1.342	16	8.1
7	SCI EDUC	943	1.312	48	8.6
8	AIDS EDUC PREV	837	1.238	58	6.8
9	ADV HEALTH SCI EDUC	159	1.219	23	3.9
10	J RES SCI TEACH	1266	1.202	47	9.2

Table 3: TEN TOPMOST JOURNALS IN GENERAL MEDICINE IN 2005

Rank	Abbreviated Journal Title	Total Cites	Impact Factor	Articles	Cited Half-life
1	NEW ENGL J MED	152715	34.833	336	7.1
2	JAMA-J AM MED ASSOC	82700	21.455	377	6.3
3	LANCET	123292	18.316	553	6.8
4	ANN INTERN MED	36590	12.427	217	8.8
5	ANNU REV MED	3184	11.381	31	5.6
6	BRIT MED J	55159	7.209	625	7.1
7	ARCH INTERN MED	25669	6.758	284	6.7
8	CAN MED ASSOC J	5995	4.783	104	6.3
9	MEDICINE	4298	4.500	40	>10.0
10	AM J MED	20895	4.403	256	>10.0

CITATION COUNTS

Citations are the true test of a scholarly paper's impact. While it is true that an indication of a paper's potential impact can be inferred from the journal in which it is published, the ultimate test of its worth is how it influences other researchers' work. Bibliographic citation is different from readership or the frequency of downloads, as may be indicated by "sitations" on the Web. It is the acknowledgment of a previous piece of work by a new published work and an indication that some sort of link is being established between the two, an important process in the progression of knowledge and of science, which is a true mark of a publication's impact or influence.

As Opthof (1997) indicated, citation counts correlate very well with peer esteem. Indeed, the assertion by Thomson-ISI (2002) captures the essence of citation counts in the consideration of an individual scientist or scholar:

> Citation counts are a form of peer recognition and generally reflect the dependence of the scientific community on the work of individual scientists. It could be argued that highly cited scientists form the essential core of scientific community. Many highly cited scientists have also received peer recognition in the form of honorific awards.

The capability to directly measure the impact of the individual researcher's work means that it is now possible to track the cumulative impact of institutions and of countries as well through counting the citations of published articles emanating from them (Hickie et. al. 2004). The values of that capability are obvious: trends can be monitored; areas of strength and weakness can be assessed; and resource allocation can be appropriately targeted.

Available tools are not without shortcomings (Walter, Bloch et al., 2003). For example, in the Thomson-ISI database, the Essential Science Indicators (Thomson-ISI, 2002), citations belonging to authors bearing similar second names may be difficult to differentiate one from the other. Also, allocation of citations to the papers of the same author may fall into different categories (e.g. some to "psychiatry/psychology" others to "clinical medicine") which could make an otherwise highly cited author not to be so ranked. These limitations however do not diminish the utility of citation counts as a good measure of the influence of a piece of

research and consequently the impact of the scientist or of the institution or country where they work. Monitoring of research impact in this way is becoming a common exercise in different parts of the world (IBRD/The World Bank, 2000; Hickie et. al., 2004; Babalola, 2005).

THE TOOLS

The Thomson-ISI suite contains several tools for monitoring and ranking citation counts. The Thomson-ISI Web of Science (WOS) (Thomson-ISI, 2002) database makes it possible to conduct simultaneous searches of science, social science, and arts and humanities citation indexes. The Science Citation Index, expanded (SCI), includes 150 scientific disciplines while the Social Science Citation Index (SSCI) covers 50 social science disciplines. The Art and Humanities Citation Index is the newest of the indexes and is rapidly expanding in its coverage. The SCI and SSCI include 6800 major science and social science journals. The WOS data provides individual citations or authors and citations to specific papers. Total citations across all disciplines are provided so citations to the papers of an author whose work spans science and social science can be readily obtained.

The Thomson-ISI Essential Science Indicators (ESI) database provides performance statistics for individual scientists, institutions, and for countries across 22 broad fields in science and social science. Its rankings are based on a selection of the most cited scientists, institutions, countries, and journals in a ten-year rolling period (Thomson-ISI 2002). For individuals, the top 1% in each field is listed. That is, the scientists in the topmost 1% of the citation counts in their field are listed. The list for institutions is composed of the top 1% and is based on the published authors'

affiliations. The top 50% of countries are listed in each field. The ESI incorporates all ISI databases and ISI-indexed journals. Letters, abstracts, and books are not included in ISI databases and so do not count towards the ESI rankings. The ESI database is based on a rolling 10-year period, with updating every two months. Thus, the rankings obtained represent the performance in the previous 10 years for individuals, institutions, and countries.

The ISI-ESI database also provides a list of highly cited papers (Thomson-ISI, 2002). Thresholds are set for both field of study (22 broad fields are covered) and year, such that the top 1% of papers are selected. By setting different thresholds for each year period, the system allows comparison of older and younger papers for each field. The time period for counts is 10 years (cumulated from the year of publication to the current year) and data is updated every two to four months. Only Thomson Scientific-index papers (regular scientific articles, review articles, proceeding papers, and research notes) are counted. Letters to the editor, correction notices, and abstracts are not counted.

The ISI Highly Cited.com provides free access to the list of the most highly cited researchers in 21 broad subject categories in life sciences, medicine, physical sciences, engineering, and social sciences. It is composed of 250 individuals that are most highly cited within each category on a 20-year rolling basis. The list is thus made up of less than one-half of one percent of all publishing researchers and can be regarded as a most exclusive list of accomplished researchers in any field. Most of the names on the list will be known to many researchers working in a particular field as influential leaders in that field.

BOX 2

WHAT THE ISI ESSENTIAL SCIENCE INDICATOR DATABASE OFFERS

- Total citations
  - Most cited scientists: topmost 1%
  - Most cited institutions: topmost 1%
  - Most cited countries: topmost 50%
  - Highly cited scientists: topmost 0.1%
- Citation per paper
  - Average
  - Highly cited papers: topmost 1% for field and time
  - Hot papers: two-month rolling period, 0.1%.

CHAPTER THREE

THE STATUS OF NIGERIA'S SCIENTIFIC RESEARCH IN THE WORLD

The worth of an academic is assessed in terms of scholarly contributions in world literature. Publications serve the three purposes of ensuring timely promotions, attracting grants and earning respect in the international community both for the individuals and the institutions of their affiliation. The importance of any of these three cannot be downplayed by any serious academic. The old cliché of "publish and perish" can be safely changed to "publish and flourish" when one considers the various benefits and paraphernalia that are associated with getting good grants and doing cutting-edge research.

Nigeria, the situation with scholarly contributions in world literature can be likened to a situation of progress in reverse direction. According to Babalola (2005), in 1981, almost a quarter of all the publications from Sub-Saharan Africa were from Nigeria. By 1995, the proportion had dropped to 12.7%. The citations of the publications had also dropped slightly from 3670 in the 1980s to 3559 in the 1990s. These changes call for concern, and thus necessitate constant revisit of the impact of Nigerian publications in world literature. The aim of this presentation is to compare the total publications and citations of the papers by Nigerian authors with those from a few selected countries.

METHOD

The Institute for Scientific Information (ISI) databases comprising the Essential Science Indicators (ESI) and the Web of Science

(WOS) were utilized for the data collection. The ISI indexes information across many scientific disciplines. As described in detail in the earlier chapters of this monograph, the ESI databases provide performance statistics by field of research for the top 50 countries and the data is mainly derived from journal articles, with exclusion of letters to editors, abstracts and article corrections. The current analysis covers the period between January 1995 and mid-2005 (about 10.5 years). Data on publications from Nigeria were compared with those of the following countries:

- USA
  - Being the dominant nation in research
- Australia
  - As another of a developed country
- India
- Brazil
  - Both as examples of large "developing countries" in different continents
- Kenya
- South Africa
- Egypt
  - Representing different levels of "development" within the "developing world" category

In certain disciplines other African countries with impressive performances in certain disciplines were mentioned.

The disciplines covered were:

Medicine

- Clinical Medicine
- Microbiology

- Molecular Biology
- Neurosciences
- Psychiatry and Psychology

Sciences and Engineering

- Agricultural Science
- Chemistry
- Engineering
- Geosciences
- Plant and Animal Science

Social Science

- Economics and
- General Social Sciences.

Tabulations were made on the total numbers of papers published per discipline per country during the study period (quantitative), total citations on the manuscripts published (qualitative), and average citations per paper computed from the former two. The respective rankings in the world were also included in the tabulations.

RESULTS

Table 4 shows the data for Clinical Medicine, where the USA dominated in the total numbers of papers published as well as in citation counts. In term of the average citation per paper, however, USA came 10th in the world. Interestingly, the country with the highest average citation was Guinea Bissau, another African country (data not shown in the table). Nigeria placed 47th in total number of papers with 1675 papers, but dropped to 58th position in citations (5770) and was last in the selected group of countries in average

citation of 3.4 per paper. Of the African countries selected, Kenya had the highest citation per paper at almost 10.

Table 4: A comparison of total number of publications, total citations and the average citations per paper Jan 1995 to mid 2005 for selected countries in the field of Clinical Medicine

Country	Total papers*	Total Citations*	Citations/ Paper*
USA	643,668 (1)	9,354,034 (1)	14.5 (10)
Australia	48,189 (9)	541,887 (10)	11.2 (26)
India	16,497 (22)	66,770 (29)	4.0 (95)
Brazil	16,386 (23)	101,701 (22)	6.2 (80)
South Africa	7,342 (30)	55,500 (31)	7.6 (61)
Egypt	2,930 (44)	16,628 (44)	5.7 (85)
Nigeria	**1,675 (47)**	**5770 (58)**	**3.4 (97)**
Kenya	1,444 (50)	13,824 (46)	9.6 (36)

*** World ranking in parentheses**

The findings with respect to Microbiology are displayed in Table 5. Amongst the countries selected for this analysis, Nigeria was last with respect to the total number of papers produced during the study period and the total citations (59th in the world). The average citation per paper of 6.3 with the ranking of 70 in the world however, appeared to have made for the low total number of papers. Nigeria was better than Brazil, India and Egypt in that order.

Table 5: A comparison of total number of publications, total citations and the average citations per paper Jan 1995 to mid 2005 for selected countries in the field of Microbiology

Country	Total papers*	Total Citations*	Citations/Paper*
USA	48,836 (1)	957,277 (1)	19.6 (2)
Australia	4,336 (10)	63,843 (8)	14.7 (19)
Brazil	2,931 (13)	17,271 (19)	5.9 (73)
India	2,388 (18)	12,469 (25)	5.2 (76)
South Africa	775 (30)	8,790 (29)	11.3 (33)
Egypt	384 (42)	1,736 (47)	4.5 (80)
Kenya	285 (44)	3,206 (41)	11.2 (35)
Nigeria	**144 (51)**	**908 (59)**	**6.3 (70)**

*** World ranking in parentheses**

Molecular Biology is a relatively new field and represents the cutting-edge in scientific research (Table 6). Nigeria with only 70 papers ranked 70th in the world, and was last among the countries being compared. The total citations were, however quite impressive with an average citation of 18.4 per paper, and Nigeria ranked 39th. Among the developing countries, only Kenya performed better than Nigeria.

Table 6: A comparison of total number of publications, total citations and the average citations per paper Jan 1995 to mid 2005 for selected countries in the field of Molecular Biology

Country	Total papers*	Total Citations*	Citations/Paper*
USA	111,492 (1)	3,668,266 (1)	32.9 (6)
Australia	5,933 (12)	129,007 (10)	21.7 (28)
Brazil	3,017 (18)	20,251 (22)	6.7 (78)
India	2,374 (20)	16,080 (39)	6.8 (76)
South Africa	593 (37)	10,195 (36)	17.2 (43)
Egypt	149 (50)	1,236 (63)	8.3 (70)
Kenya	73 (68)	1,513 (55)	20.7 (32)
Nigeria	**70 (70)**	**1,287 (59)**	**18.4 (39)**

*** World ranking in parentheses**

Table 7 compares the data with respect to Neurosciences, and only 33 papers were published by Nigerian authors compared with almost 115000 from the USA. The average citation of 11.4 per manuscript from Nigeria was however impressive. Also noteworthy is that USA was second to Seychelles Island (another African country) in average citation.

Table 7: A comparison of total number of publications, total citations and the average citations per paper Jan 1995 to mid 2005 for selected countries in the field of Neurosciences

Country	Total papers*	Total Citations*	Citations/Paper*
USA	114,359 (1)	2,553,386 (1)	22.3 (2)
Australia	6,273 (11)	87,153 (12)	13.9 (22)
Brazil	4,447 (13)	26,314 (20)	5.9 (63)
India	2,131 (24)	8,367 (32)	3.9 (73)
South Africa	377 (40)	3,360 (39)	8.9 (48)
Egypt	101 (57)	503 (64)	5.0 (69)
Nigeria	**33 (69)**	**377 (68)**	**11.4 (32)**
Kenya	21 (72)	209 (74)	10.0 (42)

*** World ranking in parentheses**

Data and ranking with regards to Psychiatry and Psychology are presented in Table 8. Although the total number of papers published by Nigerians in this discipline was relatively small, Nigeria was better than Egypt and Kenya. The average citation of 7 per manuscript placed Nigeria in the second position in the selected countries, and placed Nigeria 20th in the world.

Table 8: A comparison of total number of publications, total citations and the average citations per paper Jan 1995 to mid 2005 for selected countries in the field of Psychiatry/Psychology

Country	Total papers*	Total Citations*	Citations/Paper*
USA	111,305 (1)	1,081,186 (1)	9.7 (1)
Australia	8,448 (5)	57,852 (6)	6.8 (22)
South Africa	939 (24)	3,538 (25)	3.8 (57)
Brazil	586 (29)	3,131 (27)	5.3 (35)
India	506 (32)	2,356 (30)	4.7 (44)
Nigeria	**97 (51)**	**678 (42)**	**7.0 (20)**
Egypt	63 (57)	282 (53)	4.5 (46)
Kenya	30 (68)	132 (67)	4.4 (47)

*** World ranking in parentheses**

The situation with regards to Chemistry is akin to that of Plant and Animal Science in which Nigeria ranked last amongst the selected countries. The average citation of 2.0 per manuscript was also among the lowest. Table 10 shows the details.

Table 10: A comparison of total number of publications, total citations and the average citations per paper Jan 1995 to mid 2005 for selected countries in the field of Chemistry

Country	Total papers*	Total Citations*	Citations/Paper*
USA	211,213 (1)	2,773,905 (1)	13.1 (3)
India	43,709 (8)	185,921 (12)	4.3 (58)
Australia	15,991 (16)	144,014 (15)	9.0 (15)
Brazil	12,919 (19)	62,512 (22)	4.8 (49)
Egypt	6,220 (29)	18,098 (42)	2.9 (74)
South Africa	3,040 (41)	15,839 (45)	5.2 (42)
Nigeria	**455 (72)**	**901 (79)**	**2.0 (84)**

*** World ranking in parentheses**

In Engineering, Nigeria ranked 64th in the world, and had more papers than Kenya. The same pattern was shown in the total citations. The average citation of 1.2 per paper was, however, among the lowest recorded for all the disciplines of interest in this study. Nigeria ranked 91st in the world. Table 11 shows the data with respect to Engineering.

Table 11: A comparison of total number of publications, total citations and the average citations per paper Jan 1995 to mid 2005 for selected countries in the field of Engineering

Country	Total papers*	Total Citations*	Citations/Paper*
USA	185,572 (1)	799,263 (1)	4.3 (6)
India	17,279 (12)	34,783 (17)	2.0 (65)
Australia	14,432 (13)	54,416 (9)	3.8 (16)
Brazil	6,787 (22)	18,966 (23)	2.8 (37)
Egypt	3,710 (29)	6,677 (36)	1.8 (76)
South Africa	2,091 (42)	5,230 (42)	2.5 (47)
Nigeria	**396 (64)**	**487 (75)**	**1.2 (91)**
Kenya	81 (87)	203 (87)	2.5 (46)

*** World ranking in parentheses**

In Table 12, data with regards to Geosciences are displayed. Nigeria ranked 53rd, 88th and 94th with respect to total number of papers, total citations and average citations of paper respectively. It is remarkable that Kenya had an average citation of 8.6 per manuscript with a ranking of 23rd in the world which was higher than most of the countries apart from the United States and Australia.

Table 12: A comparison of total number of publications, total citations and the average citations per paper Jan 1995 to mid 2005 for selected countries in the field of Geosciences

Country	Total papers*	Total Citations*	Citations/Paper*
USA	77,613 (1)	869,742 (1)	11.2 (9)
Australia	10,974 (8)	104,150 (6)	9.5 (16)
India	6,453 (11)	19,805 (19)	3.1 (86)
South Africa	2,594 (20)	15,732 (21)	6.1 (48)
Brazil	2,546 (21)	15,411 (22)	6.1 (49)
Egypt	677 (39)	1,773 (47)	2.6 (92)
Nigeria	**213 (53)**	**419 (88)**	**2.0 (94)**
Kenya	115 (73)	984 (54)	8.6 (23)

*** World ranking in parentheses**

In the discipline of Plant and Animal Science, Nigeria ranked last amongst the selected countries in all aspects: total number of papers (1225), total citations (2530) and average citations per manuscript (2.1). Table 13 shows the tabulations with USA occupying the dominant position in every aspect except for the average citations.

Table 13: A comparison of total number of publications, total citations and the average citations per paper Jan 1995 to mid 2005 for selected countries in the field of Plant and Animal Science

Country	Total papers*	Total Citations*	Citations/Paper*
USA	143,141 (1)	1,128,212 (1)	7.9 (12)
Australia	23,024 (7)	156,072 (7)	6.8 (21)
India	17,159 (8)	29,848 (23)	1.7 (101)
Brazil	11,404(12)	30,752 (21)	2.7 (85)
South Africa	7,462 (18)	29,869 (22)	4.0 (55)
Egypt	1,590 (42)	4,091 (46)	2.6 (89)
Kenya	1,426 (43)	6,038 (42)	4.2 (47)
Nigeria	**1,225 (44)**	**2,530 (54)**	**2.1 (98)**

*** World ranking in parentheses**

In Economics, the average citation per paper was 1.2 just like the situation with Engineering. Amongst the countries being compared, Nigeria was better than Egypt in both the total number of papers and the total citations. Nigeria ranked last with respect to average citations per paper as shown in Table 14.

Table 14: A comparison of total number of publications, total citations and the average citations per paper Jan 1995 to mid 2005 for selected countries in the field of Economics and Business

Country	Total papers*	Total Citations*	Citations/Paper*
USA	61,408 (1)	382,871 (1)	6.2 (4)
Australia	4,377 (5)	12,270 (6)	2.8 (37)
India	708 (27)	1,574 (28)	2.2 (53)
Brazil	383 (36)	909 (32)	2.4 (45)
South Africa	477 (33)	628 (37)	1.3 (69)
Kenya	73 (48)	174 (48)	2.4 (43)
Nigeria	**50 (53)**	**61 (60)**	**1.2 (70)**
Egypt	34 (58)	59 (62)	1.7 (62)

*** World ranking in parentheses**

The last discipline of interest is Social Sciences, and Nigeria ranked 40th with 481 total papers which attracted 712 citations. The average citations per manuscript of 1.5 resulted in 89th position in the world. It is remarkable that Kenya ranked 8th in the world and was better than the United States in this discipline. The impressive performance of Kenya is presumed due to the excellent studies on social aspects of human immunodeficiency virus infections. Table 15 shows all the details with regards to publications on Social Sciences.

Table 15: A comparison of total number of publications, total citations and the average citations per paper Jan 1995 to mid 2005 for selected countries in the field of Social Sciences, General

Country	Total papers*	Total Citations*	Citations/Paper*
USA	179,159 (1)	783,065 (1)	4.4 (10)
Australia	12,945 (4)	41,113 (4)	3.2 (30)
Brazil	2,078 (20)	3,762 (24)	1.8 (77)
South Africa	2,076 (21)	4,825 (22)	2.3 (55)
India	1,979 (22)	2,753 (28)	1.4 (91)
Nigeria	**481 (40)**	**712 (43)**	**1.5 (89)**
Kenya	317 (45)	1,446 (36)	4.6 (8)
Egypt	185 (55)	360 (50)	2.0 (70)

*** World ranking in parentheses**

The total number of papers published from Nigeria ranged between 33 in Neurosciences and 1675 in Clinical Medicine. The total number of papers for all disciplines for the study period was 6289. When compared with publications from the United States, the dominant country in virtually all disciplines, whose papers for the same period totaled 1,925,523, a ratio of 1:3000 was obtained. The comparative citations were 16593 and 24,600,148 for Nigeria and USA respectively with a ratio was 67:100,000. The overall average citation per

manuscript from Nigeria was 2.6 compared with 12.8 obtained for manuscripts from the US. This is a reflection of quality as well as, possibly, the financial input. It is a well known fact that there is a dismal funding of research in Nigeria quite unlike the US where a large chunk of the heavy total budget is spent on research. It also serves as a reflection of the quality of work done. Pedestrian studies carried out with meager funds are likely to be published in local journals with relatively low impact factor.

The highest citations of Nigerian authors were in the field of Molecular Biology with 18.4 citations per paper. Being a new field where a lot of cutting edge research work is done, it is quite commendable. Neurosciences with 11.4 citations followed, and the remaining top order disciplines were Psychiatry/Psychology (7) and Microbiology (6.3). Lowest average citations ≤ 2 were recorded in Social Sciences, Economics & Business, Engineering, Geosciences and Chemistry. The decay and decline in facilities with respect to the basic and applied sciences in most of the institutions belie this low quality, in my opinion. For Nigeria to reclaim a pride of place in the academic world, a rethinking on institutional funding is essential, and the academics need to be advised to do meaningful research and avoid short-cuts or quick fixes so as to attract grants and compete in the world forum. This is best captured in Lewis Carroll's Alice in Wonderland 'that it takes all the running you can do just to keep in pace". The emphasis must shift from quantity to quality to improve how the world perceives us in the academic field.

CHAPTER FOUR

INSTITUTIONAL PROFILE OF RESEARCH IN NIGERIA

In the previous chapter, we showed that Nigeria is not doing too well in terms of both quantity and quality of research compared to some selected developing countries. It was also shown that there were areas of relative strength nevertheless. In exploring this further, we have analyzed data in respect of institutions in the country to see what is being done where. As previously noted, no Nigerian institution is in the top 1% of citation counts in any of the 22 broad areas in the ISI Essential Science Indicators. In view of this, the ESI database could not be used to examine the profile of research in Nigerian universities. We have therefore employed a different methodology to track the relative impact of the institutions. We have used representativeness of the institutions in the top journals in each of the selected fields in the period between 2000 and 2004. The top 40 journals in each field (ranked on impact factor) were selected. However, only journals with an impact factor of at least 1.0 were included. Thus, when the top 40 journals in a field included journals with impact factor less than 1.0, the selection was terminated at the level of 1.0.

METHOD

This review used the ISI Web of Science database for simultaneous searches of three citation indexes: science (150 disciplines); social sciences (50 disciplines); arts and humanities. This database contains

more than 6800 journals. The search procedure began by identifying journals meeting the aforementioned selection criteria i.e. the 40 topmost journals, ranked on impact factors, provided that the last selected journal must have an impact factor of at least 1.0. All papers published in the selected journals in the period between 2000 and 2004 were scanned. All full-length articles, commentaries, and editorials in which Nigeria appeared on the authors' byline were identified. Letters to the editor were excluded. When an author's name was identified, their institution of affiliation was recorded. The fields covered are as listed in Box 3.

BOX 3

- **Medical sciences**:
  - Microbiology
  - Psychiatry
  - Medicine
  - Pediatrics
  - Surgery
  - Neuroscience and behaviour
  - Obstetrics and Gynaecology
  - Epidemiology
- **Science and Engineering**:
  - Chemistry
  - Agriculture
  - Geology
  - Engineering, general
- **Social science, humanities, and law**
  - Sociology
  - Economics
  - History
  - Law

RESULTS

The results presented show the number of articles identified in each field and the institutional affiliations of the authors. The percentage of the articles coming from each institution is indicated. This latter does not always add up to 100% because of papers resulting from cross-institutions collaboration or because the list has been trimmed for better comprehension.

Table 16: Relative research impact of institutions in Nigeria in the field of Microbiology: (n=28)

INSTITUTIONS	%
University of Ibadan	29
National Institute of Medical Research, Yaba	25
Obafemi Awolowo University, Ile-Ife	25
University of Lagos	18
Lagos State University	11

Table 16 shows the spread of the contributions in Microbiology. Researchers from several institutions are represented in the top journals in this field with no clear dominance of any.

Table 17: Relative research impact of institutions in Nigeria in the field of Psychiatry: (n=13)

INSTITUTIONS	%
University of Ibadan	79
University of Benin	7
University of Ife	7
Nigerian Army Base Hospital, Lagos	7

In the field of Psychiatry, a total of 13 articles were identified. Most had come from researchers in the University of Ibadan. The presence of work from the Nigerian Army Base Hospital, Lagos is worth noting as an example of quality work coming from a non-academic institution.

Table 18: Relative research impact of institutions in Nigeria in the field of Medicine: (n=24)

INSTITUTIONS	%
University of Ibadan	72
Ahmadu Bello University	8
University of Calabar	4
University of Lagos	4
University of Jos	4
Baptist Medical Centre, Eku, Delta	4
University of Sokoto	4

Table 18 shows the relative institutional impact of research in the field of Medicine. Research from the University of Ibadan was dominant but several other institutions also appeared in the topmost journals in the period. Table 19: Relative research impact of institutions in Nigeria in the field of Paediatrics: (n=10)

INSTITUTIONS	%
University of Jos	30
Obafemi Awolowo University, Ife	30
Baptist Medical Centre, Eku, Delta State	20
University of Port Harcourt	10
Ahmadu Bello University	10

Ten publications were identified in Paediatrics (Table 19). Both the Obafemi Awolowo University and the University of Jos contributed 30% each, while Baptist Medical Centre Eku, Delta contributed 20%.

Table 20: SURGERY: (n=4)

INSTITUTIONS	%
University of Port Harcourt	50
University of Lagos	25
University of Ibadan	25
College of Health Sciences, Ife	25

Only 4 publications were from Nigeria in the top journals in Surgery. As shown in Table 20, half of the publications were from the University of Port Harcourt. In the field of the Neurosciences, 14 articles were obtained from Nigeria. As shown in table 21, University of Ibadan contributed 58%, establishing a clear lead in this field. The presence of Olabisi Onabanjo University was also strong. Contributions also came from the International Institute of Advance Research and Training in Owerri and the National Institute of Medical Research, Yaba.

Table 21: Relative research impact of institutions in Nigeria in the field of Neuroscience: (n=14)

INSTITUTIONS	%
University of Ibadan	58
Olabisi Onabanjo University	28
International Institute of Advance Research and Training Centre, Owerri	7
National Institute of Medical Research, Yaba	7

Table 22: Relative research impact of institutions in Nigeria in the field of Obstetrics and Gynaecology: (n=33)

INSTITUTIONS	%
University of Benin	21
University of Ibadan	15
University of Nigeria	15
University of Jos	12
Others (spread over 8 institutions)	6 each

The Universities of Benin led the pack in Obstetrics and Gynaecology (Table 22). The Universities of Ibadan, Nigeria, and Jos were, however, also active. The spread of the institutions in this field is striking with a total of 10 institutions making contributions.

Eighty-one publications were identified in the field of Epidemiology. As shown in table 23, University of Ibadan was clearly the dominant institution in this field. However, contributions came from several other institutions as well.

Table 23: Relative research impact of institutions in Nigeria in the field of Epidemiology: (n=81)

INSTITUTIONS	%
University of Ibadan	42
University of Calabar	6
NIMR, Yaba	6
Imo State University	6
Others (spread over 10 other institutions)	5 each

In the field of Engineering, 11 publications were identified from Nigeria. As shown in Table 24, 28% of the output were contributions from the Rivers State University while researchers from Obafemi Awolowo University contributed 27%.

Table 24: Relative research impact of institutions in Nigeria in the field of Engineering (n=11)

INSTITUTIONS	%
Rivers State University	28
Obafemi Awolowo University	27
University of Agriculture, Abeokuta	18
University of Nigeria, Nsukka	9
Ladoke Akintola University	9
University of Calabar	9

History as a core subject in the field of humanities has 6 publications credited to Nigerian authors in the search database. As shown in table 25, half of the cited works were from University of Lagos, while the French Research Institute in Africa (IFRA) of the University of Ibadan and Ahmadu Bello University Zaria had 33% and 17%, respectively.

Table 25: Relative research impact of institutions in Nigeria in the field of History :(n=6)

INSTITUTIONS	%
University of Lagos	50
University of Ibadan (IFRA)	33
Ahmadu Bello University Zaria	17

Four publications were cited for sociology within the search period and two-thirds of these were from the University of Ibadan while Delta State University, Abraka contributed one-third (Table 26).

Table 26: Relative research impact of institutions in Nigeria in the field of Sociology: (n=4)

INSTITUTIONS	%
University of Ibadan	75
Delta State University	25

The field of geology produces 3 cited works (Table 27).

Table 27: Relative research impact of institutions in Nigeria in the field of Geology: (n=3)

INSTITUTIONS	%
Rivers State University of Science and Technology	67
Ahmadu Bello University Zaria	33

As shown in table 28, Law had only one cited work and this was contributed by researchers from the University of Lagos.

Table 28: Relative research impact of institutions in Nigeria in the field of Law: (n=1)

INSTITUTIONS	%
University of Lagos	100

In Table 29 are the publications in Economics. Only six articles were identified with the University of Nigeria, Nsukka, being where most had come from.

Table 29: Relative research impact of institutions in Nigeria in the field of Economics: (n=6)

INSTITUTIONS	%
University of Nigeria Nsukka	83
International Livestock Research Institute, Ibadan	17

Table 30 presents cited works in the field of Agriculture where a relatively large output (of 107 papers) was identified. The International Institute of Tropical Agriculture Ibadan (IITA) was clearly dominant in this field. Also strong were the Ahmadu Bello University and the University of Nigeria, Nsukka.

Table 30: Relative research impact of institutions in Nigeria in the field of Agriculture (n=107)

INSTITUTIONS	%
IITA, Ibadan	37
Ahmadu Bello University	19
University of Nigeria Nsukka	14
University of Agriculture Abeokuta	7
Obafemi Awolowo University Ife	6
Federal University of Technology Minna	5
University of Ibadan, Nnamdi Azikwe University, Olabisi Onabanjo University and Federal University of Technology Akure	3

Table 31 below presents the cited publications from the field of Chemistry. Four publications were retrieved among, which 75% were contributions from University of Lagos, while the remaining 25% were contributions made by the Federal University of Technology Minna.

Table 31: Relative research impact of institutions in Nigeria in the field of Chemistry: (n=4)

INSTITUTIONS	%
University of Lagos	75
Federal University of Technology Minna	25

The results presented must be interpreted with caution. One limitation is that we have used a proxy (of journal ranking) to assess impact and in doing so, have set an arbitrary albeit valid cut-off of impact factor for that purpose. Ideally, direct citation counts of the papers would have been preferable, especially given that not all papers published in high impact journals ultimately receive good citation counts. It is also possible that some publications might have been missed because the authors' byline does not correctly indicate Nigeria as the address of the authors (or one of the authors). This limitation might have compromised the comprehensiveness of the search procedure.

The broad objective of this exercise was to examine the relative performance and impact of research institutions in Nigeria. The results show a paucity of Nigerian presence in the top journals of most of the fields examined. It would appear that to the extent that Nigerian researchers are working and producing papers, they are not disseminating their results in mediums where they are likely to be

read by others outside Nigeria and therefore less likely to be cited. The results nevertheless show that no single institution dominates in all fields. The impact made by Nigerian research is spread across several source institutions. Various institutions seem to have different areas of strength. Nevertheless, the University of Ibadan seems quite strong in Neurosciences, Psychiatry, Medicine and Epidemiology relative to others in Nigeria.

CHAPTER FIVE

TRACKING RESEARCH IMPACT: WHY DOES IT MATTER?

It is probably self evident that progress or lack of it in any sphere of life needs to be monitored. To that extent many would agree that tracking the impact of research is a worthwhile exercise. There are however specific personal, institutional and national reasons why it is essential to track the influence and impact of scientific research.

As previously alluded to, citation counts correlate very well with peer esteem. Indeed, as has also been pointed out earlier, many highly cited researchers have other concrete evidence attesting to their status in the world of science. The conferment of honours, higher degrees, and invitation to prestigious organizations and events are visible examples of the influence of their work. In the business of seeking for competitive grants and securing fellowships, the impact of a researcher's work often comes in strongly in the consideration by funding organizations. The status of "authority" comes with the influence of a researcher's work and with that status is the ability to attract funding.

Institutions also need credibility to attract funding and earn respect. This is well known to the administrators of the best and most prestigious institutions in the world. That is why they will go the extra length to attract to their faculties distinguished researchers and well cited authors whose work command influence and respect. In many of such universities where you publish matters and where you publish comes into consideration in deciding what institutional

support you get. It is a case of: "if you sell us (the institution) very well, we will reward you for your efforts." The efforts of such institutions are rewarded when inventories of scientific impact and research productivity are taken and ranking of status is based on them.

The recent ranking of universities by the Shanghai Institute of Higher Education provides a good example of the importance of tracking the impact of research (Liu and Cheng, 2005). As shown in Table 32, the criteria used for the ranking of world universities are all directly or indirectly related to the level and quality of research that universities engage in. All the data sources on which the ranking was based are available to everyone, the main source being the Institute of Scientific Information databases which are available in many university libraries around the world but, tragically, not here in Nigeria. The criteria used in the ranking emphasize one main point, among others: the reason for having universities is primarily to advance knowledge and secondarily to build the capacity for even more advancement of knowledge. Ultimately, the quality of the products of universities with regard to their teaching commitment is how much those who have been so taught can be at the vanguard of human advancement. The ranking also emphasizes the points made so far in this monograph: the impact of research is important; impact can be tracked objectively; and apart from prestigious honours (such as the Nobel Prize and Fields Medals which themselves go to highly influential scholars), the two best ways to track impact are citation counts and the influence of the journal where research papers are published.

Table 32: Criteria for ranking the world universities

Criteria	Indicator	Weight
Quality of education	Alumni winning Nobel Prizes and Fields Medals	10%
Quality of faculty	Staff winning Nobel Prizes and Fields Medals	20%
	Highly cited researchers in 21 broad subject areas	20%
Research output	Articles published in Nature and Science *(where applicable, otherwise the score is pro-rated)*	20%
	Articles in Science Citation Index -expanded, Social Science Citation Index, and Arts & Humanities Citation Index	20%
Size of institution	Academic performance with respect to the size	10%
TOTAL		**100%**

The ranking draws attention to the fact that indexes are not just a compilation of journals or publications and that indexing does more than facilitate the sourcing of information on work in a discipline. Indeed, not all so-called "international" journals have sufficient credibility and status to be regarded as preferred medium of disseminating good research. As already mentioned in this monograph, only a minority of journals that are listed in the most prestigious indexing databases, the Thomson-ISI JCR indexes, have impact factors of 1.0 or more. Still, at a minimum, a journal that

has not made it to a prestigious indexing database is not likely to be able to influence the advancement of science. This recognition is emphasized in the university ranking methodology which explicitly gives a score of 20% to articles listed in indexes linked to the Thomson-ISI JCR.

The pre-eminence of two journals in the ranking process, namely Nature and Science, attests to the track record of these journals in influencing the course of science in the world. Again, it is easy to see that objective evidence exists for according these two journals the status they have. As is shown in Table 33, the indices on the journals in 2005 in the JCR indicate that both journals have strong credentials in terms of their impact factor, immediacy index (the average number of times an article in the journal is cited in the year of publication), and cited half life (the mean age of the articles cited in the journal in the JCR year).

Table 33: Profile of Nature and Science in 2005

Journal Title	Impact Factor	Immediacy Index	Cited Half-life
NATURE	32.182	6.089	7.2
SCIENCE	31.853	7.379	7.0

THE BROADER CONTEXT OF RESEARCH IMPACT

The aim of this monograph is not to reduce the importance of other ways of valuing individual's contribution to knowledge (and to science) or to ignore external factors that have a direct import on the assessment of research impact. Rather, the aim is to draw

attention to available indices for measuring impact of research that have the advantages of objectivity and global comparability.

In presenting data on the impact of research conducted in Nigeria, we are not unaware of the broader context in which research is conducted and has to be judged. As stated by the Royal Academy of Engineering (2000), "No single measure of quality can be used in isolation to present the true picture" of scientific productivity and value. In some instances, it may be necessary to supplement citation counts and journal hierarchies by other indices such as value for money and relevance. It is of course true that impact can be judged simply by the immediate utility of the result of research, an utility that may not translate to publications (even much less to citation counts) or even to patents. When we measure research impact by using the ranking or influence of the journal in which its result is disseminated or by the citation counts that the publication emanating from it acquires, we must realize that we are only capturing a part of the picture that portrays the utility of the research. We are nevertheless focusing on objectively measurable indices, especially when the aim is to assess the influence of individuals, institutions, or even countries. The statement by Hicks and Crouch (1990) draws attention to the wider social context in which research impact has to be judged:

> Citations and publications cannot be interpreted as straightforward indicators of scientific merit. There are four terms that are usually confused when describing the characteristics of scientific work that bibliometric indicators measure: quality, importance, impact, and citation (or publication) rates. 'Quality'

describes how well the research has been done; it is a matter of judgment, and will therefore be evaluated differently by different people at different times. 'Importance' is the potential influence of a paper on a specialty: because of the imperfections in scientific communication, the *actua*l influence diverges from this potential and is called 'impact'. Each of these terms encompass more contingent external factors than the previous, including, for example, how well written the paper is, the eminence of its authors, their reading or referencing habits, and the size and dynamics of the field. Since further social factors intervene between impact and citation or publication rates, all one can measure are the latter, which are only partial measures of scientific impact.

Judgment about the importance or impact of the work of an individual or that coming out of an institution is ultimately a peer review process. Peer review of any sort is a complex activity (Scott, 2006); the process needs to be open, objective, and inclusive in order for it so serve its purpose. Science depends very much on peer review process and a credible peer review process is an essential tool for science to serve the society (Spaapen and Sylvain, 1993).

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

The data presented in this monograph shows that Nigeria has a lot of ground to cover if it is to claim a respectable place in the comity of nations in regard to scholarship. Even within the group of Third World countries, Nigeria is not exerting enough influence in research and development that is commensurate with its size and potentials. It would appear that the link between research and development is yet to be appreciated by policy makers in the country. Yet, that link is real. A ready example is the case of developed countries where there is a clear and demonstrable correlation between the level of social and economic development on one hand and research on the other. Research is clearly feeding development and vice versa. As has been shown for both scientific research in general and health research in particular, the benefits to a country are not just in terms of status and respect but in concrete economic terms (Salter and Martin, 2001). For example, Mansfield (1998) provided a compelling evidence for the value of basic research. He surveyed large corporations spanning seven industries in the US and collected data on the proportion of the firms' new products and processes that were made possible at the time of their development by the results of academic research. Using figures for the value of sales of research-based products and the level of spending on basic research in developed countries, he estimated that research conducted in 1975-78 generated a social rate of return of 28% worldwide. Others have shown the creation of employment and other benefits that accrued from discoveries in basic medical research (Raiten and Berman, 1993). A series of technical papers have been integrated and analyzed in another report that shows that health research produces economic gains not only in terms of human capital development but also because of health gains: for example additional life years that result from new treatments and behavioural changes that derive from research findings (Funding First, 2000).

Funding is of course central to any attempt to improve a nation's research activities. Developing countries may be unwilling to devote a substantial proportion of their resources to research, especially in the face of other competing needs. However, for such resource-poor countries that cite poverty as a reason for not supporting research, the message is clear: to break out of poverty requires a determined commitment to the advancement of science and development through research. Investment in research is essential. The creation of infrastructure for this may involve the setting up of research institutes and centers of excellence that are true to their names. With so many universities in the country, however, modalities for empowering the existing research centres to function more productively are urgently needed.

Furthermore, beyond funding, there is a need for national re-orientation on the advantages of the generation of ideas and expansion of knowledge are worthwhile endeavours. Governments at all levels should imbibe the culture of seeking credible empirical basis for their policies. By promoting the use of research in government policies and programmes, researchers will get a feeling that their efforts are valued and will be further encouraged. The nation needs to reward excellence and shun the promotion of mediocrity. Objective and verifiable criteria should be used in the conferment of honours and privileges.

No Nigerian institution featured in the ISI Essential Science Indicators because none made the top 1% of citation counts in any of the 21 broad areas covered. Even where a few individuals are doing influential works and amassing respectable citation counts, such individuals do not form a critical mass in any Nigerian university

and in any particular field for the name of the university to be so ranked. The fact that no Nigerian university is in the top 500 of world universities in the recent ranking by the Shanghai Institute of Higher Education confirms that none has a current respectable status in the world. Indeed, the lack of a critical mass of influential researchers in any field is more damaging than the poor ranking will suggest: it means that a fertile ground for mentoring of young researchers is non-existent. If no new and capable researchers are being produced and nurtured, the future is indeed dire. For Nigerian universities, therefore, the main challenge is in the creation of an environment that is conducive for sustained mentoring and research. Universities have the task of encouraging experienced researchers among their staff to keep working and improving. Incentives must be created to make the average university teacher see the attainment of the rank of professor as an impetus for further and better work rather than a reason for retiring from active research.

Local versus International Publications

The debate about whether international indexes represent the interest of developing countries adequately is an ongoing one. It is clearly the case that hurdles that are difficult to scale are often put in the way of journals from developing countries that aspire to enter international indexes (Gibbs, 1995). It is also true that without local patronage, local journals will not thrive. The responsibility of a university (and indeed that of an individual researcher) should be to balance two competing interests: dissemination of the products of their research in the most visible manner (and one that is likely

to enhance their own status and influence scientific advancement) and helping to nurture the development of local journals. Clearly, the first interest is the more pressing one. Given a choice between buying a cost-efficient but imported product and a locally produced but cost-inefficient version, most people would not hesitate to make a choice of the former. In a scenario where the choice you make now (for example, where you publish) will determine what you get in future (status and improved ability to attract funding), the choice is even clearer. Also, good research needs to have its results widely disseminated for it to serve the purpose of advancing knowledge. These are some of the reasons why universities have to encourage their staff to publish in journals where they (the universities) can best be showcased.

Not all research papers are of international interest and valid reasons can often be given why some papers are better published locally. Universities should, however, strive to create more than "local champions", especially in the fields of science and technology where the constituency is almost always international. They can strike a balance between the need to be projected internationally and the interest in developing local journals. They can do this by setting a minimum percentage of published works to be submitted for promotion that has to have been published in journals that are indexed in Thomson-ISI databases. Such a benchmark can be progressively increased over time since "moving the goal posts" is a necessary condition for academic growth. In this context, the description of a journal as "international" simply because it is listed in an index is not sufficient. There are many currencies around the

world, but not all of them are convertible! An even graver self-deception is that journal's are "good" because they have a few non-Nigerians on their editorial boards or have published some papers by authors based outside the country.

University administrators that are either not aware of the need to use objectively verifiable measures of academic or scholarly contributions or are reluctant to progressively bring their implementation to bear on their promotion exercises will not be serving the best interest of their institutions in the global race for credibility and status. It is human that persons seeking job promotions (just like students seeking to pass an examination) will relish the most favourable (or perceived easiest) route to that goal. However, the institution also needs to seek for its own promotion! Both of these needs are not necessarily incompatible but do require that they be recognized as legitimate and ways of accommodating them found. It is important to work towards the development of local journals. However, there are considerable systemic problems that stunt their growth and prevent them from acquiring credible international visibility. A good review of this along with suggestions on how to address them has been provided by others (Aina, 2005). Editorial boards of local journals need to critically review the impediments on the way to international visibility and seek to address them. Many of such journals do require long-term development plans with consistency in their implementation and neither authors nor research institutions can do this for the journals.

BOX 4: SOME SUGGESTIONS FOR IMPROVING THE IMPACT OF NIGERIAN RESEARCH

- Improve funding for research
- Build research capacity
  - Postgraduate academic training with strong research component
  - Mentorship (as part of "learning by doing" programmes)
  - Developing partnerships for improved training capacities
  - Creation of centers of excellence (that are true to their names!!)
- Create focused national research systems: e.g.
  - Medical Research Councils
    - empowered to promote both intra-mural and extra-mural research activities
  - Research Institutes
- Improve local research culture
  - Encourage productivity
  - Reward excellence
    - Also: do not glorify mediocrity!
  - Seek and nurture international collaborations
    - Cross-fertilization of ideas
    - Improvement in fund acquisition
- Strengthen local scientific journals
  - How can they acquire better international visibility?
- Encourage high quality research
  - Reward publications in high impact journals
  - Create avenues for publicizing ground-breaking research
- Be aware of international standards
  - Use credible assessment standards for promotions, etc.
- Monitor progress and nurture it
  - Conduct regular reviews of the impact of Nigerian research

REFERENCES

Aina, L. O. 2005. The impact and visibility of Nigeria-Based Scholarly Journals in the International Scholarly Community. *Improving the quality of library and information science journals in West Africa: a stakeholders conference. University of Ibadan*, Sam-Adex Printers.

Antelman, K. 2004. Do open-access articles have a greater research impact? *Coll Res Libr.* 65: 372-382.

Babalola, J. B. 2005. Writing for international academic journals: focus on scholarship, censorship and readership. *Paper presented at a Workshop on Scholarly Writing and Publication.* Postgraduate School, University of Ibadan, 27 and 28 November 2005.

Benitez-Bribiesca, L. 1999. The impact factor of medical journals: its use and misuse. *Archives of Medical Research* 30: 161-162.

Canadian Medical Association Journal. 2004. Western medical journals and the 10/90 problem. *Canadian Medical Association Journal* 170: 5.

Cozzens, S. 1997. The knowledge pool: measurement challenges in evaluating fundamental research programs. *Evaluation and Program Planning* 20: 77 - 89.

Funding First 2000. *Exceptional returns: The economic value of America's investment in medical research.* New York.

Garfield, E. 1955. Citation indexes to science: a new dimension in documentation through association of ideas. *Science* 122: 108-111.

Garfield, E. 2006. The history and meaning of the journal impact factor. *JAMA* 295.1: 90-93.

Gibbs, W. W. 1995. Lost science in the third world. *Scientific American* 93-98.

Gowrishankar, J. and Divakar, P. 1999. Sprucing up one's impact factor. *Nature* 401: 321-322.

Hansen, H. B. and Henriksen, J. H. 1997. How well does journal "impact" work in the assessment of papers on clinical physiology and nuclear medicine? *Clinical Physiology* 17: 409-418.

Hansson, S. 1995. Impact factor as a misleading tool in the evaluation of medical journals. Letter. *Lancet* 346: 906.

Hecht, T., Hecht, B. and Sandberg, A. 1998. The journal 'impact factor': a misnamed, misleading, misused measure. *Cancer Genetics and Cytogenetics* 104: 77-81.

Hefler, L., Templer, C. and Kainz, C. 1999. Geography of biomedical research in the European Union 1990 - 1998. *Lancet* 353: 1856.

Hickie, I. B., Christensen, H., Davenport, T. A. and Luscombe, G. M. 2004. Can we track the impact of Australian mental health research? *Australian and New Zealand Journal of Psychiatry* 39.7: 591-599.

Hicks, D. and Crouch, D. 1990. Can bibliometrics measure up? *Physics World* 3.9: 27-28.

Hoeffel, C. 1998. Journal impact factors. *Allergy* 53: 1225.

IBRD/The World Bank. 2000. *Higher Education in Developing Countries: Peril and Promise.* Washington, D.C.: The World Bank.

Institute for Scientific Information 1999. *1998 JCR Journal Citation Reports. Science Edition.* Philadelphia: Institute for Scientific Information.

Lawrence, S. 2001. Free online availability substantially increases a paper's impact. *Nature* 411: 521.

Liu, N. C. and Cheng, Y. 2005. Ranking methodology. Retrieved 01 June 2005, from http://ed.sjtu.edu.cn/rank/2005/ARWU2005Methodology.htm.

Mansfield, E. 1998. Academic research and industrial innovation: an update of empirical findings. *Research Policy* 26: 773 - 776.

Morgan, V. and Janca, A. 2000. Revisiting the journal impact factor. *Australasian Psychiatry* 8.3: 230-235.

Nchinda, T. C. 2002. Research capacity strengthening in the South. *Social Science & Medicine* 54: 1699-1711.

Opthof, T. 1997. Sense and nonsense about the impact factor. *Cardiovascular Research* 33: 1-7.

Paraje, G., Sadana, R. and Karam, G. 2005. Increasing international gaps in health-related publications. *Science* 308: 959-960.

Perez-Iratxeta, C. and M. A. Andrade. 2002. Worldwide scientific publishing activity. Retrieved 26 July, from http://www.url.

Perneger, T. V. 2004. Relation between online "hit counts" and subsequent citations: prospective study of research papers in the BMJ. *British Medical Journal* 329: 546 - 547.

Raiten, D. and Berman, S. 1993. Can the impact of basic biomedical research be measured? A case study approach. Bethesda (MD), *Life Sciences Research Office*, FASEB.

Rosselli, D. 1999. Letter. *Lancet* 354: 517.

Royal Academy of Engineering 2000. *Measuring Excellence in Engineering Research. A statement identifying the characteristics of engineering research and proposed methodology for assessing excellence*. London.

Salter, A. and Martin, B. 2001. The economic benefits of publicly funded basic research: a critical review. *Research Policy* 30: 509 - 532.

Saxena, S., Paraje, G., Sharan, P., Karam, G. and Sadama, R. 2006. The 10/90 divide in mental health research: trends over a 10-year period. *British Journal of Psychiatry* 188: 81-82.

Scott, A. 2006. Peer review and the relevance of science. *SPRU Electronic Working Paper Series, Paper No. 145*. Retrieved March 15, 2006 from http://www.sussex.ac.uk/spru/documents/sewp_145.pdf.

Seglen, P. 1997. Why the impact factor of journals should not be used for evaluating research. *British Medical Journal* 314: 497.

Spaapen, J. and C. Sylvain 1993. Assessing the value of research for society. *Research Evaluation* 3.2: 117 - 126.

Takei, N, 1999. Letter. *Lancet* 354: 516 - 517.

Thompson, D. F. 1999. Geography of US biomedical publications, 1990 to 1997. *New England Journal of Medicine* 340: 817 - 818.

Thomson-ISI 2002. Essential Science Indicators℠.

Thomson-ISI 2002. Web of Science (C).

Thomson Scientific Journal Performance Indicators. 2005. Retrieved January 10, 2006, from http://scientific.thomson.com/products/jpi/.

UNESCO 1996. World Science Report, 1996. Paris.

Vaughan, L. and Shaw, D. 2003. Bibliographic and web citations:

what is the difference? *Journal of the American Society of Information Science and Technology* 54: 1313-1322.

Walter, G., Bloch, S., Hunt, G. and Fisher, K. 2003. Counting on citations: a flawed way to measure quality. *Medical Journal of Australia* 178: 280-281.

Yach, D. and Kenya, P. 1990. Assessment of epidemiological and HIV/AIDS publications in Africa. *International Journal of Epidemiology* 21.3.

INTERACTIVE SESSION

Coordinated by: **Dr Victor O. Adetimirin,**
Sub-Dean, Postgraduate School

Dr. Akpenpuun Dzurgba,
Reader in Social Ethics and Sociology of Religion,
Dept. of Religious Studies,
University of Ibadan

Question: Can there be a meaningful improvement without a meaningful change in academics' mental and behavioural orientation?

Prof. Gureje: I think that the system needs to be more challenging for people to give off their best. What I see is that many times, people with enormous personal potentials turn out to have limited accomplishments because the enabling environment for excellence is not there. This is one of the reasons why leadership is very vital. Leaders have to have an idea where an institution should be heading in terms of academic growth and should have the skill to steer everyone in that direction. it is of course true that there may be a few people who are not cut out for academic life but have found themselves there. My view is that such people are probably few.

Dr. Adigun Kehinde
Resident in Family Medicine
GOPD, University College Hospital (UCH), Ibadan

Question: Part of the statutory function of the UCH is Research: as a Resident in Family Medicine, how does one benefit in these research endeavours, through collaborations, considering our low output?

Prof. Ogunniyi: There is always the problem of balancing clinical commitments with research interests for any clinician, especially more so for trainee specialists. The best way to strike a good balance is to find an active senior colleague who is willing to collaborate and develop a working relationship with such a person. Getting involved in ongoing research is a good way to learn and begin the process of seeking publications. The problem is when there are no such active colleagues around you. Isolation is a big problem for anyone with interest in developing research skills and a good track record.

How does one benefit maximally from the concept of mentorship?

Prof Gureję: Mentoring is essential for academic development. a good mentor must be experienced and keen to nurture others. He or she must have the track record that suggests there will be something on offer. A mentee can make the best of a mentoring relationship by showing their readiness to learn and willingness to accept challenges and handle criticisms.

Dr. B.O. Agbeja,
Dept of Forest Resources Management,
University of Ibadan

Question: How can the deliverables of this symposium on "Tracking the impact of Research" be channeled to the Federal Government/Minister of Education/NUC?

Prof. Gureje : We plan to do a monograph from this. How it is disseminated will be left to the University authorities.

Question: Epileptic funding of the universities has negatively impacted on the rating of Nigerian Universities' Research. Who's fault? Government. or individual scholars? The amount being charged by reputable/international journals is too exhorbitant. How can we solve the problem of funding?

Prof. Gureje: Research funding suffers from the same neglect that education in general has suffered from. The fault for this is of course that of the government. However, individuals can still attempt to help themselves by developing fundable proposals and seeking for grant givers that may be interested. Given that success at obtaining research funds often depends on previous track records, it is easy to get into a vicious circle of lack of research fund support. That is why it may have to be that individual researchers will rely on personal funds to conduct small projects that may help them acquire the necessary research antecedents. As unfortunate as that arrangement is, many people have succeeded in breaking from that vicious circle in this way.

As regards expensive journals, the story is the same: we should ideally not be relying on personal journal subscriptions for access

to the most important journals in our fields. Our libraries ought to be the repository of such journals. But here again we know the problems!

Dr. Adefemi Afolabi,
Dept. of Surgery, College of Medicine, UI

Comments: I thank the presenters for their brilliant presentations.

The problem now is that Nigeria is so far behind in the academic world that we have a lot of running to do to catch up. The gap is so much that the good research from here does not get published in International journals with high impact factor because their interests have shifted from our level of research activities. There is a low capacity utilization of the academic staff in Nigerian Universities We need to get today's discussion to the appropriate bodies like the NUC, the National Assembly and the Presidency to fund research and develop research capabilities in the Nigerian Universities to get us on this way forward to academic excellence. We cannot depend on America alone. Before then, UI should declare a period of moratorium before citation Index and Impact Factor are used for promotion exercise.

Prof. Gureje: The idea of using citation counts for promotion can not arise just yet. However, for higher awards or honors that require that the recipients be seen as authorities in their fields, citation counts will be the most objective evidence of outstanding contributions.

For promotion exercise, especially to the position of a professor, there is no particular reason why the university can not begin to require that

a certain proportion of the papers to be presented must have been published in journals listed in one of ***ISI INDEXES***. As we have indicated in this symposium, many such journals do not have impact factors higher than 1.0 and are therefore not necessarily very influential. Nevertheless, they are at least widely accepted as credible outlets for disseminating research findings to the international audience. The proportion that the university insists should be published in such journals needs not be high at all, at least initially. What is essential is that by doing so, the university is using a criterion of widely accepted validity, is promoting itself by encouraging its name to reach a wider international audience, and is using an objective criterion that can be progressively raised with time to promote academic growth.

The truth is that if in another ten years we are not insisting that some publications of those wishing to become professors have appeared in journals with high impact factor, then we will have made no credible attempt to be among the foremost universities in Africa, not to talk of the rest of the world.

Dr. Duro Adeleke,
Dept of Linguistics and African Languages,
University of Ibadan

Question: There are a number of inhibitions such as uncooperative attitude of senior colleagues, inadequate facilities, power outage etc. It will be interesting to know what Professor Gureje has done

to encourage young scholars in his field in terms of publication output.

Prof Gureje: I am not very comfortable talking about myself in this way. Nevertheless, I think your question is a good one because we have to ask people to give account of how they are using the honours and privileges that have been bestowed on them. I have a long history of encouraging younger colleagues to do good research and get published. My record in this regard in my department is probably second to none. One of the reasons why I find my work so very satisfying, and why I am in this country rather than elsewhere, is the collaborative network I build all the time. However, it takes two to collaborate and whatever success I have in this regard has been because some of these colleagues have also been keen to work with me. the idea of this symposium is partly related to my interest in nurturing academic excellence in this university as I realize that it is the presence of a critical mass of very active and excellent researchers, and not just the presence of a few individual researchers, that can truly make the university great and thereby enhance the status of those of us working there internationally.

About the publication

This monograph comprises the Proceedings of a Symposium with the theme "Tracking the Impact of Research: How and Why?" organised by the Postgraduate School, University of Ibadan and held on 13 January 2006.

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