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*Full Length Research Paper*

## Research growth and citation impact of Tanzanian scholars: A 24 year's scientometric study

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**A scientometric analysis was conducted to map the research growth and citation impact of Tanzania scholars over a period of 24 years starting from 1991 to 2015. We analyzed data for research publications of all Tanzania scholars obtained from the SCOPUS database. The study analyzed the year-wise distribution of publications, subject-wise distribution of publications, the authorship pattern, degree of collaboration, and the citation impact. A total of 12,379 articles were published from 34 academic and research institutions. The top three universities with high cumulative number of publications were Muhimbili University of Health and Allied Sciences, University of Dar es salaam and Sokoine University of Agriculture. The top subject was medicine. The maximum number of citations received in a single publication was 1914. Publications metrics scores varied a lot based on indices chosen to rank the Tanzanian scholars. The study findings call for a need for scholars to collaborate with external partners within and outside the country, and publish in journals with a higher impact.**

**Key words:** Scientometrics, research growth, research performance, research publications, citation impact, Tanzania.

### INTRODUCTION

Science, technology, and innovation are widely acknowledged as important components in achieving sustainable economic development goals (Guindon et al., 2010; Lavis et al., 2010; Toivanen and Ponomariov, 2011; Inglesi-Lotz and Pouris, 2013; Confraria and Godinho, 2015).

Parallel to this movement, the United Nations Sustainable Development Goals emphasized the critical

role of improving science, technology, and research cooperation as a specific goal, and as a means of implementing a number of thematic goals (United Nations, 2015). Universities and research institutions play a significant role in building a strong public sector of research and development of a country or region, and their capacity is critical for national system of innovation (Kotecha et al., 2011). However, there

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have been insufficient efforts to improve science, technology and innovation activities in Africa, despite the movement from agriculture-dominated economies to a research and knowledge-based future (Schemm, 2013).

In 1999, Tanzania developed the Development Vision 2025 which aims at propelling Tanzania from a least developed country to a middle income country with a high level of human development and whose economy is diversified and semi-industrialized. This implies that there is a need to prioritize science, technology and innovation to raise productivity, value addition and value chain in agriculture and to promote linkages with other sectors (The United Republic of Tanzania, 2010; The Citizen Magazine, 2016).

Most universities and research institutions in sub-Saharan Africa have a weak research infrastructure, capacity, and funding which affects their contribution to the world's knowledge production and development through research activities (Abrahams et al., 2009; Kotecha et al., 2011; Toivanen and Ponomariov, 2011; Pouris, 2015). Lack of access to international and local research outputs, and poor visibility of Africa's research outputs contribute to low research productivity (Abrahams et al., 2009; Nature, 2015).

Most of the African scholars disseminate their research findings in journals that are not indexed by international databases (Nature, 2015). Africa faces many challenges of which investments in science, technology and research could assist to improve their economic base. Understanding the nature and dynamics of research performance of a specific country is important for building and integrating the national innovation system (Toivanen and Ponomariov, 2011).

The African scientific outputs have been growing at a rapid rate than the world average, although the share of the Africa's scientific output at the global level has remained low (Schemm, 2013; Confraria and Godinho, 2015). For instance, Schemm (2013) reported that the share of Africa's research outputs to the world increased from 1.2% in 1996 to around 2.3% in 2012.

Further, the African science is dominated by a few countries. For instance, South Africa accounted for 64% of the region's 2014 World Future Council (WFC), followed by Egypt, Kenya, Algeria and Tunisia (Nature, 2015). Another research also reported almost similar findings that the leading countries in terms of research outputs were South Africa, Egypt, Tunisia and Nigeria (Confraria and Godinho, 2015). It is therefore important to have a complete picture of research productivity and level of collaboration of a certain region or country in order to determine gaps critical for socio-economic development.

Further, evidence shows that the research output in Tanzania is considerably less than other countries in the African region (Abrahams et al., 2009; Boshoff, 2010; Pouris, 2010; Confraria and Godinho, 2015; Onyanha, 2016). For instance, Abrahams et al. (2009), reported that Tanzania total publications according to Information

Sciences Institute (ISI) were 4,815 out of the 95,711 papers in 14 countries in the Southern African Development Community (SADC) during the period of 1990 to 2007.

In another study, Pouris (2010) reported that South Africa published almost 14 times more publications than the second country in the list-Tanzania, with a total of 4184 publications from 1994 to 2008. A recent study reported that Tanzania total publications were 2,354, which was twelve times less publications produced by South African scholars during the period 2007 to 2011 (Pouris and Ho, 2014). It is therefore important to assess whether the rapid developments of technology, open access movement and related initiatives such as research for life programmes (Schemm, 2013) have contributed to the growth of Tanzania's research outputs.

The level of collaborative research activities in Africa is substantially higher as compared to the rest of the world, although the intra-Africa collaboration is still low (Onyanha and Maluleka, 2011; Confraria and Godinho, 2015; Nature, 2015).

According to the 2014 Nature Index, 70% of Africa's research output was generated through international collaborative research (Nature, 2015). Pouris and Ho (2014) also found that the international collaborative articles grew by 66 to almost twice the growth of the single-country articles in Africa.

However, other scholars found that the research collaborations within African countries are still low, when compared with extra-Africa collaborations (Onyanha and Maluleka, 2011; Confraria and Godinho, 2015; Nature, 2015). Further, the research collaboration of the top publishing African countries is dominated by a few external partners, mainly the US, UK and France (Confraria and Godinho, 2015). It is therefore imperative to assess the status of collaborative research activities in Tanzania, and how they influence the research productivity in the country.

Scientometrics is the statistical analysis of research patterns (Ramkumar et al., 2016). Scientometric is important for measuring research productivity and quality, specializations, collaborative networks, patterns of scientific communications (Perron et al., 2016). It allows a wide range of metrics to be conducted, including comparisons of different disciplines, institutions, countries, changes over time (Pouris, 2012).

Scientometric can inform decisions related to policy, resource apportionment, and understanding the socio-economic impact of research (Perron et al., 2016). It is an important approach for analyzing the research productivity and citation impact of researchers' work in their discipline, institutions or region. The number of publications produced by an individual is often regarded as a key research productivity indicator and the impact of such publications is based on the frequency of their citations. A number of research performance indicators such as h-index, g-index, Hc-index and HI-norm that

simultaneously consider quantitative and qualitative aspects of publications have been developed in recent years (Van Leeuwen et al., 2003).

H-index is a single-number metric that represents the impact of an author's publications. It is a combined measure of both the researcher's publications productivity and their visibility in terms of citation counts. According to Hirsch, a scholar has an index  $h$  if  $h$  of his/her total publications ( $N_p$ ) have at least  $h$  citations each and the remaining ( $N_p - h$ ) publications have less than  $h$  citations each (Hirsch, 2005). The Egghe's  $g$ -index improves the  $h$ -index by giving more weight to highly cited publications. A researcher has index  $g$  if  $g$  of his or her most cited publications collectively have at least  $g^2$  citations (Egghe, 2006). The contemporary  $h$ -index (Hc-index) gives more weight to recent publications (Sidiropoulos et al., 2007); thus take into consideration the age of publications. The HI-norm index normalizes the number of citations for each publication through dividing the number of citations by the number of authors for that publication. This gives a better approximation of the individual author's impact in multi-authored publications (Braun et al., 2006).

When searching the literature on research productivity and impact in Tanzania, we found few African studies that included Tanzania in their analysis (Abrahams et al., 2009; Boshoff, 2010; Pouris, 2010; Pouris and Ho, 2014; Confraria and Godinho, 2015; Onyanha, 2016). Other Tanzanian's studies either focused on the research productivity and impact of a specific institution or discipline, or profession (Lwoga and Sife, 2013, 2014; Sife et al., 2013, 2014; Sife and Bernard, 2016). Thus, there is still no comprehensive study to examine the patterns and impact of research performance among the Tanzanian scholars.

This study reports findings of a scientometric study of research growth and impact in Tanzania scholars from 1991 to 2015. The aim of the paper is to provide empirical findings to inform multi-sectoral policies, programmes, capacity, and financing issues related to improving research performance across the country. The study seeks to answer the following research questions:

1. What is the growth of the Tanzanians' scholarly literature?
2. What is the year-wise and subject-wise distribution of publications?
3. What is the authorship pattern among Tanzania scholars?
4. What is the pattern of collaboration in knowledge production in Tanzania?
5. What is the citation impact of Tanzania scholars?

## METHODOLOGY

We used the scientometric approach to assess the extent and impact of research growth among Tanzanian's scholars.

This scientometric analysis was conducted on data extracted from SCOPUS (Elsevier, 2016) on the 2nd June 2016.

The study data was extracted from the SCOPUS database, because it indexes quality research outputs and it provides adequate coverage of African research (Onyanha and Ocholla, 2009; Fari and Ocholla, 2016). We acquired the list of the Tanzanian universities from the Tanzania Commission for Universities (TCU) website, while the list of the research institutions was obtained from the Tanzania Commission for Science and Technology (COSTECH) website.

The study used the "institutional affiliation" search term to extract and download data from SCOPUS. The study created the search query with the specific names of the different search phrases (that is, AFFIL ("name of the university") AND (LIMIT-TO (AFFILCOUNTRY, "Tanzania"))).

Thereafter, in order to identify a wide range of research institutions, we used truncated search queries with terms that are broadly used to name research-based institutes in the country, such as science-, technology-, research, center, etc., (that is, AFFIL("sci\*") AND (LIMIT-TO(AFFILCOUNTRY, "Tanzania")). The study used both specific and truncated queries, which were restricted to the year between 1991 and 2015. Domestically and internationally co-authored papers were identified for co-authorship analysis through descriptive bibliometrics. We calculated Tanzania scholars' publications, citation counts, number of authors per publication, average citations per paper, average citations per year,  $h$ -index,  $g$ -index, Hc-index and the HI-norm index.

From the list of aggregated authors and affiliations, we identified the authors' affiliations and countries from the fields of affiliation and corresponding address. The names of affiliations and countries that were not well formatted were reconstructed from the author's address. We manually reprocessed the author's affiliation to reflect the historical changes of names for those institutions that had changed their names. Python version 2.7 scripts (<https://www.python.org/>) were used for cleaning data and splitting the authors' names, and the data was stored in a MySQL® version 5.5 (<https://www.mysql.com/>) database. The data cleaning was finalized using Microsoft Excel® version 2010 (<https://products.office.com/en-us/excel>).

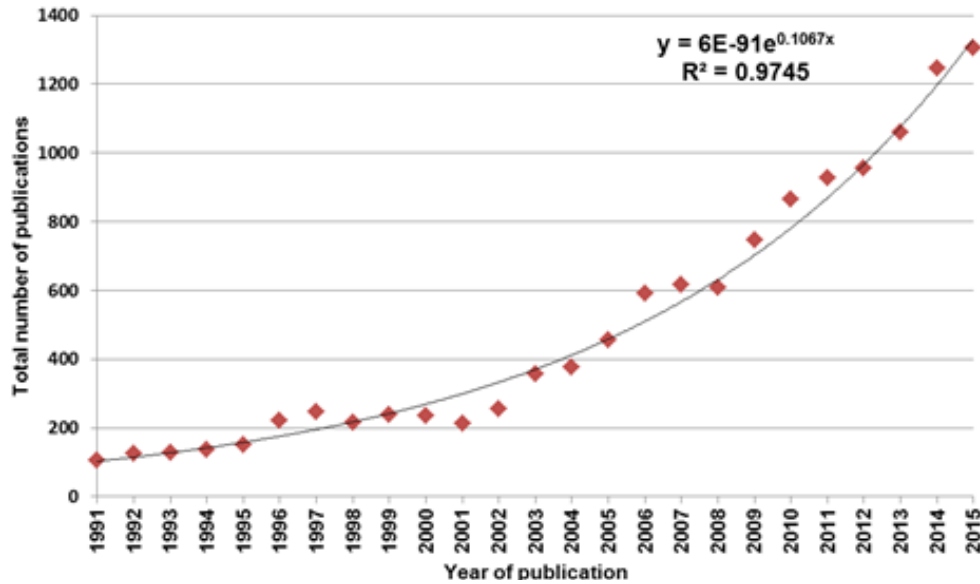
A total of 16,662 articles were retrieved when we conducted a search by using country affiliation "Tanzania" as the search term. In order to confirm that these articles were published by the Tanzanian scholars, we conducted a search by using the institutional affiliations of authors. We also excluded articles that were not published by authors in Tanzania, which had been accidentally included in the original set. Finally, we retrieved a total of 12,379 articles that were published by Tanzanian scholars, and they were finally used for analysis.

## RESULTS

The study findings indicate that the research publications increased exponentially to a total of 12,379, and the highest number of publication (1307) was recorded in 2015 (Figure 1).

There was more than 12.5 fold increase in number of articles per year from 105 in the year 1991 to 1,327 articles in the year 2015, which is a 92% increase in publications. A rapid growth in annual publication turnover was witnessed after 2000, for example the number of articles doubled in 4 years from 235 in 2000 to 456 publications in 2005. The results further indicate that most researchers published journal research articles (83.9%) (Table 1), which were followed by reviews and





**Figure 1.** Annual increase of research articles in Tanzania from 1991 to 2015.

**Table 1.** Publication types published by Tanzanian scholars.

Publication type	Number (%)
Articles	10392 (83.9)
Reviews	587 (4.7)
Conference papers	579 (4.7)
Book chapters	393 (3.2)
Letters	169 (1.4)
Others	224 (1.8)
Books	35 (0.3)
Total	12379 (100)

Other = editorials, erratum and notes.

conference presentations, each contributed 4.7%.

The study results further show that Muhimbili University of Health and Allied Science (MUHAS) was the leading Institution with a cumulative total of 2009 articles during the 24 years, accounting for 16.2% of all publications in the study period (Table 2). Other institutions with high number of publications were University of Dar es Salaam, Sokoine University of Agriculture and National Institute for Medical Research. None of the institution maintained the same rank over the study period (Figure 2). In 2015, Sokoine University of Agriculture (SUA) was the leading institution with 183 articles compared to University of Dar es Salaam (UDSM) and MUHAS, which had 178 and 168 publications, respectively.

The subject-wise breakup of all publications published in the years 1991 to 2015 indicates that nearly half of the publications (55.5%, n=6868) belonged to the medicine subject category, which was followed by agricultural and

biological sciences (42.5%, n=5260) and immunology and microbiology (22.5%, n=2781) (Table 3).

The distribution of articles in journals showed that most Tanzanian researchers published in journals in the field of medical sciences, which was followed by agricultural journals. Table 4 indicates that most researchers had published in the Plos One Journal (n=328), which was followed by Malaria Journal and Tanzania Journal of Health Research.

However, most articles that had received high number of citations were published in the Lancet journal (n=10.354), which was followed by Malaria journal and New England Journal of Medicine with 6.013 and 5.506 citations, respectively. The journals showed variations in ranking based on number of articles, citation, and average number of citations per publication in that journal as shown in Table 4.

The top six most cited publications with more than 500

**Table 2.** Overall Institution publications rank in the study period 1991 to 2015.

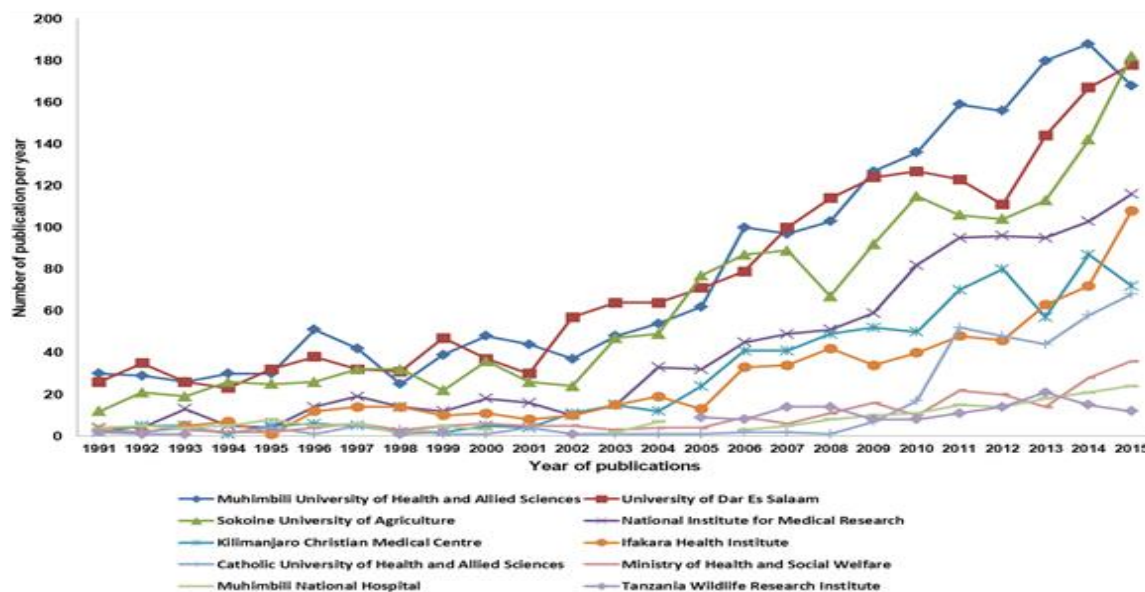
<b>Name of institution</b>	<b>Number of publications (%)</b>
Muhimbili University of Health and Allied Sciences	2009 (16.2)
University of Dar es Salaam	1880 (15.2)
Sokoine University of Agriculture	1571 (12.7)
National Institute for Medical Research	1004 (8.1)
Kilimanjaro Christian Medical Centre	703 (5.7)
Ifakara Health Institute	664 (5.4)
Catholic University of Health and Allied Sciences	332 (2.7)
Ministry of Health and Social Welfare	226 (1.8)
Muhimbili National Hospital	184 (1.5)
Tanzania Wildlife Research Institute	142 (1.1)
University of Dodoma	104 (0.8)
Tanzania Fisheries Research Institute	98 (0.8)
Ardhi University	82 (0.7)
Nelson Mandela African Institute of Science and Technology	80 (0.6)
International Institute of Tropical Agriculture	69 (0.6)
African Medical and Research Foundation	68 (0.5)
Veterinary Investigation Centre	67 (0.5)
Haydom Lutheran Hospital	61 (0.5)
Wildlife Conservation Society	60 (0.5)
Kongwa Trachoma Project	58 (0.5)
Tanzania Food and Nutrition Centre	58 (0.5)
Open University of Tanzania	53 (0.4)
Tropical Pesticides Research Institute	50 (0.4)
Africa Rice Center	46 (0.4)
Tanzania Forestry Research Institute	44 (0.4)
Tanzania National Parks	44 (0.4)
Kilimanjaro Clinical Research Institute	39 (0.3)
Mzumbe University	37 (0.3)
Hubert Kairuki Memorial University	34 (0.3)
Dar es Salaam Institute of Technology	33 (0.3)
Helminth Control Laboratory Unguja	33 (0.3)
Ocean Road Cancer Institute	31 (0.3)
Other institutions	2415 (19.5)
<b>Total</b>	<b>12379 (100)</b>

citations had a total of 2.8% (n=5285) citation out of 186,777 citations from all Tanzanian publications in the study period (Table 5). The top 20 prolific authors in Tanzania had published 2,207 (17.8%) of all publications and included many publications from the field of health sciences (Table 6).

With respect to the number of publications, J. Fawzi was the most prolific author (200 publications), who was followed by M. Schellenberg (163 publications) and R. Tanner (162 publications). When ranked based on the citation counts, M. Schellenberg ranked the first (7258 citations), who was followed by R. Tanner (7002 citations) and H. Hayes (5138 citations). With respect to the number of cites given to each individual's publications, P. Mayaud ranked the first with 115.6 cites per paper though

with average rank of 59. M. Schellenberg and R. Tanner had the highest h-index of 46, meaning that their 46 publications had been cited 46 or more times each, and the rest of the publications had fewer than 46 citations.

When more weight is given to the authors' highly cited publications, M Schellenberg again ranked the first (g-index 81), who was followed by R. Tanner (g-index 80) and H. Hayes (g-index 70 each). By giving more weight to newly published works, R. Tanner topped the list (Hc-index 28), who was followed by M. Schellenberg (Hc-index 27), J. Fawzi (Hc-index 25) and S. Mshinda (Hc index 24). With regard to the HI norm-index which evaluates the effects of co-authorship, M. Schellenberg and R. Tanner occupied the first position with HI-norm index of 14, who was followed by J. Fawzi and S.



**Figure 2.** Annual progress of top 10 performing institutions in Tanzania.

**Table 3.** Subject classification of publications for all the 12,379 Tanzania publications from 1991 to 2015 (Some articles have more than one subject area).

Subject area of publications	Number of publications
Medicine	6868 (55.5)
Agricultural and Biological Sciences	5260 (42.5)
Immunology and Microbiology	2781 (22.5)
Environmental Science	2309 (18.7)
Biochemistry, Genetics and Molecular Biology	1853 (15)
Social Sciences	1800 (14.5)
Earth and Planetary Sciences	1017 (8.2)
Veterinary	865 (7)
Engineering	572 (4.6)
Pharmacology, Toxicology and Pharmaceutics	532 (4.3)
Chemistry	419 (3.4)
Economics, Econometrics and Finance	355 (2.9)
Computer Science	274 (2.2)
Business, Management and Accounting	258 (2.1)
Energy	247 (2)
Arts and Humanities	232 (1.9)
Nursing	228 (1.8)
Psychology	190 (1.5)
Multidisciplinary	183 (1.5)
Chemical Engineering	177 (1.4)
Physics and Astronomy	176 (1.4)
Mathematics	175 (1.4)
Health Professions	168 (1.4)
Materials Science	167 (1.3)
Neuroscience	148 (1.2)
Dentistry	116 (0.9)
Decision Sciences	58 (0.5)
Undefined	17 (0.1)

**Table 1.** Journal ranking with respect to three measures; total citations, total number of publications and average citation per publication, ranking is shown in brackets. Journals are listed in the order of average rank of the three measures.

Average rank	Journal	Total citations (Rank)	Total publications (Rank)	Average citation (Rank)
1	Lancet	10354 (1)	108 (10)	95.9 (12)
2	New England Journal of Medicine	5506 (3)	26 (66)	211.8 (3)
3	Nature	3600 (8)	21 (78)	171.4 (4)
4	Science	2662 (11)	25 (71)	106.5 (9)
5	AIDS	3668 (7)	92 (15)	39.9 (76)
6	Journal of Infectious Diseases	2713 (10)	82 (16)	33.1 (110)
7	American Journal of Tropical Medicine and Hygiene	3924 (6)	136 (7)	28.9 (145)
8	Transactions of the Royal Society of Tropical Medicine and Hygiene	3431 (9)	125 (9)	27.4 (162)
9	Tropical Medicine and International Health	4885 (4)	213 (4)	22.9 (219)
10	Malaria Journal	6013 (2)	287 (2)	21 (248)
11	PLoS ONE	3942 (5)	328 (1)	12 (452)
12	BMC Public Health	1414 (24)	128 (8)	11 (491)
13	East African Medical Journal	1521 (20)	188 (5)	8.1 (629)
14	Nature Genetics	835 (40)	3 (692)	278.3 (2)
15	Journal of Personality and Social Psychology	280 (102)	2 (916)	140 (6)
16	Livestock Research for Rural Development	437 (66)	154 (6)	2.8 (992)
17	Journal of Cross-Cultural Psychology	267 (108)	2 (968)	133.5 (7)
18	Tanzania journal of health research	474 (61)	247 (3)	1.9 (1101)
19	Journal of Experimental Medicine	285 (99)	2 (1086)	142.5 (5)
20	Nature Medicine	332 (83)	1 (2176)	332 (1)
21	Nature Reviews Microbiology	127 (211)	1 (2174)	127 (8)
22	Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science	105 (255)	1 (2222)	105 (10)

**Table 2.** Highly cited articles.

Publication	Number of citations	Tanzania Institution
Haynes et al.(2009). A surgical safety checklist to reduce morbidity and mortality in a global population. New England Journal of Medicine	1914	St Francis Designated District Hospital
Grosskurth et al. (1995). Impact of improved treatment of sexually transmitted diseases on HIV infection in rural Tanzania: Randomized controlled trial. The Lancet	1061	African Medical and Research Foundation (AMREF)
Sankaran et al. (2005). Determinants of woody cover in African savannas. Nature	649	University of Dar Es Salaam
Tishkoff et al. (2007). Convergent adaptation of human lactase persistence in Africa and Europe. Nature Genetics	592	Muhimbili University of Health and Allied Sciences
Tishkoff et al. (2009). The genetic structure and history of Africans and African Americans. Science	562	Muhimbili University of Health and Allied Sciences
Olldashi et al. (2010). Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): A randomised, placebo-controlled trial. The Lancet	507	Muhimbili Orthopaedic Institute

Mshinda with indices of 13 and 12 respectively. Overall, M. Schellenberg ranked the first, who was followed by R.

Tanner, H. Hayes, S. Mshinda and J. Kapiga (Table 6). There was a high level of collaboration with three quarters

**Table 6.** Ranked list of prolific Tanzania scholars.

Author name	Number of publications	Number of citations	Cites per paper	H-index	G-index	HC-index	HI-Norm	Average position
Schellenberg M.	163 (2)	7258 (1)	44.5 (66)	46 (1)	81 (1)	27 (2)	14 (1)	1
Tanner R.	162 (3)	7002 (2)	43.2 (75)	46 (2)	80 (2)	28 (1)	14 (2)	2
Hayes H.	112 (7)	5138 (3)	45.9 (62)	40 (5)	70 (3)	20 (12)	10 (16)	3
Mshinda S.	117 (6)	4821 (6)	41.2 (86)	41 (4)	67 (5)	24 (4)	12 (5)	4
Kapiga J.	92 (13)	4507 (8)	49 (52)	29 (16)	67 (6)	23 (5)	10 (17)	5
Todd H.	101 (9)	4951 (5)	49 (51)	34 (9)	70 (4)	19 (15)	9 (26)	6
Grosskurth H.	63 (36)	4722 (7)	75 (12)	31 (13)	63 (8)	16 (35)	9 (32)	7
Reyburn C.	77 (19)	3286 (13)	42.7 (77)	30 (14)	57 (13)	23 (6)	11 (7)	8
Lengeler C.	62 (38)	2913 (18)	47 (60)	35 (7)	54 (15)	21 (10)	11 (10)	9
Drakeley G.I.	41 (76)	3293 (12)	80.3 (10)	28 (22)	41 (30)	21 (11)	11 (11)	10
Msamanga S.	103 (8)	3562 (11)	34.6 (118)	33 (10)	57 (12)	19 (14)	13 (4)	11
Abdulla G.	123 (5)	4094 (10)	33.3 (129)	35 (6)	62 (10)	22 (7)	10 (15)	12
Killeen WW.	75 (23)	2680 (20)	35.7 (114)	33 (11)	51 (17)	20 (13)	11 (8)	13
Fawzi J.	200 (1)	5130 (4)	25.7 (196)	41 (3)	64 (7)	25 (3)	13 (3)	14
Changalucha J.A.	155 (4)	4309 (9)	27.8 (164)	34 (8)	62 (9)	21 (9)	10 (14)	15
Crump Z.	74 (24)	3279 (14)	44.3 (69)	28 (20)	58 (11)	22 (8)	7 (79)	16
Premji F.	73 (25)	2504 (21)	34.3 (122)	31 (12)	49 (19)	18 (19)	10 (19)	17
Mosha M.	56 (43)	2844 (19)	50.8 (47)	25 (29)	54 (16)	16 (36)	8 (58)	18
Lemnge D.	87 (16)	3138 (15)	36.1 (111)	28 (18)	55 (14)	17 (25)	8 (52)	19
Mabey T.K.	40 (85)	2946 (17)	73.7 (13)	25 (30)	40 (36)	15 (51)	9 (39)	20

of publications (73%, n=9075) being co-authored with international scholars. The top collaborating countries were the United States (21.6%) and the United Kingdom (20.2%). The top African collaborator was Kenya, which contributed 7% of all collaborations with the Tanzanian researchers (Table 7). The results further indicate that ninety percent of publications were multi-authored and nearly half of research articles were authored by six or more authors (40.7%) (Table 8).

## DISCUSSION

The use of scientometrics can help countries to make informed political decisions with regards to achieving sustainable development goals. The scientific research and scientific publication are requirements for the creation of the necessary long-term potential for sustainable economic development (Confraria and Godinho, 2015).

The study reveals an exponential growth of articles spanning over 24 years; between the year 1991 and 2015. The propensity to publish in the Tanzania has grown at a high speed since 2004-2008, suggesting that a possible take-off of Tanzania science similar to trend observed in other countries in sub-Saharan Africa (Pouris and Ho, 2014; Confraria and Godinho, 2015; Breugelmans et al., 2015).

This period was marked by the establishment of new

private and public universities which might have contributed to the growth of research publications in Tanzania. Similarly, the increase in number of publications from 2004 was observed by other countries in Africa and this may be due to presence of international collaborations such as the presence of medical and Tropical research centers focusing in poverty diseases in East Africa (Breugelmans et al., 2015).

Notable productivity of African science, as measured by publications to gross domestic product, has risen in recent years to a level above the world average (Confraria and Godinho, 2015). However, it is argued that looking at the equivalent ratio after it has been normalized by population; there is still a huge gap to overcome (Confraria and Godinho, 2015). It is therefore important to analyze the growth rate with respect to the country population and the number of researchers in a given institution.

The research on medical sciences appears to be the leading research field in Tanzania. Other important subjects were agriculture and biological sciences, and immunology and microbiology. This is in concordance with other studies which indicate that Africa's research outputs are greatly represented in the fields of health sciences which is similar to the coverage of world's publications (Abrahams et al., 2009; Confraria and Godinho, 2015).

The high contribution of research publications in health-related sciences, such as medicine and immunology and

**Table 7.** Top collaborating countries in published literature during 1991 to 2015.

<b>Country</b>	<b>Number of articles</b>	<b>% of all articles</b>
United States	2673	21.6
United Kingdom	2496	20.2
Kenya	870	7.0
The Netherlands	752	6.1
Switzerland	741	6.0
South Africa	724	5.8
Sweden	715	5.8
Germany	661	5.3
Denmark	627	5.1
Norway	576	4.7
Uganda	559	4.5
Belgium	472	3.8
Canada	364	2.9
Japan	326	2.6
Australia	314	2.5
France	305	2.5
Italy	294	2.4
Nigeria	236	1.9
Ghana	219	1.8
Zambia	211	1.7
Spain	205	1.7
India	200	1.6
Malawi	193	1.6
Ethiopia	182	1.5
Zimbabwe	169	1.4
Austria	155	1.3
Thailand	144	1.2
China	139	1.1
Finland	134	1.1
Mozambique	130	1.1
Brazil	127	1.0
South Korea	125	1.0

**Table 8.** Authorship patterns of Tanzania scholars between the years 1991 to 2015.

<b>Category of authorship</b>	<b>Number of publications (%)</b>
Single author	1206 (9.7)
Two authors	1504 (12.1)
Three authors	1713 (13.8)
Four authors	1607 (13)
Five authors	1308 (10.6)
Six/More authors	5041 (40.7)
Total	12379 (100)

microbiology, may stem from research work on tropical diseases and specific health problems, and the visible presence of international cooperation between Tanzanian

researchers and those overseas (Gondwe, 2010; Confraria and Godinho, 2015).

The prosperity of health related research may also be

due to increase of funding in these areas by organizations such as Swedish International Development Cooperation Agency (SIDA), the European and Developing Countries Clinical Trials Partnership (EDCTP), Wellcome-Trust, and National Institute for Health (NIH) among others (Breugelmans et al., 2015).

The ranking of agricultural sciences seems reasonable, given the needs of the Tanzania to depend on agriculture. Similar trend and the significance of agriculture applies to other studies in Africa (Abrahams et al., 2009; Confraria and Godinho, 2015). Therefore, scientific specialization, in Tanzania is not quite different from the overall Africa's specialization in areas of medical research and Agriculture. However, compared to the world patterns, agricultural sciences are relatively more important in Africa (Confraria and Godinho, 2015).

Accordingly, a number of health institutions including medical universities and research institutions appear to rank high in the list of contributors of Tanzanian science in our analysis. The most prolific institution in the 24 years period was Muhimbili University of Health and Allied Sciences (MUHAS), which produced a volume of 16.2% (n=2009) of all publications. The top 3 institutions alternated the first to third rank. In 2015, the leading institution was SUA followed by UDSM and MUHAS. These results coincide with web ranking of Tanzania University in 2016 (Ranking web of Universities United Republic of Tanzania, 2016).

The authorship pattern is dominated by multiple authors (90.3%), indicating a high degree of collaboration among Tanzanian scholars. Furthermore, collaboration between Tanzania and international researchers is quite high at 73%. In other studies, it was noted that collaborative patterns among African scholars are substantially higher than in the rest of the world (Pouris and Ho, 2014; Nature, 2015). Tanzania Scientists that collaborate with peers in Europe and US are likely to receive more scholarly impact as reflected in their citation impact (Confraria and Godinho, 2015; Breugelmans et al., 2015). Papers that had more citation impact were those papers that were coauthored in collaboration with international researchers.

The top 20 scholars comprise mostly researchers in the field of health. The list includes both Tanzanian native scholars and foreign scholars working in Tanzania. The productivity and impact of the top 20 scholars varied in various metrics since no single scholar maintained the same rank in all metrics. For instance, some of the top scholars in terms of publications had fewer citations compared to some scholars with fewer publications.

Hence, these findings support the argument that research performance is a complex multifaceted endeavor that cannot be assessed using a single indicator (Smith and Katz, 2000). This confirms the fact that citation counts depend on several factors other than the number of publications.

Moreover, the ranking of researchers in this study was

based on publications and citations that were available online covering the mentioned period. This means that some senior researchers could rank differently if their productivity and impacts were measured based on their career life and if offline publications and citations were retrieved.

The top six most cited publications had received more than 500 citations each. All these top six papers had multiple authors. These findings suggest that citation counts rely on several factors including the number of authors, accessibility of journals where articles are published, the age of the publication, the quality of the publication, the size of the scientific community, the topic which one publishes (Bornmann and Daniel, 2008) and the visibility of collaborating authors.

Moreover, the top ranking journals with high number of citations were the high impact journals such as Lancet and New England Journal of Medicine. Malaria journal, an open access journal ranked second in both number of articles and citations rank. Medical researchers in this area should consider the online and open access journals to boost their impact and visibility. One local journal, the Tanzanian Journal of Health Research was ranked third in the number of articles, however the journal was ranked poorly in the average number of citations with each articles receiving less than 2 citations. This underscores the need for Tanzania authors to publish in the highly visible e-journals and open access journals in order to improve their visibility and citation impact.

## Conclusions

The amount of research publications from Tanzania increased exponentially from 1991 to 2015. Collaborative research with external partners had a higher impact, and it was more cited than non-collaborative research. This, work emphasizes the importance of research collaboration among African countries and others, on common issues related to economic growth and sustainable development.

## LIMITATIONS

The study had several limitations. We used Elsevier's Scopus (Elsevier, 2016) database to analyze research impact of Tanzanian scholars over other online databases alternatives such as Thomson's Reuters Web of Science (WOS) database.

Scopus covers about 20,000 journals compared to 13,000 journals which are hosted by WOS (Mongeon and Paul-Hus, 2016). Moreover, the database is updated on daily basis rather than weekly. This gives opportunity to get a wider coverage of publications. The coverage of data in WOS with English-language journals is very comprehensive. One limitation of the WOS is that

coverage of non-English-language journals is less extensive, although this has recently increased with the inclusion of French and Portuguese journals. In a study of pharmacy and pharmacology journals, Gorraiz and Schloegl (2008) found that Scopus reported a higher citation rate for health relevant articles as compared to WOS possibly because Scopus indexes more biomedical journals than WOS.

Gorraiz and Schloegl (2008) further revealed that both WOS and Scopus databases differ in the number of articles within a tolerable margin of deviation for most journals when pharmacy and pharmacology journals research were analyzed from both databases. In addition, Scopus database is periodically updated with previous articles. Therefore, results from Scopus need to be interpreted with caution when one compares these data with other databases. Another potential limitation of our analysis is the method used to assign papers to organization. Authors often report their affiliations in different ways for different publications. Even though, we used an algorithm to unify these affiliations, some authors who published in foreign countries may have been excluded in the analysis. Moreover, scientists from foreign countries working in Tanzania were also counted as Tanzanian scholars.

The findings imply that researchers should continue to collaborate with external partners within and outside the country to increase the impact of their scientific works. Moreover, these findings can be used by the Tanzanian government to prioritize research funding for research institutions and increase budget to support research activities to more than the current 1% of the Gross Domestic Product (GDP). This initiative will enable researchers, policy-makers and service providers to collaborate in efforts to bridge the gaps between research, policy and practice for the country to progress from a low- to a middle-income country.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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*Full Length Research Paper*

# **An appraisal of the impact of grant-in-aids (Tetfund) and donations in sustaining academic library services in Nigeria: The cross river state experience**

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The study surveyed the impact of grant-in-aids Tertiary Education Trust Fund (TETFUND) and donations/gifts as alternative sources of funding to support academic libraries in Cross River State, Nigeria. The survey design method was used to carry out the study. A modified six-point Likert-type scale questionnaire was designed to measure responses on sources of library funding and support through grant-in-aids (TETFUND) and donations/gifts from the institutions studies. The vetted instrument was administered on 30 senior management librarians from five (5) academic institutions in the state. The internal consistency of the instrument laid in the range (0.729<Yxx<893) with across the time stability in the range (0.706<Ytt<0.796) measured via Cronbach alpha and test-retest reliability respectively. The study found that grand-in-aids and donations/gifts have been playing vital supportive role in the funding of academic libraries. However, librarians on their part were not exploiting this avenue enough in their collection development strives. The author recommends that more efforts in this direction should be explored by librarians and that training on grant proposal writing for them should be provided to encourage, strengthen and equip them with skills to more seriously pursue these options.

**Key words:** Funding, library resources, academic libraries, grant-in-aids (TETFUND), donations/gifts.

## **INTRODUCTION**

Oyegunle (2013) defines academic library as a library that is attached to academic institutions above the secondary school level, serving the teaching and research needs of students and staff which serve two complementary purposes to support the school curriculum and to support the research of the university faculty and students. As Otubelu (2010) observes, academic libraries

in tertiary institutions occupy position as the hub of all academic activities and such libraries have always emerge almost simultaneously with the Libraries provide useful services to the user community by selecting, acquiring and organizing information sources which support the overall vision and mission of their parent institution. The development of an academic parent

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institutions library collection is not just the duty of the librarian but a cooperative effort between librarians, the teaching faculty and students. The philosophy of an academic library focuses on providing active learning spaces and diverse services to meet the various needs of the students, faculty staff and entire parent institution (Oyegunle, 2013). A deficient collection can have adverse implication for the institution. It is imperative that libraries should be developed to meet the aspirations of patrons. Achieving, this is becoming herculean.

Funding has always been very great challenge to libraries. Libraries cannot on their own generate enough funds adequate to run their services. They depend on funds allocated from their parents' institution and these funds are almost always inadequate to meet library needs.

Impediments to library (circulation) services to the increase in information needs of users, and (cost of information resources) without a corresponding increase or provision of modern facilities. Lack of sufficient funds to build, procure and maintain basic infrastructure and equipment is real. Other challenges in recent times include digitalization of collections, electronic access, competition from online search engines, information literacy, value added services for 'new students and faculty and the education and skills needed by today's libraries to address these issues (Oyegunle, 2013).

In the face of continued budget cuts and reduced allocation from governments and proprietary authorities to libraries, many self-help options have been contemplated. While Lawal (2002) opines "partial recovery of academic cost", the process whereby the sources of the students, Popoola (2005) suggests that managers of information systems should embark on priced based information services which will enable them to recover their cost. He reiterated that libraries must be capable of generating revenue of possible making maximum profit using appropriate pricing policy and concluded that any good and service that is provided free is never valued.

The success of the implementation of this option has in our libraries has not been reported in the literature apart from moderate charges on photocopying, bindery services and library services fees paid in some institution. Another significant areas where libraries have also generated support for services from special grant-in-aids are donations/gifts from organizations, friends of the library fund raising campaigning and alumni support. An attempt is being made here to appraise the level to which grant-in-aids and donation and gifts are playing to support library funding and services in Cross River State, Nigeria.

### **Statement of the problem**

As earlier emphasised, funding is very critical to the sentence of services provided in academic libraries. The down-turn in the economy, resulting in continuous cuts in

library budgets and worsened by inflation and in rising cost information resources has aggravated library funding challenges. Libraries are increasingly finding it difficult or unable to procure requisite materials nor sustain basic services required of them. Alternative sources of funding must out of necessity be sourced to assist in ameliorating or help solve the problem. This study seeks to appraise how grant-in-aids and donations/gifts are helping to fill this yawning gap in helping to bail libraries from funding challenges.

### **Objective of the study**

The study was designed to investigate the extent to which academic libraries in Cross River State were using the options of Grant-in-Aids and donations/gifts to support the funding of their libraries and the extent to which they were satisfied with these options.

### **Research questions**

1. To what extent are academic libraries using the options of grant-in-aids and donations/gifts to support their library funding and services?
2. How regular are the supports in form of grant-in-aids and donations/gifts to support library services?
3. What is the extent to which academic libraries are satisfied with these alternative sources of funding?
4. To what extent can academic libraries rely on these options as sources of funding?

### **Delimitation of the study**

The study was delimited to public academic libraries in Cross River State, Nigeria. Five academic libraries were chosen in the study. Of these, two are federal government owned institutions, while three are state government owned. The University of Calabar, Calabar Library and the Federal College of Education, Obudu libraries are federal government owned while Cross River University of Technology (CRUTECH), Calabar Library, the College of Health Technology, Calabar and Cross River State College of Education Libraries are state owned. These institutions background, nature of establishment, management and socio-political and economic climates in which they operate are similar to other states in the country. Also, both government policies and regulatory agencies governing the institutions are the same, thus making generalization from a given state to another or geopolitical regions in the country inevitable or justifiable. Librarians in charge and heads of libraries who are library management staff considered competent to provide relevant information were used to complete the questionnaire instrument designed for the study.

## LITERATURE REVIEW

### Government funding/Parent institution

The main source of funding academic libraries in Nigeria in the public institutions is from government funds and grants. The funding model, formula or level is greatly dependent on whether the institution is private, state or federal government owned. In general, both states and federal government budgetary provisions/policies and funding allocations to higher education have overall influence on library financing and development.

Hisle (2002) observed that academic libraries in developing countries depend mainly on government funding and do not show any interest or experience in well organised fund raising programmes to generate the funds they require to sustain their services. He maintains that most institutions' libraries lack flexible administrative systems and neither do they have clear responsibility for organising fundraising assigned for libraries or university (institutions) administrators. So, most often, they rely on whatever is appropriated to the libraries from their managements.

Commenting on the underfunding of the educational sector, Inoyo (2014) in his convocation lecture titled "challenges and opportunities for university graduates in a season of economic and moral decay" decried the poor level of funding education in Nigeria. As a country, he noted we are still far off the UNESCO given recommendation that 26% of a country's total budget must be dedicated to education. He informed that in 2012, N400.15bn or 8.43%, 2013, N426.5bn or 8.7% and in 2014, N495.2bn or 9.9% out of the nation's total budgets respectively was allocated to the education sector despite a quantum growth in our gross domestic product (GDP) over the period (67.7billion in 2003 to 522.6 in 2013) representing 672% growth by World Bank statistics.

Ibok (1996) noted that the concern for an effective and efficient management of academic libraries has in the past years been expressed in many countries, including Nigeria. Most of the issues raised border on inadequate funding, the effect of inflation on library finances, poor accountability, unsatisfactory investment decisions which fail to consider new developments in the approach to academic instruction and/or take advantage of development in information technologies and apparent lack of concern for the plight of the libraries by government and university authorities which fail to allocate adequate funds to their libraries among others.

According to Ogundipe (2008), on recommendation of the National Universities Commission (NUC), ten percent (10%) of each university's recurrent budget is supposed to be allocated to the library. Ironically, he decries that the recommendation is never complied with for two obvious reasons. Firstly, that it is difficult to predict what grants eventually come from government to universities

through NUC and secondly too that whatever comes from the institutions' budget is dependent on not what the libraries request but on what is allocated to her after other competing demands for scarce resources in the institution. In practice, libraries most often receive less than their budgetary provision due to irregular grants from government or arbitrary cuts or withholding of funds by administrative fait to meet contending exigencies.

As a consequence of the aforementioned, Edoke (2001) pointed out that budgets of university libraries are negotiated with its parent institutions not based on operational cost, required information resources and services but on whatever the library is made to do with. Lawal (2002) remarked and rightly pointed out that the freedom of universities to allocate financial resources on the bases of internally established priorities does not augur well for libraries. He further maintains that due to competitive demands on limited budgets from faculties and departments, there is the temptation to lose sight of the library's role and arbitrarily cut her budget. The tendency to undermine the critical role libraries play in institutions through budgetary cuts borrowing or vive of library funds/allocations when the funds have not been accessed is not uncommon in academic libraries.

It is important and cautionary to note as Hiscock (1986) maintains that in order to justify its existence, the academic library needs to demonstrate a positive link between its use and the educational performance of undergraduates. Powell (1992) argued that libraries need to account for their costs because of keen competition from various departments for limited financial resources of the parent institution noting that to justify their existence, libraries need to be able to demonstrate that their resources and services are making a significant contribution to the education and research of their clientele.

Thus in evaluating and assessing libraries, Pritchard (1996) suggests that the library should move beyond inputs (for example, budgets, number of volumes in the collection) and instead focus on the performance measures associated with academic library's impact on undergraduates' educational outcomes. To attract and sustain funding libraries must therefore strive to show and demonstrate their relevance to their institutions.

Studies and surveys by scholars have revealed that libraries in Nigeria are operating in a resource constrained environment. According to Aguolu and Aguolu (2002), libraries in Nigeria do not only lack adequate funds to purchase books and required journals but that they cannot afford huge amount needed to purchase and maintain computers hardware, build and sustain infrastructure nor hire and keep requisite personnel. Ajibero (2003) and Madu (2008) citing Sofoluwe (2003) and Ojedokun (2008) have all decried poor funding by government as a major hindrance to not only virtual/electronic library services but the entire academic library development in Nigeria. Further commenting, Aguolu (2013) outlined the following

additional challenges for resources/collection development in Nigeria university libraries:

1. Inadequate budgetary allocation to libraries which limit their effort to acquire necessary materials.
2. The ever increasing cost of books and journals worldwide due to general inflation and
3. Delays in payment for materials ordered due to procedures involved in processing invoices for payment since most materials are imported and required sourcing for scarce foreign exchange/currency.

Given this scenario, alternative or supplementary source must be sought rather than depending on government alone.

### Donations and gifts

These are funds received from private foundations, government sponsored organisations, individuals, group or institutions in support of a worthy project or cause. These monies or grants sometimes do not come as windfalls. Recipients who are informed about their existence, and are needy write proposals to the grantors or donors/agencies to compete for the funds.

In general, the overriding principles behind these donations is the vision that all people especially the developing countries of Africa and the third world should have access to and contribute information, ideas, and knowledge necessary to improve and drive sustainable and equitable development.

In this light, the British Medical Association (BMA) and British Medical Journal (BMJ) set up a small fund to respond to request for health information from organisations in developing countries and other areas of need. The fund considers applications from medical schools, medical libraries and healthcare institutions. In the same lights, Book Aid International based in United Kingdom is a major supporter for libraries in sub-Saharan African. Book Aid International works with partners that give wide possible access to books and information to non-governmental organisations, universities, colleges, public libraries and schools.

Also, Books for Africa (BFA) founded in 1988, in USA is a non-profit organisation whose mission is to eliminate book famine in Africa. Ifidon (2006) reports that since it began operation, BFA has shipped over 7 million books to 22 African countries served by BFA of which Nigeria is a beneficiary. Others in this category and their affiliation include Brother's Brother Foundation (BBF) established in 1987, USA, Netherlands Periodical Project (NPP) and Ontario College of Family Physician, Canada. Many academic libraries benefited from these facilities in the past and there still exist opportunities for their exploitation and use. As Igbo and Dike (2006) report efforts from World Bank between 1990 to 1996 and Federal

Government European Union (EU) Project for State library development intervention had sufficed.

On their path, Olanlokun and Adekanye (2005) acknowledged donations of relevant and useful materials received from several individual and organizations both solicited and unsolicited for over a period of 23 years to the University of Lagos. A list of some of the donors agencies include the British Council, Ford Foundation USA, Carnegie Corporation, UNICEF, World Bank, National Population Commission of Nigeria, Council for the Development of Social Commission of Nigeria Council for the Develop of Social Research in Africa and Rotary Club of Victoria Island, Lagos among others some of these gifts they note were facilitated by teaching staff who interacted with their foreign colleagues and others who persuaded them to donate books and materials to the library.

### Grant-In-Aids (TETFund)

Reitz (2004) define these as funds received by a library or library system from a State or Federal Government agency in support of regular operations, or a special project or program, as opposed to funds derived from the community or district served.

In the time past, States and Federal Government have approved special grants to libraries of new institutions for the development of their stock especially in the beginning years. At other times, under due pressures from academic staff unions, government is forced to sign agreements for the capital provision for the upgrading of basic infrastructure/facilities like laboratories, workshops and libraries.

However, most of the pact signed are honoured more in the breach than being implemented.

Currently, the most practicable and substantial support enjoyed by academic libraries is under the former Education Tax Fund (ETF) now restricted to fund tertiary education alone called Tertiary Education Trust Fund (TETFUND). TETFund was established by Act No.7 of 1993 as amended because education was stabbed of funds and infrastructure and had deteriorated badly in all educational institutions.

In 2011, Act No.7 was repealed and substituted with Act No.16 which created TETFund and was refocused to intervene only in Public Tertiary Institutions which Section 20 of the Act defines as "a University, a Polytechnic or a College of Education". The specific mandate of the fund as provided in Section 7(i) of the Act No.16 as it pertain to the libraries is to disburse the amount in the fund to Federal and State tertiary educational institutions specifically for the provision or maintenance of:

1. Library buildings
2. Library books
3. Library journals and

**Table 1.** TETFund allocations 2001 to 2013.

<b>Beneficiary sector</b>	<b>Allocation</b>	<b>As at August 2014 Disbursement (₦)</b>	<b>As at August 2014 balance (₦)</b>
Universities	12,347,256,176.47	4,458,693,489.51	7,888,562,687.06
Polytechnics	6,353,500,000.00	2,396,375,000.00	3,957,125,000.00
Colleges of education	5,142,035,000.00	2,782,228,700.00	2,359,806,900.00
Total	23,842,791,176.57	9,637,296,589.51	14,205,494,587.06

#### 4. e-library services

It is very important to commend TETFunds role in her interventions especially in e-library services development as Ya'u (2003) stress that digital libraries has the opportunity to address the scarcity of teaching and research materials in the libraries of institution of higher education in Nigeria.

In specific terms, Jaji (2006) stated that TETFund over the years has supported the building of e-libraries or cybercafés in fifty (50) universities four (4) inter-university centres, forty-six (46) polytechnics, sixty (60) monotechnics and sixty-one (61) colleges of education in the country. In Cross River State, of the five tertiary institutions in the state, all but one which of the state college of Health Technology have benefited from TETFund intervention in e-library development.

Okiy (2006) applauded TETFunds timely intervention through funding for adopting and renovating library environment to not only accommodate e-library facilities and resources but also through workshops organized set sponsored by it across the six geo-political zone to ensure adequate service provision by staff to user. She also noted that through her international agencies like Ford Foundation, British Council, CIDA, UNESCO, UNICEF etc are contributing in ICTs development in Nigeria by accelerating access to computers, connectivity and localised internet content.

TETFund (2014) reported that between 2001 to 2013, it had allocated twenty-three billion, eight hundred and forty-two million, seven hundred and ninety-one thousand, one hundred and seventy-six naira, fifty-seven kobo (N23,842,791,176.57k) for library development in public tertiary institutions. Out of this sum, a total of nine billion, six hundred and thirty-seven million, two hundred and ninety-six thousand, five hundred and eighty-nine naira, fifty-one kobo (N9,637,296,589.51k) had been accessed as at August 2014 leaving a balance of Fourteen billion, two hundred and five million, four hundred and ninety-four thousand, five hundred and eighty-seven naira, six kobo (N14,205,494,587.06k) to be accessed. The allocation is presented in Table 1. TETFund has continued to play very vital role in the development and sustenance of library services through her intervention funds for information resources, equipment and infrastructure. Agbedo (2015) in the Guardian Newspaper features article reported that TETFund under the leadership of Prof. Bogoro was not only working but

was bridging the gap between industry and classroom by funding and sustaining materials and infrastructure for teaching and learning. It credited all basic infrastructure fund in tertiary institutions to TETFund, including libraries. Adamu (2017) reported that although TETFUND "Special Intervention" has been removed from 2017 budget due to the current economic crunch in the country, its annual interventions have remained sustained.

Guidelines for accessing the fund are usually spelt out in the letters of award to beneficiary libraries. These involve a written proposal of what the institution intends to use the fund for, accompanied by a performance invoice or invoices for items for purchase and bill of quantities for construction jobs. From the table above, it is evident that none of the institutions have been able to access or fully utilize funds allocated to them. Only about 30.06% of universities, 37.6% of the polytechnics and 54.08% of colleges of education fund have been utilized. This puts a question mark on the capacities and seriousness of librarians in charge to access these library funds given their precarious funding environment.

Other additional conditions required before libraries could access the funds noted by Adamu (2017) include (1) Libraries must produce evidence of properly constituted library development committees of their institutions, (2) submit library development policy and guide in line with TETFund template and (3) submit list of resources, tools and equip to be procured among other requirements. TETFunds complain of major constraints to accessing these funds from beneficiaries' libraries to include amongst others the following:

1. Piece Meal submission to TETFund by beneficiary libraries.
2. Poor packaging and non-compliance with TETFund implementation guidelines even after discussions and consensus at annual strategic meetings and
3. Constant request for substitution of approved items after disbursement of funds.

Bamigboye et al. (2015) carried out a survey on the funding of academic libraries in Nigeria through TETFund intervention grants. They observed that the funds were regular and that all the federal and state government owned institutions benefited from the grants.

Despite the obvious benefits of the fund, the study also found that libraries faced a lot of problems in accessing the funds. They reported that there were delays in

inspection and approval of completed projects to enable libraries access new interventions. The result of the aforementioned is that many libraries are often in arrears of several years of fund allocated but not accessed or used. According to this study, TETFund puts the blame on libraries for the following reasons:

1. Delays in the submission of projects for reconciliation and approval by institutions
2. Non-completion of ongoing projects which do not allow such institutions to access the succeeding year's project or intervention and
3. Insufficient documentation to substantiate proposed projects as well as completed ones in line with TETFund's guideline and template.

Surely a more purposeful and sustained effort need to be made on the part of libraries to jump at such opportunities as provided by TETFund to make a change to their libraries. Libraries cannot cry wolf of underfunding when opportunities for available funds cannot be utilized. The implication from the above is that the complain of some heads of libraries of inadequate funding is not far from their lack of capacity and initiative to access and utilize fund even if they are available.

## METHODOLOGY

A 21-item questionnaire called funding Nigeria academic libraries through grants-in-aids, and donated and gifts source was developed for this study. The questionnaire was divided into two (2) sections (A and B). Section A was designed to collect demographic data of respondents while section B built on a six-point Likert scale and divided into two parts was designed to measure sources of library funds variables of the parent institutions and internally generated revenue respectively.

Each section of part B of the questionnaire consisted of seven (7) items. The items were vetted by faro measurement experts from University of Calabar and Cross River University of Technology, Calabar. The vetted instrument was pilot tested by administering it on a sample of twenty (20) senior library staff. The internal consistency of the two parts lied in the range ( $0.729 \leq r_{tt} \leq 0.893$ ) with across time stability in the range ( $0.706 \leq r_{tt} \leq 0.796$ ) measured via Cronbach alpha and test-retest reliability respectively. The demographic description of the study sample is given in Table 1.

From Table 2, it can be seen that there were five (5) institution involved, with six (6) respondents from each academic library. Of this number, twenty-one (21) representing 70% were males while nine (9) representing 30% of the samples were females. In terms of rank, there were five (5) university/college librarians' three (3) Deputy/Chief librarians, eight (8) Senior/Assistant Chief Librarians, seven (7) each of librarian I and II of principal and senior librarian. Five (16.7%) each came from acquisition/resource development unit, five (16.7%) from processing, six (20.0%) from reader Five (16.7%) each came from acquisition/resource development unit, five (16.7%) from processing, six (20.0%) from reader services/circulation, five (16.7%) from reference, five (16.7%) from serials/periodicals and four (13.3%) from Bindery/Reprography units.

In terms of their educational qualification, 17 (56.7%) had bachelor's degree six (20.0%) master's degree and seven (23.3%) doctorate degrees. None of the respondents was single and none was separated. There were 28 (93.3%) married persons, one (3.3%)

divorced and one (3.3%) widowed.

In terms of their years of working experience, none had worked for less than 5 years, one (3.3%) between 5 and 9 years, 7 (23.3%) between 10 and 14 years, 11 (36.7%) between 15 and 19 years, 10 (33.3%) between 20 and 24 years and one (3.3%) between 25 and 29 years. None had worked for more than 30 years. Thus, the sample was considered heterogeneous enough for an inferential study of this nature.

## RESULTS

For each variable built on the six-point Likert scale, frequency of responses and their percentage were weighted such that a response of strongly agree (SA) was awarded 6 points, agreed (A), 5 points, tend to agree (TA) 4 points, tend to disagree (TD) 3 points, disagree (d) 3 points and strongly disagree (SD) one (1) point; if item is positively worded. The scoring was reversed of the item was negatively worded. The weighted score were then added for each section. The resulting data were analysed using statistical package for social sciences (SPSS) version 18.0. simple frequency counts, percentages, descriptive statistics (mean, standard deviation etc.) The frequency analysis of response to items on parent institution was done using frequency counts and simple percentages. The result is presented in Table 2.

From Table 3, there was about an even split in the opinion of the respondents on whether donations and gifts form a substantial source of their library funds while 46.7% agreed with the statement, 53.3% (higher) disagreed, there was no "strongly agreed" response just as there was no "strongly disagreed" response. About 56.6% disagreed with the statement that they have been receiving regular donations and gifts for their libraries in the past five years while 43.4% agreed.

To the issue of relying on donation funds, 90% of them said they cannot while only 10% said they could do that they also almost completely disagree (73.4%) with the statement that they have had regular donations/gifts for their libraries in the past five years. When the issue sufficiency of donations and gifts in sustaining library services was put to them, all of them disagreed.

About 80% of the respondents disagreed with the statement that they have never received donations or gifts for the functioning of their library while 20% of them agreed. About 70% of them agreed that relying on donation and gifts for the proper functioning of their libraries, will be very disastrous. From Table 4, 80% the respondents disagreed with the statement that their library had not received any grants- in-aid for the past five years but 20% agreed. There was about an even split on the issue of satisfaction with the grants-in-aid received, as 56.7% agreed while 43.3% disagreed. About 76.7% of the respondents agreed that grants-in-aid have contributed significantly to their funds while 23.3% disagreed.

However, 63.3% of them agreed that the grants-in-aid

**Table 2.** Demographic description of study.

Demographic variable	Category	Frequency	Percentage (%)
Institution	Unical, Calabar	6	20.0
	Crutech, Calabar	6	20.0
	COE, Akamkpa	6	20.0
	FCE, Obudu	6	20.0
	College of Health Technology, Calabar	6	20.0
	Total	30	100.0
Gender	Male	21	70.0
	Female	9	30.0
	Total	30	100.0
Rank	University/College librarian	5	16.7
	Deputy University/Chief librarian	3	10.0
	Snr./Ass. Chief librarian	8	26.7
	Librarian I/Principal librarian	7	23.3
	Librarian II/Senior librarian	7	23.3
	Total	30	100.0
Unit	Acquisition/Resource development	5	16.7
	Processing	5	16.7
	Readers Service/Circulation	6	20.7
	Reference	5	16.7
	Serials/Periodicals	5	16.7
	Bindery/Reprography	4	13.3
	Total	30	100.0
Highest level of education attained	Bachelor's degree	17	56.7
	Master's degree	6	20.0
	Doctorate degree	7	23.3
	Total	30	100.0
Marital; Status	Single	-	-
	Married	28	93.3
	Divorced	1	3.3
	Separated	-	-
	Widowed	1	3.3
	Total	30	100.0
Years of working experience	Below 5 years	-	-
	5-9 years	1	3.3
	10-14 years	7	23.3
	15-19 years	11	36.7
	20-24 years	10	33.3
	25-29 years	1	3.3
	30 and above	-	-
	Total	30	100.0

they have received cannot sustain their library materials and services while 36.7% disagreed. On regularity, about

60% agreed that grants-in-aid to their library has been regular while 40% disagreed. To the item "we can rely on



**Table 3.** Analysis of responses to items on donation and gifts as a source of library Finances.

Items content	Statistics	Responses					
		SA	A	TA	TD	D	SD
Donations/gifts from substantial source of our library funds	n	-	5	9	10	6	-
	Percent	-	16.7	30.0	33.3	20.0	-
We have been receiving regular donations and gifts for the library in the past five years	n	2	5	6.	7	3	7
	Percent	6.7	16.7	20.0	23.	10.0	23.3
We cannot rely on gifts and donations as a source of funds for our library materials and services	n	6	13	8	-	2	1
	Percent	20.0	43.3	26.7	-	6.7	3.3
In the past five years, we have regularly had donations/gifts for our library	Q	-	5	3	9	11	2
		-	16.7	10.0	30.0	36.7	6.7
The donation/gifts we have had from our library are sufficient to sustain library services	n	-	-	-	7	10	13
	Percent	-	-	-	23.3	33.3	43.3
We have never received donation/gifts for running our library	n	-	3	3	12	11	1
	Percent	-	10.0	10.0	40.0	36.7	3.3
As far as the library is concerned, relying on donation/gifts will be very disastrous	n	9	10	2	6	3	-
	Percent	30.0	33.3	6.7	20.0	10.0	-

grants-in-aid as a source of our library funds” 56.7% agreed while 43.3% disagreed. On the whole 73.3% agreed that if not grants-in-aid their library services would have crumbled while 26.7% disagreed with the statement. Responses to items on internally generated revenue as a source of library funds were analysed equally.

**Observations**

1. There is a general agreement from the respondents that grants from the government are

the major source of financing academic libraries in public institution.

2. For now grants-in aid principally from TETFUND constitute the major source of funding academic libraries of beneficiary institutions. The fund accounts for about 70.6% of finances accruing to these libraries.

3. Also, gifts and donations are making some impact through their contributions to library development in these institutions.

4. It can also be observed from the study that parent institutions are not doing enough by allocating or making adequate budgetary provision

for library services. From the study, the predatory variable on the major source of financing libraries shows that grant-in-aid’s (TETFund) scored high, followed by donations and gifts.

**DISCUSSION**

In general, various creative sources of generating alternative finances to run library services have been advanced by scholars and other professionals in the field. Income generation must not necessarily be limited to allocations from

**Table 4.** Analysis of responses to items on grant-in-aids (Tetfund) as source funds of library.

Items content	Statistics	Responses					
		SA	A	TA	TD	D	SD
Our library has not received any grant-in-aid for the past five years	n	20	5	-	4	12	8
	Percent	20.0	16.7	-	13.3	40.0	26.7
We are quite satisfied with the grant-in-aid contributed significantly to our library funds	n	-	5	14	3	5	5
	Percent	-	16.7	46.7	10.0	16.7	16.7
Grant-in-aid have contributed significantly to our library funds	n	5	13	3	1	-	6
	Percent	16.7	43.3	10.0	3.3	-	20.0
The grant-in-aid we have received cannot sustain our library materials and service	Q	5	5	7	6	5	
		16.7	16.7	23	20.0	16.7	
Grant-in-aid in our library have been very regular	n	1	-	10	3	3	6
	Percent	3.3	-	33.3	10.0	10.0	20.0
We can rely on grant-in-aid as a source of financing our library	n	2	3	8	3	3	7
	Percent	6.7	10.0	26.7	10.0	10.0	23.3
If not grant-in-aid, our library services would have crumbled.	n	4	10	4	-	1	7
	Percent	13.3	33.3	13.3	-	3.3	23.3

government library development fees and other sundry charges only.

Support in terms of grant-in-aids and support in terms of materials/equipment also play a very ameliorating role in supporting library services. Ultimately, funds donated in physical cash if not used to pay for sponsorship and training of personnel is used to acquire textbooks, journals, other reference materials or building facilities, equipment all subscription to online/e-resources needed in these libraries.

From this study, result from Table 3 reveal that a majority of 80% disagreed with the statement

that their libraries had not received any grant-in-aid to their libraries from TETFUND for the next 5 years. It is not surprising, that 20% of the respondent disagreed with the statement. These respondents are most likely to come from the College of Health Technology, Calabar which does not fall within the mandate of TETFUND qualified to earn grants from it. Also from the study, 76.7% of the respondents agreed that grant-in-aids from TETFUND have significantly contributed to the finding of their libraries.

This result is in tandem with Okiy (2006) and Otubelu (2010) who acknowledged and applauded

TETFUND for timely intervention through funding to renovate, upgrade and develop beneficiary libraries especially in the area of e-library and Information and Communication Technology Equipment (ICTs) for improvement in teaching and learning.

Still on TETFUND support to libraries, 60% of the respondents agreed that funds from TETFUND have been regular in the past five (5) years while 40% disagreed. On whether funds from TETFUND are enough to sustain the entire library services, 56.7% disagreed while 43.3% disagreed. On the whole 73.3% agreed that but

not for grant-in-aid from TETFUND the services of their libraries would have been playing given the precarious state of libraries diminished funding. The above can possibly justify the claim by TETFUND (2014) that between 2001 to 2013, it had allocated and disbursed twenty-three billion, eight hundred and forty-four million seven hundred and ninety-one thousand, one hundred and seventy-six naira, fifty-seven kobo (N23,842,791,176.57k).

From the study, it has been discovered that other sources of income and donations/gifts can as well assist in supporting library finances and services. On donations and gifts to these libraries, 80% of the respondents disagreed with the statement that they have never received donations or gifts within the period under study. There was however a split in opinion of the respondents to the question of whether donations and gifts form a substantial source of their library funds and support. While 46.7% agreed with the statement 53.3% disagreed. There was no strongly agreed or strongly disagreed response. Clearly these responses are an indication that these libraries are benefiting in some form from donations and gifts as affirmed by Olanlokun and Adekanye (2005) who acknowledged significant contribution by ways of donations and gifts to the University of Lagos by sprinted individuals and organizations.

Adeyonye (2011) also in his assessment of the impact of Nigeria's Book Foundation (NBF) on the development of library collections in private universities in South-West Geographical Zone of Nigeria recognized the role contribution from such donations and sources can make by impacting positively on the development of book collections in beneficiary institutions.

Despite the aforementioned recognition of the role donations and gifts may offer to improve library resources, responses to the statement that these libraries can rely on donations and gifts for proper functioning was rejected by 70% of the respondents.

It is either obvious of what can be inferred from these statement is the fact that these libraries have no faith in gifts and donations as significant sources library support as 90% of them responded that they cannot rely on this option. It can also be translated to mean that librarians in these libraries are not putting enough efforts in attracting donations and gifts to the libraries on their efforts have not yielded needed rewards.

Whatever way, the implications are that librarians to seek alternative sources of looking for support to stem the shortfalls they receive from their parent institution. There is a need for training and retraining in proposal writing to attract grant-in-aids gifts from both internal, national and international donor agencies, organization and corporate bodies.

## CONCLUSION AND RECOMMENDATIONS

This study underscores the need for librarians and their

proprietary authorities to explore and vigorously explore all available avenues to source for funds and materials to acquire and maintain libraries and information services in order to attain their institutional goals and objectives of meeting the teaching, learning and research needs of her patrons.

Grants-in-aids from TETFUND and other donations and gifts have been considerably playing a vital role in sustaining public academic library services in the country. Libraries and librarians on their part have not demonstrated enough zeal and capacity to exploit alternative sources of generating revenue to complement grants from government, donor, agencies and parent institutions. Consequently, the following recommendations are being offered for improvement:

1. A clarion call is being made on government to place the financing of education and the funding and recognition of libraries as critical infrastructure in learning especially in academic institutions.
2. Edeka (2001), Ifidon (2006) and Ogundipe (2008) have all suggested that a new approach must be adopted through alternative sources of funding by libraries to stem the legion of library funding problems. It is recommended that academic libraries must also set targets to generate a certain percentage of her own income since income from parent institutions also are expected to be generated from internal sources. A permanent committee set up in the library charged with the sole responsibility of raising funds internally for the library is recommended.
3. The need to promote and publicise library services and as well as mobilize and seek support from interested public, development agencies and donor support group is highly advocated. Libraries need to take advantage of NGO's and international organisations interested in library development in third countries to attract funds.
4. In order to justify and attract additional finances and support academic libraries must strive to measure their services and performance against their institutional objectives. They must justify their existence while ensuring that they are making a difference and adding value to their system.


## CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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