

Research Trends by TU-K Staff in Google Scholar, 2013-2016

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Abstract

This chapter explores the research trends by Technical University of Kenya's staff in Google Scholar for the period of 2013-2016. The study from which the chapter has been extracted analysed research output including all publications such as books, research papers, dissertations, theses, research projects, and conference proceedings produced by fulltime academic staff. The publications were collected from Google Scholar using Harzing's "Publish or Perish" software. A total of 647 papers were published in the years 2013 to 2016. The findings revealed a steady increase in the quantity of the research output from 2013 to 2015. However, a drop in the number of publications occurred in 2016. The highest number of publications came from lecturers who produced 182 (28.1%) papers while associate professors ranked highest (12.2%) in the average publications per author. The majority 457 (70.6%) of the publications were in journals while 72 (11.0%) papers were published in institutional repositories (like theses and dissertations) and 118(18.2%) papers in conference proceedings. Out of the 647 publications analysed, only 196(30.29%) were singly authored while 451(69.71%) were co-authored. The authors recommend more collaboration between researchers. They also recommend the use of research load to complement the teaching load stipulated for researchers since teaching and research are all core activities in universities. Therefore, teaching and research should receive the same attention. Finally, the authors recommend that further research into the factors that influence researchers in the choice of channels to publish their research output in be conducted to demystify and improve journal selection and visibility of research from TU-K.

Keywords: *Bibliometrics, Research Output, Impact, Visibility, Academic Staff, Google Scholar, the Technical University of Kenya.*

1 Introduction

Research is defined in this study as the systematic search for appropriate information to respond to a particular problem, question or issue for the purpose of obtaining a solution to it or even to satisfy curiosity through scientific application of procedures (Kothari, 2004; Collis & Hussey, 2013). There are various reasons for conducting research. According to Kothari (2004), some of the reasons include gaining certain academic qualifications; desire to solve unsolved problems; quest for intellectual joy of doing some creative work; and prestige. Research involves either or both searching through literature and empirical observation. The result of this process is an original research output which constitutes knowledge which can be used for decision making or scholarly purposes (Ocholla, Ocholla & Onyancha, 2013).

Research output is a core concern in universities. It influences capacity to attract funding, research grants, quality of staff and students. Research output also contributes to the prestige of a university (Parker & Gathrie, 2012). Furthermore, university rankings are partly based on research output, visibility and research impact. Academic staff who engage in research gain from their output by securing employment, tenure, prestige and promotions (Altbach, 2015). Therefore, the research output of academic staff contributes immensely to marketability.

Research output by academic staff is usually made available to readers and other researchers through publishing in journals, books, conference papers and proceedings. Research output constitutes individual and institutional publications. However, some research outputs are sometimes never published. Some are placed in institutional repositories or self-archived without ever being published formally. Examples of such output include theses and dissertations. The visibility of published research output is influenced by their quality and availability. Citing Fooladi, Salehi, Yunus, Farhadi, Chadegani, Farhadi and Ebrahim (2013), Ebrahim, Salehi, Embi, Habibi, Gholizadeh and Motahar (2014) note that high quality research papers receive high citations and reach the widest audience possible.

Research should be beneficial. This implies that it should improve life in one way or another. Research impact is partly associated with the visibility of output which is usually gauged by metrics such as citation analysis (Harmelen & Workman, 2012). Research impact has six zones, namely, knowledge, teaching and learning, practice, public policy, society and environment, and economy (Peters, 2010) and the impact in each zone is measured differently. However, the impact of research may vary from discipline to discipline hence it is important to compare like to like. The impact of research is also a factor of where the research output is published in terms of whether it is open access or subscription-based channel.

Google scholar offers an opportunity for most researchers in developing countries to avail their work for scholarship. This can be attributed to the fact that researcher accounts or profiles are free of charge. Research output and impact can be easily accessed from this platform through search tools such as "Publish or Perish" software. Visibility is an

important aspect as it accounts for over twenty percent in the metrics used in university rankings (Usher & Savino, 2007). Therefore, it is important to note that research impact is not only a factor of how much one publishes but also of how visible the research is to other researchers (Ravenscroft, Liakata, Amanda & Duma, 2017).

2 Contextual Setting

The Technical University of Kenya (TU-K) was established through the elevation of the Kenya Polytechnic University College (KPUC) to a full-fledged university status. TU-K was established as the first technical university in Kenya in line with the provisions of the enacted Universities Act, 2012. Being a new type of university, it has a mandate to offer higher education in research and technology. Its programmes contribute to the realisation of Kenya's Vision 2030 by providing the skills and technologies which drive national socio-economic development (TU-K, 2015). At the time of this research, TU-K had three faculties that offer a vast range of courses. Each faculty has both fulltime and part-time academic staff. One of the roles of these academic staff is to conduct research whose visibility and impact contributes to their survival and continuity in the institution.

The study from which this chapter has been extracted investigated the visibility and impact of research by TU-K academic staff using Google Scholar. The period of consideration was from 2013 to 2016. The objectives of the study were to determine the trends of research publication and impact at the TU-K from 2013 to 2016; establish the locations in which TU-K researchers publish their work; and ascertain the nature and pattern of research collaboration in TU-K.

3 Literature Review

Bibliometrics, just as the name implies, is metrics about biblios (Wilson, 2016). Biblio means book and metrics means science of meter, that is, scale or measure (Kori, 2016). The term was coined by Alan Pritchard in 1969 (Roy & Basak, 2013). It was used to describe the quantification of discrete data publication elements of the processes of written communication. It came up as a substitute of statistical bibliography which involved the application of mathematical models and statistics to research (Russell & Rousseau, 2010).

Bibliometric-based studies analyse research production and avail the results to policy makers, stakeholders and other researchers (Ellegaard & Wallin, 2015) for informed decision making. This analysis is based on the assumption that carrying out of research and communicating the results of that research goes hand in hand (Russell & Rousseau, 2010). Bibliometrics applications are myriad. Some of them include locating core literature, especially journals; classifying literature; tracing the spread of ideas and growth of literature; improving the efficiency of information handling services; and predicting publishing trends (Powell & Connaway, 2010), just to mention a few.

Research trends give the general direction of change or evolution of research publication. It can be monitored by the fluctuations in quantity or the changes in subject of research. These can show the development in research over time. Research trends can focus on quantity or subject area or discipline and mostly reflects underlying strategies and priorities. However, comparison of trends in research in various disciplines necessitates the comparison of like against like (Ma, Dong, Zhou, Mita, Liu & Wayne, 2016; Agarwal *et al.*, 2016).

The trend of research shows the evolution of an institution's intellectual journey. This, in universities, is seen in the varying interests of the researchers over time and points to the motivation behind such interests. For instance, the ranking and evaluation of university staff based on number of papers published is an incentive which has led to an increase in publications (Larivière & Costas, 2016). Subject-wise evolution can point to the emergence of particular subject areas which need demystification or new modern subjects which have been researched less. Quantity fluctuation, on the other hand, may point to funding availability, increase in the number of academic staff with Master's and doctorate degree qualifications and introduction of new rules which may require publishing portfolio as a mandatory metric for promotion, tenure and recruitment, among others.

As much as quantity of research output is given attention, quality and influence is equally of great importance since the former measures productivity and the latter measures impact (Agarwal *et al.*, 2016). Quality and influence are subject to the content produced and partly to where the content is published. The choice of journals in which to publish research output can be based on factors like the reputation of the journal (Smith, 2015; Rosas, Kagan, Schouten, Slack & Trochim, 2011), whether the journal is open access or subscription-based, whether publishing is free or payment is required, the acceptance rate of the journal, whether the journal is online, the journal indexing services and publication frequency (Adjei & Owusu-Ansah, 2016).

The quality of research in the academic arena is usually controlled by the peer review process. Papers published in academic refereed journals are known for their quality, credibility and authority (Mweru, 2010). These traits increase the influence and impact of the research publication which should be the outcome of every research and desire of every researcher. Bearing in mind that such publishing is one way of scholarly communication, researchers therefore need to dedicate time and effort for this activity.

The impact and visibility of research output is influenced by collaborations (Aksnes, Osipov, Moskaleva & Kullerud, 2016). Research collaboration, which can also be termed as intellectual collaboration (Ramkrishna & Grover, 2016), uses co-authorship as a proxy in its measurement (Rosas, Kagan, Schouten, Slack & Trochim, 2011). Through co-authorship, two or more researchers come together and conduct research and produce outputs of greater quality and quantity than could have otherwise been produced by one researcher working alone. Collaborations can take place between authors in the same institution, same country, different institutions or different countries which can be further categorised into inter and intra collaboration.

Collaboration has a close association with research output and research quality (Morrison, Dobbie & McDonald, 2003). As researchers collaborate, their research capability improves (Chen, Yao, Sun, He, Yao & Liu, 2016). Katz and Martin (1997) further add that the desire to increase recognition, popularity, and visibility are some of the factors stimulating collaborations. When scholars collaborate, ideas are shared (Ware & Mabe, 2015), new ones are created, better combination of skills required is achieved, new relationships are formed and research visibility is increased. Collaborations most often result to professional growth and development (Walker, Anbari, Bredillet, Söderlund, Cicmil & Thomas, 2008) and a social network for researchers.

4 Methods and Procedures

This study took the form of a quantitative research approach since data collection was based on predetermined instruments that yielded statistical data. Bibliometrics was applied as a research design and more specifically publication count, co-authorship analysis, and citation analysis were examined as a means of assessing research quantity, quality and visibility at the Technical University of Kenya.

Publications count measured productivity using variables such as the number of publications per author, publications per department, publications per school, publications per faculty, collaboration, and year of publication, among other variables. Content analysis and citation analysis, which indicated the university's research areas and impact, respectively, assessed the subject content and the number of citations respectively. Co-authorship showed the nature and pattern of research collaboration among researchers.

This study analysed research output including all publications such as books, research papers, dissertations, theses, research projects, and conference proceedings produced by fulltime academic staff. The publications were collected from Google Scholar using Harzing's "Publish or Perish" software.

The scope of the study covered all the three faculties of the Technical University Kenya. These include the Faculty of Engineering Sciences and Technology (FEST), Faculty of Social Sciences and Technology (FSST) and Faculty of Applied Sciences and Technology (FAST). In terms of time scope, the authors considered the period between 2013 and 2016. This is because the university was chartered in 2013 and additionally, all the research from 2016 had not been reflected in Google scholar at the time of research.

The researchers selected "New Google Scholar Query" under "Query" which is located in the menu bar then keyed in the name of the authors under "Authors" which is one of the provided fields. The researchers then specified the time period as 2013-2016 on the "Year" slot provided on the right end of the "Authors" field. This was then concluded with a look-up to retrieve the results. The results from the look-up were retrieved and tabulated in their various fields. These fields were: cites per year, rank, authors, year, publication, and publisher. A metrics section also displayed the summarised details of the searched author. The results were then copied through "Results for Excel" option under the "Copy" dropdown menu and saved in Microsoft Excel for cleaning purposes with the help of the checklist before analysis was done. The same procedure was repeated for all the academic staff to obtain their data for the study. The data was processed and analysed using Bibexcel, VOSviewer and Ms Excel and WordPad. The choice of these software for processing and analysing the research data was based on the different aspects of the subject of the study which demanded different tools for comprehensive and accurate results.

5 Results and Discussions

This section presents and discusses the findings under the following subsections: the trends of research publication and impact; the locations in which TU-K researchers publish their work; and the nature and pattern of research collaboration in TU-K.

5.1 The trend of research publication and impact

The study revealed, as shown in Figure 1, a steady increase in the quantity of the research output from 2013 to 2015. However, a drop in the number of publications occurred in 2016. Out of a total of 647 papers published in the years 2013 to 2016, the highest number of publications per year, that is, 197(30.4%) was published in 2015 whereas the lowest number of publications (140), (21.6%) was published in 2013 and 2016. The increase of publications from 140 (21.6%),

170 (26.3%), 197(30.4%) in the years 2013, 2014 and 2015 respectively could be related to the growth of the university since it was chartered in 2013. This may be due to recruitment of more senior researchers. On the other hand, the decrease in the year 2016 could be related to the fact that not all research publications produced had been indexed in Google Scholar at the time data was collected. However, this trend implies that more growth in research publications is expected in the near future as the university grows and recruits more senior researchers.

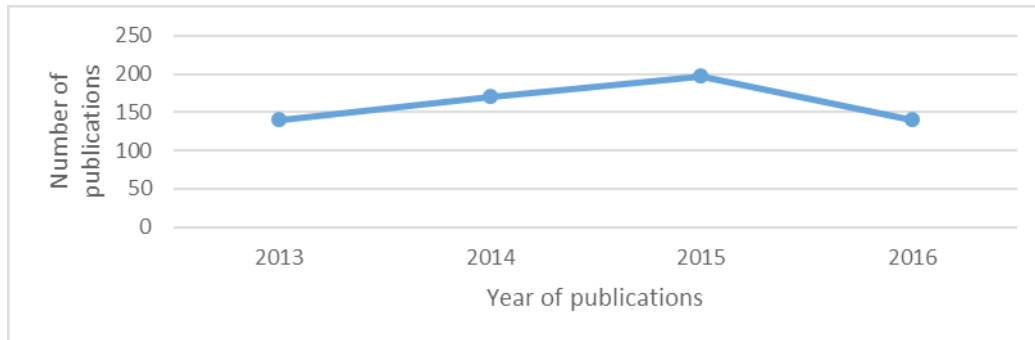


Figure 1: Number of publication from 2013-2016

Source: Research Data

Table 1 further shows the number of research publications listed according to the rank of the academic staff at the Technical University of Kenya. Production of research papers was done at all ranks from the professors and associate professors down to graduate or teaching assistants. The highest number of publications was from lecturers who published 182 (28.1%) papers. This was followed closely by senior lecturers that had 152(23.5%) publications and assistant lecturers who had 138 (21.3%). Professors published 61 (9.4%) publications while graduate teaching assistants produced 23(3.6%) publications.

Table 1: Research publication by rank

S/N	Rank	No. of Authors	No. of Publications	% of 647	Number of publications per author
	Professor	11	61	9.4	5.8
	Associate Professor	6	73	11.3	12.2
	Senior Lecturers	25	152	23.5	6.1
	Lecturers	61	182	28.1	3.0
	Assistant Lecturers/Tutorial fellows	60	138	21.3	2.3
	Teaching Assistants/Graduate Assistants	10	23	3.6	0.4
	Others i.e Technicians, Technologists	5	18	2.8	0.3

Source: Research Data

5.2 The channels in which TU-K researchers publish their work

The study revealed out of the total 647 papers published, the majority 457 (70.6%) of these were published in journals while 72 (11.0%) papers were published in institutional repositories (like theses and dissertations) and 118(18.2%) papers in conference proceedings.

The top twenty journals, ranked by the total number of the publications, produced a total of 91(19.9%) publications while the rest, 366 (80.1%), of the publications were produced by the remaining journals. At the top of the top twenty list was the *International Journal of Soft Computing and Engineering* (IJSCE) which contributed 8(1.8%) publications, following closely by *International Journal of Advanced Research in Management and Social Sciences* and PLOS One which had 7 (1.5%) and 6 (1.3%) respectively. Table 2 presents the top 20 journals as well as the number of papers published in each.

Table 2: Top 20 journals in which research is published, 2013-2016

NAME OF JOURNAL (SOURCE)	No of Publications	% of 457
International Journal of Soft Computing and Engineering (IJSCE)	8	1.8
International Journal of Advanced Research in Management and Social Sciences	7	1.5
Plos one	6	1.3
Aquatic ecosystem health & management	5	1.1
Chemistry International	5	1.1
Citeseer	5	1.1
Aids research and human retroviruses	5	1.1
Scholars Journal of Arts Humanities Social Sciences	5	1.1

NAME OF JOURNAL (SOURCE)	No of Publications	% of 457
European journal of business and management	4	0.9
Inkanyiso: Journal of Humanities and Social Sciences	4	0.9
International Journal of Economics, Commerce and Management	4	0.9
International Journal of Education and Research	4	0.9
International Journal of Psychology	4	0.9
Journal of Acquired Immune Deficiency Syndromes	4	0.9
Journal of sustainable research in engineering	4	0.9
Mediterranean Journal of Social Sciences	4	0.9
Plos neglected tropical diseases	4	0.9
Innovation: journal of appropriate librarianship and information work in Southern Africa	3	0.7
BMC Health Services Research	3	0.7
International Journal of Humanities and Social Science	3	0.7

Source: Research Data

5.3 The nature and pattern of research collaboration in TU-K

As shown in Table 3, the study showed that out of the 647 publications analysed, only 196(30.29%) were singly authored while 451(69.71%) were co-authored. The study further revealed that more publications 141(21.79) were done by three collaborating authors while ten collaborating authors produced the least number 13 (2.01%) of papers. From the study, it was found that researchers in the university collaborated more. This is a good gesture given the myriad benefits of collaboration in research. Some of benefits include sharing of skills and techniques, transferring of knowledge, and more especially tacit knowledge, encouraging cross-fertilisation of ideas, enhancing of intellectual companionship and increasing the potential of visibility of the work produced by collaborating authors (Ocholla & Ocholla, 2007; Sitienci & Ocholla, 2010; Katz & Martin, 1997).

Table 3: Number of collaborating authors and corresponding number of papers

Number of Authors	Number of Papers	% of 647
1	196	30.29
2	76	11.75
3	141	21.79
4	66	10.20
5	37	5.72
6	26	4.02
7	21	3.25
8	18	2.78
9	19	2.94
10	13	2.01
11	34	5.26

Source: Research Data

The pattern of collaboration was further displayed in a social network, Figure 2, to show how different authors were collaborating. The social network reveals that researchers with larger nodes (kwanyat, lalahj, omolloe, shiundupm, bakip) were doing more collaborative research than their counterparts with relatively smaller nodes. This kind of findings can be attributed to the fact that most of the researchers with relatively larger nodes are professors and engage much in mentorship on research work and also supervise students in research. The network further revealed the researchers who have not collaborated in any of the analysed publications. These researchers (adamr, chandras) had nodes not connected with other nodes in the social network.

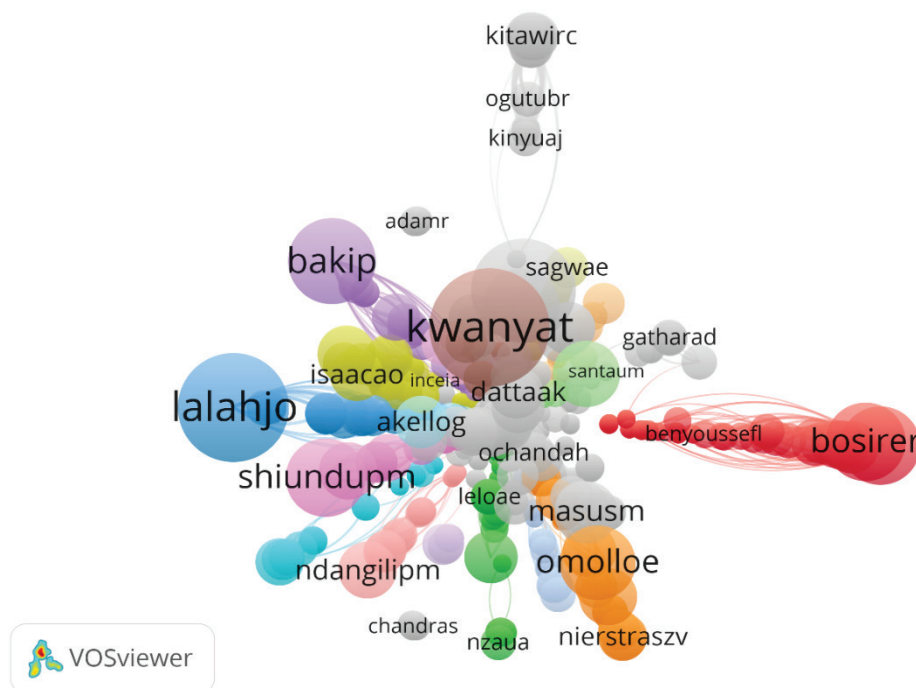


Figure 2: Pattern of research collaboration

Source: Research Data

6 Conclusion and Recommendations

Research and the well-being of universities are inseparable. Universities with more research output and impact tend to be more visible to researchers and the user community in general compared to their counterparts that have less. This is based on the gradual increase in the number of publications and the production of more publications from collaborations between and among authors which encourage knowledge incubation and enhance visibility of research output. However, the finding on the research publications by ranks in the university does not present the expected scenario. Professors and senior researchers should produce more research output than their counterparts given their immense experience and knowledge on matters pertaining to research.

The authors recommend more collaboration between researchers. They also recommend the use of research load to complement the teaching load stipulated for researchers since teaching and research are all core activities in universities. Therefore, teaching and research should receive the same attention. Finally, the authors recommend that further research into the factors that influence researchers in the choice of channels to publish their research output in be conducted to demystify and improve journal selection and visibility of research from TU-K.

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