Global Journal of Engineering Education

Evaluating the research performance of an emergent technological university

Paul Ivey, Tashoya Streete, Martin Henry & Gossett Oliver

University of Technology, Jamaica
Kingston, Jamaica

ABSTRACT: Research output is one of the key indicators that sets a university apart from other post-secondary institutions. Therefore, it is of paramount importance that a university evaluates its research performance. This article reports the results of a study undertaken to document the research performance of the University of Technology, Jamaica (UTech), Kingston, Jamaica, for the period 2007-2011. The metrics used were counts of the number of papers published in refereed journals and counts of citations by other authors of the papers authored by research-active faculty members of UTech. The results revealed considerable variation in research productivity among academic units and also a trend of an increasing number of refereed publications for the period under review. The Faculty of Engineering and Computing ranked second in terms of the number of published papers and third in relation to the number of citations, making it one of the more productive academic units at the University. These results have emerged within an environment, which has seen the implementation of various initiatives aimed at encouraging and promoting research within the University.

Keywords: Research and innovation management, research support, research performance metrics

INTRODUCTION

Research and innovation play an important role in underpinning a country's economic and social life; and universities are at the centre of the research, innovation and human capital generating process. It is generally agreed that research output is one of the key indicators that sets a university apart from other post-secondary institutions [1].

Having been accorded university status in 1995, it was important for the University of Technology, Jamaica (UTech), Kingston, Jamaica, to establish and implement a coherent research agenda and supporting infrastructure. Accordingly, the Office of Research and Graduate Studies (ORGS) was initially established.

In 2007, it was replaced by the School of Graduate Studies, Research and Entrepreneurship (SGSRE) as the unit responsible for research and innovation management (RIM) at UTech. This was in keeping with an understanding of the fact that *research management* comprises a distinct suite of activities separate from the conduct of research itself [2].

Recognising the importance of research to the legitimacy of its status as a university and the benefits to society that may flow from its research findings, UTech has implemented a number of initiatives to promote and encourage academic staff (faculty) involvement in research. These include the Research Development Fund (RDF) and the President's Research Initiative award.

Action is also taken on an on-going basis to improve the support provided to faculty, to encourage research activity among them. For example, in 2010 two additional research support staff members were employed; and in 2011, the list of activities eligible for RDF funding was expanded to include the publication costs of faculty members' papers in refereed journals.

Also, in the same year the SGSRE re-launched the *Journal of Arts, Science & Technology*, which *...publishes peer-reviewed papers in the areas covered by the two colleges, five faculties and 16 schools/departments of the university.* The most recent initiative under consideration is a proposed re-organisation of the SGSRE for greater effectiveness.

Quantitative analysis is perhaps the main tool of science, which may take the form of counting, measuring, comparing quantities or analysing measurements; and the conduct of research, and recording and communicating the results through

publications is at the heart of the scientific process. Because research output is one of the key indicators that sets it apart from other post-secondary institutions, it is of paramount importance that a university evaluates its research performance. Indeed, the measurement of research output and the ranking of universities has become an industry in itself [3].

Various metrics for assessing the research performance of universities have been used over the years. But, in terms of pervasiveness of use, the two most common metrics are: 1) to count the *number* of publications; and 2) to count the number of time a particular paper has been *cited* by other authors.

These are referred to as bibliometric measures. Measuring research performance provides a university with information that may be useful in: 1) informing decisions concerning allocation of funding to particular areas of research; and 2) benchmarking itself against local and international standards of research output that revolve around the following questions: how much research is conducted? What is its impact? How many papers are published in quality journals? What is the overall trend in the number of such publications? [4].

For the reasons stated above, and also to use the findings as a proxy indicator of the effectiveness of UTech's research support infrastructure, the SGSRE measured the institution's research productivity and impact - using counts of papers published in peer-reviewed journals and counts of citations of the papers, respectively - since the establishment of the SGSRE in 2007.

METHODOLOGY

The metrics used were counts of the number of papers published in refereed journals and counts of citations of the papers authored by research-active faculty members for the period 2007-2011 (August). A request and submission approach was used; that is, each faculty, through its Graduate Studies, Research and Entrepreneurship Coordinator (FGSREC), was asked to provide the SGSRE with data on the publications generated by their respective academic unit for the period under review.

The data were, then, tallied to arrive at the number of publications in refereed journals for each academic unit. The Google Scholar Universal Gadget for Scientific Publications Citation Counting was used to arrive at the citation counts for each published paper; care was taken to avoid the issues that may arise with use of the Google Scholar [5].

RESULTS

The collected data show that the total number of publications in refereed journals by UTech's seven academic units for the period 2007-2011 (August) was **77** (Table 1). This translates into an average of 15.4 peer reviewed publications per year and 11 per academic unit.

The top three academic units in terms of the number of papers published in refereed journals were the College of Health Sciences (COHS), the Faculty of Engineering and Computing (FENC) and the Faculty of Science and Sport (FOSS), respectively (Table 1). Research productivity varied by academic unit over the review period (Figure 1). The results also showed a trend of an increasing number of refereed publications for the period under review (Figure 2).

Table 1: Number of publications in refereed journals from UTech's academic units, 2007-2011.

Academic Unit/Year	2011	2010	2009	2008	2007	Total
COBM	1	0	0	0	0	1
COHS	11	16	0	7	0	34
FOBE	1	0	2	0	0	3
FENC	18	0	1	2	4	25
FELS	1	0	0	0	0	1
FOSS*	5	0	4	3	1	13
FOL**	0	0	0	0	-	0
Total	37	16	7	12	5	77

Explanatory notes to Academic Units: COBM = College of Business and Management; COHS = College of Health Sciences; FOBE = Faculty of the Built Environment; FENC = Faulty of Engineering and Computing; FELS = Faculty of Education and Liberal Studies; FOSS* = Faculty of Science and Sport (established in academic year 2009-2010, formerly a part of the then Faculty of Health and Applied Sciences); FOL** = Faculty of Law (established in academic year 2008-2009).

The data also showed that the total number of citations of the published papers was 54. This translates into an average of 10.8 citations per year, **7.7** per academic unit, and a citation to publication ratio (total number of citations ÷ total number of published papers) of 0.70. The top three academic units in terms of the number of citations were the Faculty of Science and Sport (FOSS), College of Health Sciences (COHS) and the Faculty of Engineering and Computing (FENC), respectively (Table 2).

Table 2: Citations of publications in refereed journals from UTech's academic units, 2007-2011.

Academic Unit/Year	2011	2010	2009	2008	2007	Total
COBM	0	0	0	0	0	0
COHS	1	0	0	18	0	19
FOBE	0	0	0	0	0	0
FENC	2	0	1	0	10	13
FELS	0	0	0	0	0	0
FOSS	1	0	11	10	0	22
FOL	0	0	0	0	-	0
Total	4	0	12	28	10	54

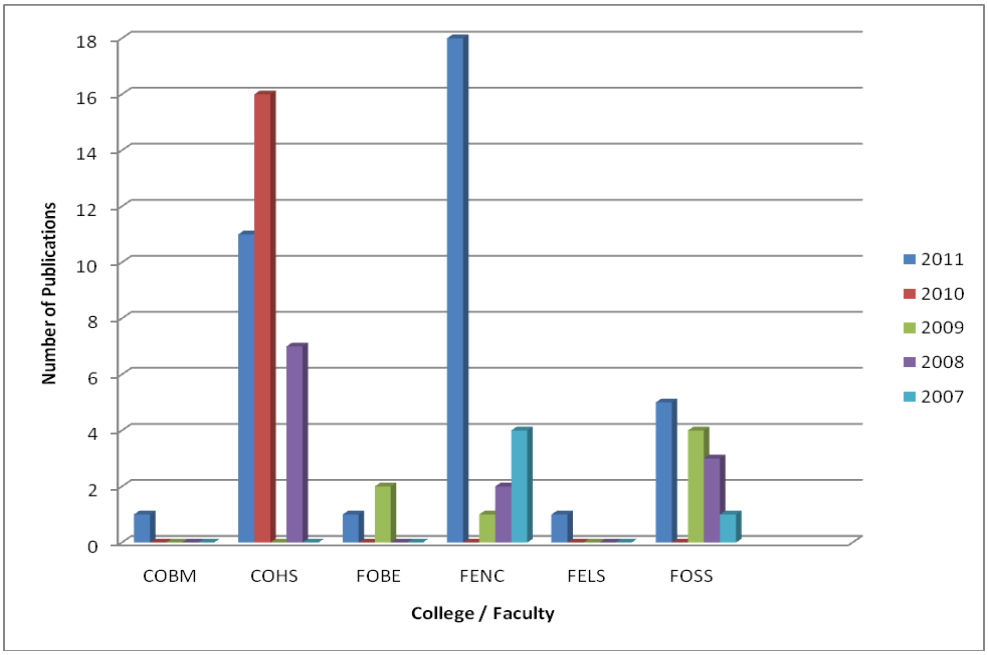

Figure 1: Variation in research productivity among UTech's academic units, 2007-2011.

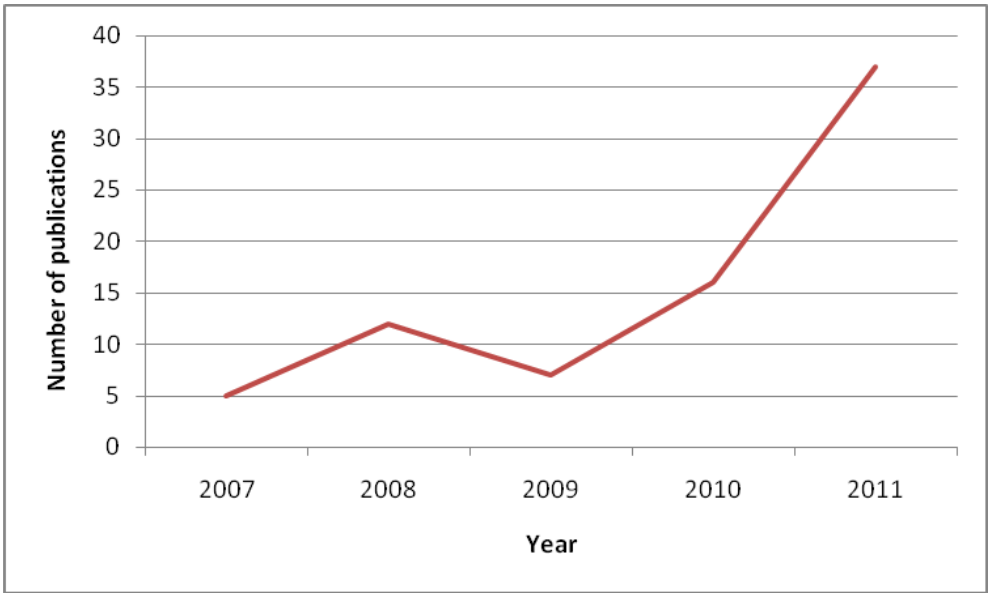

Figure 2: UTech's annual research productivity, 2007-2011.

DISCUSSION

A limitation of the study is that undercounting of papers published in refereed journals was a real possibility because the request and submission approach has been reported to be less reliable than extracting data from a database [6]; a robust system of logging publications is absent at UTech, the need for which is indicated.

The results showed wide variation in the research productivity among academic units. This may be related to the presence of a few *star performers*, a situation that is consistent with reported findings for academics employed in Canadian business schools [7]. In addition, the fact that 70% of the published papers were cited is taken as evidence that they had some impact within the scientific community; this is significant and consistent with the notion that the mantra, *publish or perish*, has now changed to, *publish, get cited, or perish* [5].

Finally, it is important to note that the overall trend of an increasing number of published papers indicated that a research culture is taking root within the fabric of the institution, and occurred amidst the implementation of various initiatives aimed at encouraging and promoting research at the University of Technology, Jamaica.

REFERENCES

1. The Growing Significance of The Research Mission to Higher Education Institutions. *University Research Management: Meeting the institutional challenge*. OECD (2004).
2. Association of Commonwealth Universities (ACU), International Research Management: Benchmarking Programme Report to the HEFC, UK (2006).
3. Leydesdorff, L., Caveats for the use of citation indicators in research and journal evaluation. *J. of the American Society for Information Science and Technol.*, 59, **2**, 278-287 (2008).
4. Anonymous, Using Bibliometrics: A Guide to Evaluate Research Performance with Citation Data. Thomson Reuters (2008).
5. Jacso, P., Google Scholar's Ghost Authors (2009), 9 December 2011, http://www.libraryjournal.com/article/CA6703850.html
6. Karim, S. and Dastmalchian, A, Research Productivity of Canadian Business Schools (2005-2009): A Report by Gustavasan School@UVic. University of Victoria (2011).
7. Erkut, E., Measuring Canadian Business School research output and impact. *Canadian J. of Administrative Sciences*, 19, **2**, 97-123 (2002).

BIOGRAPHIES

Paul Ivey is an Associate Professor in the School of Graduate Studies, Research and Entrepreneurship at the University of Technology, Jamaica, where he is primarily involved in research and innovation management. He is also a founding member and Coordinator of the Caribbean Research and Innovation Management Association (CabRIMA.org). He received his BSc in Agriculture from The University of the West Indies, St Augustine, Trinidad and Tobago; his MEd in Adult Education/Lifelong Learning from Mount Saint Vincent University, Halifax, Canada; and his MSc and PhD in Entomology and Environmental Planning and Management from Louisiana State University, Baton Rouge, USA. For the past 20 years, he has worked within the tertiary education system in Jamaica.

Tashoya Streete is the Graduate Studies, Research and Entrepreneurship Officer in the School of Graduate Studies, Research and Entrepreneurship at the University of Technology, Jamaica. She is also a founding member of the Caribbean Research and Innovation Management Association (CabRIMA.org). She holds a BSc in International Relations, an MSc in Government, and a Certificate in Project Management from the University of the West Indies, Mona, Jamaica. Miss Streete has experience in academic and public policy development and analysis, project management, research management and teaching at the tertiary level.

Martin Henry is Manager of Projects and Operations in the School of Graduate Studies, Research and Entrepreneurship at the University of Technology, Jamaica. He is also a founding member of the Caribbean Research and Innovation Management Association (CabRIMA.org). He holds a BSc in Natural Sciences, an MA in Media and Communication, and a Diploma in Science Education from The University of the West Indies, Mona, Jamaica; a Diploma in Project Management from the Jamaica Institute of Management, Jamaica; a Diploma in Journalism, and a Certificate in Small Business Management. A career educator, he has 30 years of experience in teaching, curriculum development, assessment and administration, from the high school level to the university level in both the public and private education sectors in Jamaica.

Gossett Oliver is a Professor of Engineering and Vice President for Graduate Studies, Research and Entrepreneurship at the University of Technology, Jamaica. He is also a founding member of the Caribbean Research and Innovation Management Association (CabRIMA.org). He received his BSc in Metallurgy and Materials from the City London Polytechnic, London, England; his MSc in Metallurgical Engineering and Quality Control from Brunel University, Middlesex, England, where he also earned his PhD in Metallurgical Engineering. He has over 40 years experience as an engineer and educator (lecturer, senior administrator and researcher). He has over 100 publications in peer-reviewed journals and other scholarly publications, and has successfully supervised the research projects of doctoral students. As Vice President for Graduate Studies, Research and Entrepreneurship, he has overall responsibility for the development and delivery of graduate programmes that are in line with international standards and best practices, promotion of the research mandate of the University, and leading the University's thrust for expanded income-generation through entrepreneurial activities.