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A Bibliometric Analysis of Malaysian Authorship Pattern in the Field of Engineering, 2000 - 2010

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Abstract: This paper reports an analysis of publications of scholars affiliated in Malaysia in engineering subject. The study uses bibliometrics method which examines patterns of Malaysian authorship publications in engineering, publish from 2000 to 2010. 11,819 bibliographic records were gathered from Scopus database. The findings indicate Malaysian researchers have considerably enhanced their influence especially since the period of 2007 onwards. Most authors in this field are not one time contributors and 71 authors produced 30 or more papers each. Collaborative research activity has been a consistent trend towards increased collaboration in engineering. The main types of publication produced are conference papers and journal articles. 99.907% of the publications were written in English. This study indicates that Malaysian researchers have made significant contributions to global engineering study.

Keywords: Authorship pattern; Authorship; Bibliometrics; Bibliometric analysis; Publication productivity; Research productivity; Engineering; Malaysia

1. Introduction

Bibliometrics is the use of statistical analyses to study publication patterns. It can be a valuable tool for describing and promoting scientific productivity (McBurney and Novak (2002). Today citations are used to rank journals, research groups, laboratories, universities and nation states. And not infrequently, they are factored into the promotion and tenure decision-making process, a perennial topic of lively debate (Cronin and Atkins (2000)).

After conceiving an idea for a research project, he has to decide whether to pursue the idea alone or to seek partners with whom to collaborate. The co-authorship decision is important because it is likely to affect the project's quality, efficiency of execution, and exposure, as well as the amount of credit an author receives following its eventual publication. Ultimately, the co-authorship

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decision will partly determine how efficiently a researcher uses her or his human capital, converting research effort into research outcome (Vafeas (2010)).

The scope of the study is limited to publications affiliated in Malaysia published within 2000 to 2010 in engineering subject indexed in Scopus database. The study are to examine authorship pattern specifically:

- Proportion of single versus multi-authored papers
- Degree of collaboration
- Country of collaboration
- Language wise distribution of publications

2. Method

This study uses bibliometrics method which examines patterns of Malaysian authorship publication in engineering, published from 2000 to 2010. The bibliographic records were gathered from *Scopus* at the end of December 2010. *Scopus* was chosen because it comprises a huge number of publishers, multidiscipline, more of Asian content and subscribed by the Library.

Verification of data was complemented by the printed and electronic version of the journals and related websites. Analysis for number of author/authors per document, degree of collaboration, country of collaboration, organizational category, top publication and citation and distribution of language were done. Data were analyzed using Microsoft Excel and SPSS. Data analysis was presented in the form of table, graph and figure for each type of analysis.

3. Findings

A total of 11,819 publications were discovered to have been published in engineering subject affiliated in Malaysia within 2000 to 2010. These publications were contributed by 43,107 authors. Figure 1 shows number of publications from 2000 to 2010. The amount of publications concerning engineering has been generally presenting an increasing trend from 2004 to 2007. Especially in 2008 to 2009, the number of publications was times larger than the earlier years. The findings indicate Malaysian researchers have considerably enhanced their influence especially since the period of 2007 onwards.

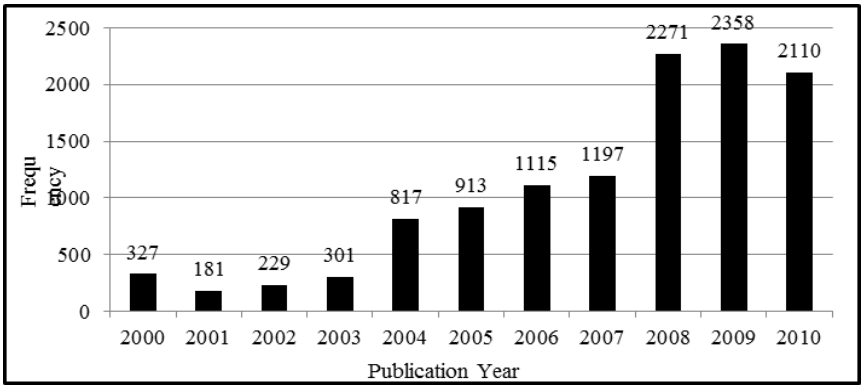

Figure 1: Distribution of Malaysia affiliated publications in engineering

Figure 2 indicates the total citations received by the publications. The amount of citations concerning engineering has been generally presenting a steady increasing trend. Total citations for 11,819 papers were 18,357 counts. This indicates that more researchers may have the same interest of research and Malaysian researchers becoming more prominent in engineering discipline.

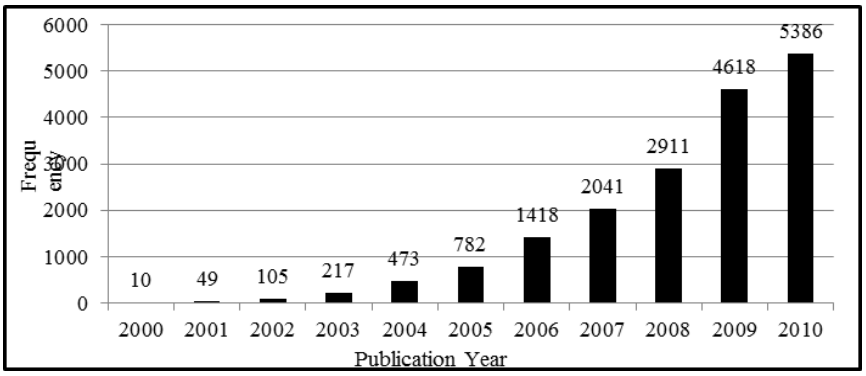

Figure 2: Number of citations to Malaysia affiliated publications in engineering

As displayed in Figure 3, publication and citation in early years were at the same rate. Starting year 2006, number of citation were greater than publication for about 303 counts and increased faster than publication could chase. The value for h index is 39 (of the 11819 documents considered for the h-Index, 39 have been cited at least 39 times).

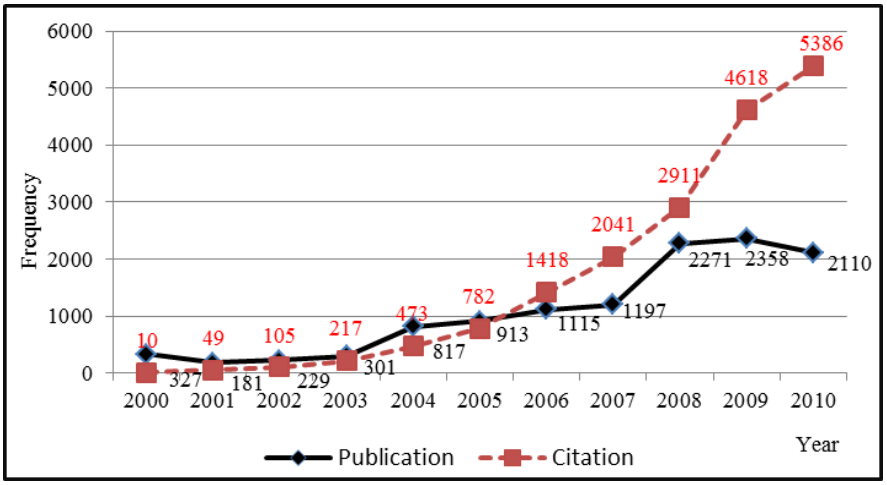

Figure 3: Distribution of publications versus citations

Figure 4 indicates the predominance of multi-authored papers over single authored papers where 665 papers (5.63%) were single authorship, while 11,154 papers were published with multiple authors (94.37%).

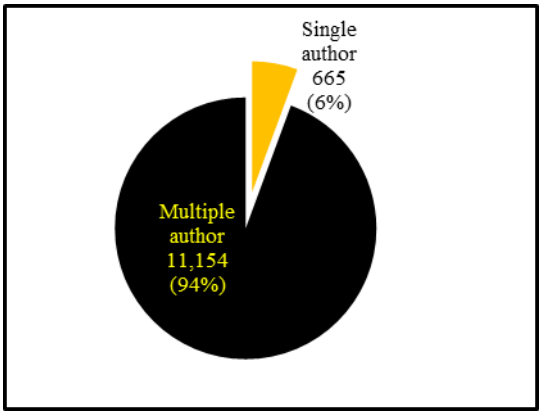

Figure 4: Single versus multiple authorship in engineering

As shown in Figure 5, there were 2807 papers with two authorship, 3581 papers with three authorship, 2480 papers with four authorship,1294 papers with five authorship and 992 papers with six authorship and above. Most publications are likely to be co-authorship with three authors.

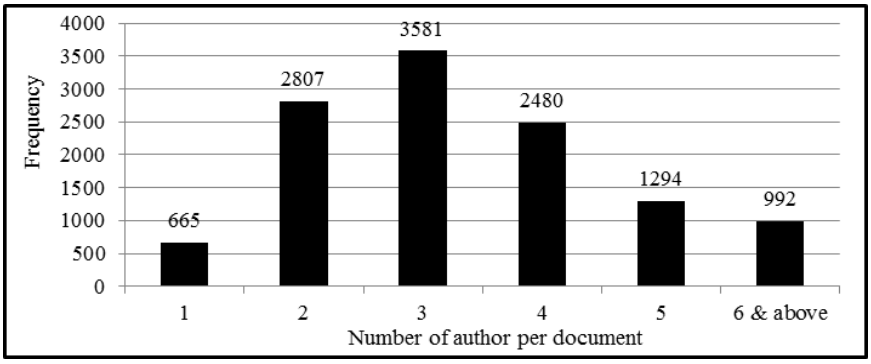

Figure 5: Authorship pattern

Degree of collaboration in respect of a discipline is the ratio of multi-authored papers published during a year and the total number of papers published during the year, using the formula given by Subramanyam (1983).

Degree of collaboration, C = Nm/Nm + Ns
where Nm = Number of multiple authors
Ns = Number of single author

Table 1: Degree of collaboration in engineering

Year	No. of documents	No. of single author	No. of multiple authors	Degree of collaboration
2000	327	34	293	0.90
2001	181	28	153	0.85
2002	229	15	214	0.93
2003	301	23	278	0.92
2004	817	57	760	0.93
2005	913	59	854	0.94
2006	1,115	96	1,019	0.91
2007	1,197	64	1,133	0.95
2008	2,271	105	2,166	0.95
2009	2,358	116	2,242	0.95
2010	2,110	68	2,042	0.97
Total	11,819	665	11,154	0.94

It is observed from Table 1 that the degree of collaboration in engineering has been increasing from the period 2002 to 2005 and from 2007 to 2010. This indicates the declining trend of single authored papers and increasing trend

towards collaborative research. This results is in accordance with the findings of Terry (1996), Atinmo and Jimba (2002), Krishna and Kumar (2004), Acedo et al. (2006), Manton and English (2007) and Zafrunnisha and Pullareddy (2009) where co-authorship was found to be popular. According to Vafeas (2010), the increase in the number of multi authored papers may be due to the collaboration of specialists leading to enhanced quality of research.

Table 2: Rank List of Most Prolific Institutions

Ranking	Affiliation	No. of author
1	Universiti Teknologi Malaysia	1,649
2	Universiti Kebangsaan Malaysia	1,471
3	Universiti Sains Malaysia	1,429
4	Universiti Putra Malaysia	1,349
5	University of Malaya	1,272
6	Multimedia University	1,225
7	Universiti Teknologi MARA	608
8	International Islamic University Malaysia	429
9	Universiti Tenaga Nasional	347
10	Universiti Malaysia Perlis	332

The institutional affiliation of all the authors was presented in Table 3. It reveals a complete dominant of the publication arena by researchers from university/college – 381 (54.1%), followed by researchers in company – 184 (26.1%), followed by institute/research center – 115 (16.4%), followed by hospital – 9 (1.3%), followed by government – 9 (1.3%) and association – 5 (0.7%).

Table 3: Authorship by institutional affiliation

Institutional affiliation	Frequency	Percent (%)
University / College	381	54.1
Company	184	26.1
Institute / Research Center	115	16.4
Hospital	9	1.3
Government	9	1.3
Association	5	0.7
Total	704	100.0

The author collaboration by country was presented in Table 4. National collaboration of Malaysian authors were 24.3% where else international collaboration were greater i.e. 76.7%. Highest collaboration were from United States (11.2%), followed by India (8.8%), United Kingdom (8.0%), Japan (6.7%), Australia (5.1%), Canada (2.7%), Germany (2.6%), France (2.1%), Indonesia (2.0%), China (1.8%) and other 54 countries (32.6%).

Table 4: Country of collaboration

Collaboration	Country	Frequency	Percent (%)
National Collaboration	Malaysia	171	24.3
International Collaboration	All countries	533	76.7
	US	79	11.2
	India	62	8.8
	UK	56	8.0
	Japan	47	6.7
	Australia	36	5.1
	Canada	19	2.7
	Germany	18	2.6
	France	15	2.1
	Indonesia	14	2.0
	China	13	1.8
	Other 54 countries	174	32.6

Source types were conference proceedings (55.7%), journals (42.3%), book series (1.3%), trade publications (0.5%) and books (0.1%). Document types were conference papers (57.6%), articles (38.6%), article in press (1.8%), review (1.1%), editorial (0.5%), erratum (0.1%), note (0.1%), letter (0.1%) and short survey (0.0%).

Most authors in this field are not one time contributors and 71 authors produced 30 or more papers each in the period of 2000 to 2010. Table 5 showed top ten authors affiliated in Malaysia concerning engineering subject.

Table 5: Top ten Malaysia authors in engineering

Name	Full name	Author's affiliation	No. of paper
Majlis, B.Y.	Burhanuddin Yeop Majlis (Prof. Dato' Dr.)	Faculty of Engineering, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia	125
Harun, S.W.	Sulaiman Wadi Harun (Prof. Dr.)	Faculty of Engineering, University of Malaya, 50603 Kuala Lumpur,	110

		Malaysia	
Shaari, S.	Sahbudin Hj Shaari (Prof. Dr.)	Faculty of Engineering, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia	101
Mahdi, M.A.	Mohd Adzir Mahdi (Prof. Dr.)	Faculty of Engineering, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia	85
Ahmad, H.	Harith Ahmad (Prof. Dr.)	Faculty of Science, University of Malaya, Kuala Lumpur 50603, Malaysia	77
Rahim, M.K.A.	Mohamad Kamal A. Rahim (Assoc. Prof. Dr.)	Faculty of Electrical Engineering, Universiti Teknologi Malaysia, Skudai, Johor Bahru 81310, Malaysia	76
Ahmad, H.	Hussein Ahmad (Prof Dr.)	Faculty of Electrical Engineering, Universiti Teknologi Malaysia, 81310, UTM Skudai, Johor, Malaysia	67
Khatun, S.	Khatun, Sabira (Assoc. Prof. Dr.)	Faculty of Engineering, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia	65
Ab-Rahman, M.S.	Mohd Syuhaimi Ab Rahman (Assoc. Prof. Dr.)	Faculty of Engineering, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia	62
Misran, N.	Norbahiah Misran (Assoc. Prof. Dr.)	Faculty of Engineering, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia	62

Research was published in many languages. Most of the publications were in English language (99.907%). Remaining publications were published in Japanese language (0.034%), Turkish language (0.025%), Bosnian language (0.008%), German language (0.008%), Polish language (0.008%) and Russian language (0.08%).

4. Conclusions

The degree of collaboration of author affiliated in Malaysia in engineering discipline reveals a perceptible upward trend of collaborative engineering research. The number of collaborative papers indicates that collaborative nature of research is growing. Collaboration was not a problem among engineering researchers on the Malaysian scene. This study indicates that engineering research in Malaysia has moved toward internationalization, and Malaysian researchers have made significant contributions to global engineering study. A

detailed analysis of the relative contributions of Malaysian authors to international engineering research has important implications for strategic planning in research and research policy in the country.

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