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Publishing in the First Quartile: A Case of 50 Malaysian Prolific Scientists

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ABSTRACT

This paper provides the results of the first phase of the research project entitled 'Motivations for scholarly productivity and impact of top-rated Malaysian scientists: The need for power, affiliation and achievement'. Researchers play pivotal factors in deciding the direction of scientific development of a country. Among those researchers, there are group of successful scholars with outstanding accomplishment in research; who are experts in the fields, productive in producing quality papers, highly cited by peer researchers and receive prestigious recognitions locally and globally. This study purposely sampled 50 prolific Malaysian scientists, and analyse their productivity and impact with regard to publishing in Quartile 1 journals. Top 50 Malaysian scientists have published 11,327 articles indexed in the Science Citation Index Expanded (SCIE), the Web of Science, with a cumulative citation of 83,141. Out of this figure, 3,157 (28%) of articles were published in Q1 journals, received 51,524 citations which represent 62% of the total citations. The finding from this study will be useful in providing indicators of reference for future Malaysian scientists to publish in Q1 journals as one of the indicator to increase their scientific impact.

Keywords: scientific productivity, scientific impact, journal quartile, bibliometrics

INTRODUCTION

Scientific publications are indicators of knowledge productivity, an essential characteristic of a developed nation. Research is not complete until its findings are made known to the scientific community and the public at large. Publication is the way that researchers communicate their findings with the rest of the world, but more importantly, the process of publication gives the scientists feedback on their research works. Peer-reviewed journals are considered the most prestigious place that researchers communicate their research as they are likely to contain high-quality materials. Although they also publish in a range of academic forms and forums such as conference abstracts, books reviews, and invited chapters, it is the impact-factored journals that receive the most notice from promotion panels and search committees.

The main currency for the scholar is not power or wealth, but reputation. However, this reputation has been built upon one activity – research; one output – publication; and one measurement – citation. For maximum impact, a researcher would like to publish articles in the most prestigious journals. Impact factored journals denote prestige - which is a measure to convey the influence of journals and the research they carry. JIFs are widely regarded as a good measure of the overall standing and prestige of journals. While journal impact factors (JIFs) were prohibited from being used for research assessment, it is a known fact that many universities are using them in their internal processes of appointment, promotion and research assessment.

Because JIF is incomparable across different research disciplines, field-normalized JIFs have been used. JIF Quartile is the commonly used one. Based on the Journal Citation Report (JCR) database, journals are categorized into four different tiers, namely Q1, Q2, Q3 and Q4, which apparently is supposed to indicate their quality or tier in ranking. This is done based on the number of citations and the Impact Factor (IF) of the journal concerned. Q1 denotes the top 25% of the IF distribution, Q2 for middle-high position (between top 50% and top 25%), Q3 middle-low position (top 75% to top 50%), and Q4 the lowest position (bottom 25% of the IF distribution). JIF Quartile is intended to reflect the place of a journal within its field, the relative difficulty of being published in that journal, and the prestige associated with it. JIF Quartile can be used to evaluate an entity's (e.g., a country, institutions, research groups, or individual) publications distribution among journals of different fields, e.g. 40% publications in Quartile 1 (Q1) & Quartile 2 (Q2).

Q1 journals are those journals that have impact factors within the top 25% of the JIF distribution of a category. Bornmann and Marx (2014) suggest JIF quartile as a valuable tool of normalized JIF indicator. For example, an interesting alternative is the % Q1 indicator. It is the ratio of publications that a researcher has published in the most influential journals. These journals are ranked in the first quartile (25 %) of their subject categories. It is an advantage of this indicator that expected values are available: therefore one can expect that 25 % of a researcher's publications have been published in the first quartile.

However, Bornmann and Marx (2014) statement rouses doubt, and based on Liu, Hu, and Gu (2015) work, we would like to ascertain if one can really expect that 25% of a researcher's publications have been published in the first quartile, based on the case of Malaysian scientists.

CONTEXT OF THE STUDY

The Ministry of Education Malaysia (2015) aspiration in Malaysia Education Blueprint 2015-2025 (Higher Education) emphasizes on quality of educational institutions, stated that only one of Malaysia's universities is currently in the Top 200 QS global rankings. The number of research articles published by Malaysian universities increased more than threefold between 2007 and 2012, and the number of citations grew fourfold from 2005 to 2012. The five Malaysian Research Universities (MRUs) alone contributed 70 percent of these publications. By 2025, the Ministry aims to place one university in Asia's Top 25, two in the Global Top 100, and four in the Global Top 200. However, to achieve the target by 2025, more prolific scientists must be produced not merely in MRU, but also in all Higher Learning Institution in the country. But first, we need to have a clear view on the characteristics of successful scientists. Thus, the study will identify characteristics of top Malaysian scientists in term of publication productivity and impact, particularly with regard to publishing in Q1 journals. The findings will be useful for next generation of Malaysian scientists who wish to emulate some of the characteristics, while libraries, ministries and universities' management as care takers of researchers are able to provide appropriate trainings and services to support the needs of researchers.

LITERATURE REVIEW

When discussing top scientists, Nobel laureate is the most coveted recognition in science community. The people with outstanding contributions are selected every year to receive this prestigious award as a symbol of excellence and pinnacle achievement. As prolific figures, the laureates become centre of attention by all including the information professionals who eager to know their successful research characteristics and impacts thus embark study on them. Studies on Nobel Laureates were conducted extensively including on Harald zur Hausen (Munnolli, Pujar, and Kademani 2011), Anthony J. Leggett (Angadi et al. 2006), C.V. Raman (B. Kademani, Kalyane, and Kademani 1994) and Barbara McClintock (Kalyane and Kademani 1997). Basically, all studies discussed on the following issues; the publications productivity of laureates, collaboration works, dissemination of research outputs, research characteristics and impact of their research.

Bibliometrics study as a mechanism to identify research productivity and impact of scientists toward knowledge atmosphere is used extensively in the field of information science for various purposes and studied upon different target groups. Some studies were carried out to identify research performance in a country (Haiqi and Yuhua 1997; Leydesdorff and Gauthier 1996), research performance of full economic professors in Sweden (Henrekson and Waldenström 2007), PhD theses contribution to advancement of knowledge (Larivière 2010) and Nobel Laureates contribution (Angadi et al. 2006; B. Kademani, Kalyane, and Kademani 1994; Kalyane and Kademani 1997; Munnolli, Pujar, and Kademani 2011; Zuckerman 1967).

A study by Haiqi and Yuhua (1997) on research performance in China identified that the performance has increased steadily with regard to output of publications and their impact on global research productivity. Henrekson and Waldenström (2007) on the other hand tried to identify research performance of economic professors in Sweden by using seven commonly used research output measurement tools divided under three main headings based on weighted journal publications, citation to most cited works and number of international publications; however the findings showed large discrepancies between the measures with regard to professors' rank order and their performances. Another study was done to see scientific productions and their impacts of universities in Spain. The team introduced Institutional Field Quantitative-Qualitative Analysis Index as a tool to measure Spanish universities' research productivity and finally produced a rank of best universities in the country (Herrera 2013). Meanwhile, Larivière (2010) studied the contribution of Quebec PhD students in 2000 – 2007 toward knowledge advancement in the province. The findings showed that 33% of publication output in the province derived from PhD students, which 5 times higher than publications of federal and industrial researchers. However, the citation rates received were significantly lower even though they published in averagely high impact factor journals.

Studies on individual scientist were done widely on scientists especially Nobel laureates to investigate their contributions towards science (Kademani, Kalyane, and Kumar 2002; Kademani, Kalyane, and Kademani 1996; B. Kademani, Kalyane, and Balakrishnan 1994). Bibliometrics analysis was applied to present scientists' productivity in term of authorship pattern, publication productive life, domainwise classification, productivity co-efficient, research group productivity, domainwise author productivity, distribution of authors and papers, journal publication rank, publication density and publication concentration. On the other hand, Bornmann and Marx (2014) focused on citation measures as an important indicator to evaluate individual researcher, based on percentiles normalize impact and visualized using Beam plots (Doane and Tracy 2000). This method took into account the issue of citation skewness between fields and publication years. However, it is still difficult to evaluate young researchers, due to limitation in citations received. Costas and Leeuwen (2010) explained on how bibliometric analysis can be applied as one of research assessment exercise at micro level involves research team or individual researcher. This exercise is in demand because of increase demand by policy makers, research managers and scientists themselves. However, special attention should be given when analysing research at micro level especially in relation with calculation of indicators, final interpretation of findings, lack of normalization, names disambiguity and inaccuracy of data provided by the databases.

In the context of Malaysia, bibliometrics study was carried out by the Malaysian Citation Centre in 2012 to gauge the performance of 112 Malaysian Journals indexed in MyCite. The findings were tabulated into ranking of journals (by h-index, impact factor and total citations), top 20 authors ranked by total publications and total citations, top 20 institutions ranked by total publications and authors affiliated to foreign countries contributing to Malaysian journals. The study also produced a rank of top authors based on the number of publications and citations received, but it is limited only to the articles published in journals that were indexed in MyCite (Malaysian Citation Centre 2013). Nevertheless, no previous study has focused on journal publications based on quartile in Malaysia, thus this study try to fill the gap by reporting the inclination of prolific scientists towards publishing in Q1 journals.

OBJECTIVE AND METHOD

In this paper we address the research objective: to identify the percentage of publications Malaysians' prolific scientists have published in the first quartile. The research question posed is: What is the real proportion of WoS indexed articles of Malaysian prolific scientists allocated to Q1?

The data were collected from Web of Science Core Collection, by searching through address (Malaysia) and time span (from 2006 to 2015). For citation indexes, Science Citation Index Expanded (SCIE) was chosen to identify prolific Malaysian scientists in science, technology and medicine (STM) field. Next, document types were refined by article and review, then analysed result by authors. Finally, the rank of top scientists will be displayed. Next, biographical data of each scientist will be checked in web CV or organizational website to verify nationality, and those non-Malaysian will be excluded from the list.

Bibliometrics data from Web of Science then were tabulated and analysed to identify the pattern of scholarly communication with regard to productivity (publication counts and distribution by journals' quartile) and scientific impact (times cited by quartile). A journal that acquire a Q1 rank in a particular category but a lower rank in another category is recognized as a Q1 journal[1].

RESULTS

The top 50 most productive Malaysian scientists within the period of 2006 to 2015 as extracted from the Web of Science database are affiliated to the following public universities; USM (19 scientists), UM (14), UPM (8), UKM (6), UTM (2) and UNIMAP (1) (Appendix 1, ranked based on the number of papers). They come from nine broad areas of research fields: Engineering (20), Physics (10), Chemistry (9), Medicine (4), Industrial Technology (3), and Food Technology (1), Mathematics (1), Biological Science (1) and Biotechnology & Biomolecular (1). At the macro level, they have published 11,327 articles with a cumulative citation of 83,141. A total of 3,157 (28%) of these articles were published in Q1 journals, and received 51,524 citations which represent 62 percent of the total citations. In other word, each article published in Q1 received 16 citations on average (citation per publication). Surprisingly, the top two scientists based on productivity (R1 & R2) published only 4 and 6 percent of their articles in Q1 journals respectively. Both scientists were found to be publishing the bulk of their articles (85% respectively) in Q4 journals, with 1331 articles from R1 (USM) and 1261 articles by R2 (UM).

At the micro level, our finding shows that the scientist with the highest number of Q1 articles is R17 (79%, USM), followed by R6 (75%, UTM) and R27 (71%, UM), thus revealing authors' preference for journals with a high IF. In term of citations, R6 (UTM) received almost 94% of total citations from his Q1 articles, followed by R10 (93%, USM), R17 (90%, USM) and R27 (90%, UM). This finding showed that publication in Q1 correlates with quality and thus increases the scientific impact (citation); one may conclude that the amount of citations received would be mechanically inherited by the journal's importance (IF) or where it has been published.

[1] In world university rankings, a journal that has been characterized as Q1 in a particular category and Q4 in a different category will be recognized as a Q1 journal.

Table 1: Top Malaysian scientists with Q1 publications (ranked by % of Q1 allocation)

No	Researcher	Institution	Field	Q1				TOTAL	
				No. of Paper	%	Times cited	%	No. of Paper	Times cited
1	R17	USM	Chemical Engineering	134	**79%**	3343	90%	170	3714
2	R6	UTM	Energy Engineering	242	**75%**	5111	94%	324	5456
3	R27	UM	Chemical Engineering	99	**71%**	2290	90%	140	2558
4	R10	USM	Chemical Engineering	141	**68%**	5100	93%	208	5500
5	R26	UM	Physics	97	**66%**	1012	80%	147	1263
6	R20	UKM	Chemical & Process Engineering	101	**64%**	2316	89%	159	2589
7	R8	USM	Chemical Engineering	144	**63%**	3799	82%	230	4613
8	R48	USM	Materials & Mineral Resources Engineering	70	**63%**	679	81%	112	837
9	R45	UM	Chemical Engineering	73	**60%**	996	59%	122	1697
10	R11	UKM	Mechanical & Material Engineering	115	**58%**	1802	88%	197	2054
11	R22	UPM	Food Technology	89	**57%**	1340	82%	157	1643
12	R30	UM	Biological Science	78	**57%**	469	62%	136	753
13	R32	UPM	Chemistry	75	**57%**	694	72%	131	969
14	R46	USM	Industrial Technology	59	**50%**	931	71%	118	1317
15	R39	UM	Biomedical Engineering	62	**49%**	276	57%	127	484
16	R43	UM	Chemistry	58	**46%**	448	55%	125	809
17	R37	USM	Industrial Technology	58	**45%**	1209	83%	128	1456
18	R40	USM	Industrial Technology	57	**45%**	1133	83%	126	1357
19	R31	UM	Physics	56	**42%**	552	61%	133	905
20	R12	UKM	Mathematics	76	**40%**	1272	53%	192	2408
21	R50	USM	Materials & Mineral Resources Engineering	44	**40%**	720	69%	111	1049
22	R42	USM	Materials & Mineral Resources Engineering	49	**39%**	456	49%	126	935

23	R16	UPM	Engineering	66	**38%**	870	64%	172	1370
24	R36	UPM	Chemistry	48	**38%**	636	67%	128	956
25	R47	USM	Electrical Engineering	43	**38%**	453	59%	114	762
26	R29	UPM	Chemistry	50	**36%**	622	60%	137	1045
27	R19	UPM	Engineering	52	**32%**	889	64%	162	1388
28	R23	UM	Medicine	50	**32%**	1322	45%	155	2939
29	R38	UNIMAP	Electrical Engineering	38	**30%**	321	48%	128	674
30	R41	UKM	Electrical Engineering	38	**30%**	398	55%	126	718
31	R7	USM	Materials & Mineral Resources Engineering	74	**26%**	939	43%	283	2176
32	R14	UPM	Biotechnology & Biomolecular	47	**26%**	369	35%	182	1068
33	R44	UPM	Veterinary Medicine	31	**25%**	230	30%	124	758
34	R3	UM	Physics	113	**24%**	1324	47%	478	2839
35	R21	UM	Physics	38	**24%**	537	37%	159	1455
36	R15	USM	Physics	39	**22%**	446	50%	177	899
37	R35	UTM	Chemical & Natur al Resources Engineering	28	**22%**	428	43%	129	989
38	R5	USM	Physics	76	**21%**	804	42%	357	1917
39	R49	USM	Medicine	23	**21%**	236	44%	112	535
40	R4	UM	Electrical Engineering	97	**20%**	1302	46%	477	2832
41	R9	UM	Chemistry	29	**13%**	135	20%	224	658
42	R18	USM	Physics	18	**11%**	215	36%	164	592
43	R24	USM	Chemistry	12	**8%**	216	31%	152	704
44	R2	UM	Chemistry	95	**6%**	1956	43%	1477	4512
45	R1	USM	Physics	64	**4%**	857	17%	1559	5105
46	R13	UKM	Medicine	5	**3%**	13	2%	186	559
47	R25	UM	Chemistry	3	**2%**	20	7%	150	272
48	R28	UKM	Chemistry	3	**2%**	38	9%	137	407
49	R33	USM	Physics	0	**0%**	0	0%	130	192
50	R34	USM	Physics	0	**0%**	0	0%	129	454

DISCUSSION AND CONCLUSION

To answer the research question of ‘what is the real proportion of WoS indexed articles of Malaysian prolific scientists allocated to Q1?’ the finding shows that as overall, 28 percent of the articles were allocated in Q1. In considering Q1 represents top 25 percent of high impact journals in the field, the study also expect that at least 25 percent of top

Malaysian scientists' publications are allocated in Q1, therefore 28 percent received is considered slightly above the expectation.

The remarkable number of Q1-ranked articles indicates the high level of publications produced by researchers sampled in the study. This means that Malaysian top scientists carefully consider JIF Quartile when deciding where to target their work which helps them to build their reputation as a scholar. On individual basis, 33 scientists were found to be publishing 25 percent or higher of their publications in Q1 journals. While the rest of the scientists allocated between 2 to 24 percent of their publications in Q1, and two of them, who seem to focus on quantity (i.e. the number of papers) did not allocate any article in Q1.

Therefore, the analysis shows that for papers published in WoS indexed journals by the top 50 Malaysian scientists, on average the probability of being published in journals in Q1 (high impact journals) is above 25 percent. Liu, Hu, and Gu (2015) found that at least 1/3 of WoS publications are actually published in Q1 journals. Thus, there is a wide choice of high IF journals to consider when submitting a manuscript. However, by their nature, they are very competitive and the acceptance rate varies between 7 and 25 percent.

Since this is only an initial part of research project to study a larger number of top Malaysian scientists, and with more indicators of assessments, this finding has paved the way for basic understanding on their scientific characteristics with regard to productivity and scientific impact. Future work will explore top scientists' social impact as well as the motivation that drive them towards excellent achievements. Researchers are becoming increasingly aware that the impact of scientific work strongly depends on successful journal publication strategies, and publishing in Q1 journals are one of those strategies.

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REFERENCES

Angadi, M, MM Koganuramath, BS Kademani, BD Kumbar, and Suresh Jange. 2006. Nobel Laureate Anthony J Leggett: A Scientometric Portrait. *Annals of Library and Information Studies* 53: 203–12.

Bornmann, Lutz, and Werner Marx. 2014. Distributions instead of single numbers: Percentiles and beam plots for the assessment of single researchers. *Journal of the Association for Information Science and Technology* 65: 206–208. doi: 10.1002/asi.22996

Bornmann, Lutz, and Werner Marx. 2014. How to Evaluate Individual Researchers Working in the Natural and Life Sciences Meaningfully? A Proposal of Methods Based on Percentiles of Citations. *Scientometrics* 98 (1): 487–509. doi:10.1007/s11192-013-1161-y.

Costas, Rodrigo, and Thed N Van Leeuwen. 2010. A Bibliometric Classificatory Approach for the Study and Assessment of Research Performance at the Individual Level : The Effects of Age on Productivity and Impact. *Journal of the American Society for Information Science* 61 (8): 1564–81. doi:10.1002/asi.

Doane, D. P, and R. L Tracy. 2000. Using Beam and Fulcrum Displays to Explore Data. *The American Statistician* 54 (4): 289–90. doi:10.1080/00031305.2000.10474561.

Haiqi, Zhang, and Zhang Yuhua. 1997. Scientometric Study on Research Performance in China. *Information Processing & Management* 33 (1): 81–89.

Henrekson, Magnus, and Daniel Waldenström. 2007. *How Should Research Performance Be Measured ? A Study of Swedish Economists*. Stockholm, Sweden. http://www.ifn.se/wfiles/wp/wp712.pdf.

Herrera, Francisco. 2013. *Scientometrics and Bibliometrics : Some Data on the Spanish Universities*. *Soft Computing and Intelligent Information Systems*.

Kademani, B S, V L Kalyane, and A B Kademani. 1996. Scientometric Portrait of Nobel Laureate S. Chandrasekhar. *JISSI* 2 (September): 119–35.

Kademani, BS, VL Kalyane, and MR Balakrishnan. 1994. Scientometric Portrait of PK Iyengar. *Library Science* 31.

Kademani, BS, VL Kalyane, and AB Kademani. 1994. Scientometric Portrait of Nobel Laureate Dr. CV Raman. *Indian Journal of Information, Library & Society* 7 (3-4).

Kademani, BS, VL Kalyane, and V Kumar. 2002. AH Zewail: Research Collaborator Par Excellence. *Scientometrics* 53 (1): 113–21.

Kalyane, VL, and BS Kademani. 1997. Scientometric Portrait of Barbara McClintock: The Nobel Laureate in Physiology. *Kelpro Bulletin* 1 (1): 3–14.

Larivière, Vincent. 2010. *A Bibliometric Analysis of Quebec' S PhD Students ' Contribution to the Advancement of Knowledge*. (Doctoral thesis,McGill University, Montreal, Canada).

Leydesdorff, Loet, and Elaine Gauthier. 1996. The Evaluation of National Performance in Selected Priority Areas Using Scientometric Methods. *Research Policy* 25: 431–50.

Liu, Weishu, Guangyuan Hu, and Mengdi Gu. 2015. The Probability of Publishing in First-Quartile Journals. *Scientometrics* 106 (3). Springer Netherlands: 1–4. doi:10.1007/s11192-015-1821-1.

Malaysian Citation Centre. 2013. *Performance of Malaysian Journals in MyCite : 2012*. Putrajaya: Ministry of Higher Education Malaysia.

Ministry of Education Malaysia. 2015. *Malaysia Education Blueprint 2015-2025 (Higher Education)*. Putrajaya: Ministry of Education Malaysia .

Munnolli, S. S., S. M. Pujar, and B. S. Kademani. 2011. Scientometric Portrait of Nobel Laureate Harald Zur Hausen. *Annals of Library and Information Studies* 58 (1): 71–78.

Zuckerman, H. 1967. Nobel Laureates in Science: Patterns of Productivity, Collaboration, and Authorship. *American Sociological Review*, 391–403.

Appendix 1: Top Malaysian scientists with Q1 publications (by publications count)

Researcher	Institution	Field	Q1 No. of Paper	Q1 %	Q1 Times cited	Q1 %	TOTAL No. of Paper	TOTAL Times cited
R1	USM	Physics	64	4%	857	17%	1559	5105
R2	UM	Chemistry	95	6%	1956	43%	1477	4512
R3	UM	Physics	113	24%	1324	47%	478	2839
R4	UM	Electrical Engineering	97	20%	1302	46%	477	2832
R5	USM	Physics	76	21%	804	42%	357	1917
R6	UTM	Energy Engineering	242	75%	5111	94%	324	5456
R7	USM	Materials & Mineral Resources Engineering	74	26%	939	43%	283	2176
R8	USM	Chemical Engineering	144	63%	3799	82%	230	4613
R9	UM	Chemistry	29	13%	135	20%	224	658
R10	USM	Chemical Engineering	141	68%	5100	93%	208	5500
R11	UKM	Mechanical and Material Engineering	115	58%	1802	88%	197	2054
R12	UKM	Mathematics	76	40%	1272	53%	192	2408
R13	UKM	Medicine	5	3%	13	2%	186	559
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R23	UM	Medicine	50	32%	1322	45%	155	2939
R24	USM	Chemistry	12	8%	216	31%	152	704
R25	UM	Chemistry	3	2%	20	7%	150	272
R26	UM	Physics	97	66%	1012	80%	147	1263
R27	UM	Chemical Engineering	99	71%	2290	90%	140	2558
R28	UKM	Chemistry	3	2%	38	9%	137	407
R29	UPM	Chemistry	50	36%	622	60%	137	1045
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R35	UTM	Chemical and Natural Resources Engineering	28	22%	428	43%	129	989
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R37	USM	Industrial Technology	58	45%	1209	83%	128	1456
R38	UNIMAP	Electrical Engineering	38	30%	321	48%	128	674
R39	UM	Biomedical Engineering	62	49%	276	57%	127	484
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