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OPEC Countries: Research Performance Across Nations in Library and Information Science

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Abstract

Study analyses scientometric assessment of LIS research performance of OPEC member countries. The research publication data indexed in Scopus for the OPEC member countries were extracted and used for the analysis. The data are analyzed to identify quantitative research performance of OPEC member countries in terms of total documents, citable documents, and non-citable documents. The citation impact is measured by different parameters, like total citations, citations per document, Relative Citation Impact, self-citations, and self-citations per document. Finally, the quality of the document is assessed by means of *h*-index. Nigeria has been found to be most productive country in LIS research and Iran is receiving highest citations and also in *h*-index performance amongst OPEC member countries. Iraq, Libya, and Ecuador are far away in LIS research productivity and needs strong steps to improve LIS research productivity for future endeavor.

Keywords: LIS Research, OPEC, Research Productivity, Research Performance, Scientometrics, Citation Analysis, H-index.

Introduction

Scientometrics analyses the growth and trends of scientific research in the field quantitatively as well as qualitatively. Publication counts of research productivity become meaningful when analyzed and compared with various scientometric indicators. The indicators have a scientific base behind them and countries' research performance measured and compared based on them. Rankings have been generated on research performance of countries. Gauffriau & Larsen (2005) mentioned that "rankings of countries, regions, institutions, and individuals based on the counting of publications and citations are prominent in studies of science and in research policy. The impact of a country's research on the world scene is, of course, more closely related to the overall size of the country's output." Research output is increasingly evaluated and monitored at different levels and for different purposes (Gonzalez-Brambilaa & Velosob, 2007). Rankings of research performance of countries are mostly based on their research output measured by various scientometric indicators. Scientometric "studies the evolution of science through some quantitative measures of scientific information, as the

number of scientific articles published in a given period of time, their citation impact" (Rajendran, Jeyashankar & Elango, 2011). Pouris (2011) advocated that philosophy underlying the use of scientometric indicators as performance measures are based on De Solla Price's (1975) statement that "for those who are working at the research front, publication is not just an indicator but, in a very strong sense, the end product of their creative effort". Scientometric Indicators have been used for decision making (Dutt, Garg & Bali, 2003) by the countries to observe and boost the research growth in the particular field of studies. The big difference has been observed between the economically sound and poor countries in many terms. The Organization of the Petroleum Exporting Countries (OPEC) is famous for petroleum extraction and marketing in the world for their development. By supplying the petroleum products to world countries, still there is big economic gap among OPEC countries and this difference may also appear in their research performance. Analyzing the research performance of OPEC countries in LIS domain is very much related to ascertaining the level of research across the member countries. The OPEC was founded in Baghdad, Iraq in September 1960 with five member countries namely Iran, Iraq, Kuwait, Saudi Arabia and Venezuela. The OPEC countries were later joined by Qatar (1961), Indonesia (1962), Libya (1962), United Arab Emirates (1967), Algeria (1969), Nigeria (1971), Ecuador (1973), Gabon (1975), and Angola (2007). Indonesia suspended its membership on 30th November 2016. Presently the Organization has a total of 13 member countries (OPEC Member Countries, n.d.).

There are number of researches conducted on research performance of an individual, group, institution, subject, small geographic region or continent level geographic regions by using various scientometric indicators (Barbaro, Gentili & Rebuffi, 2014; Costas and Bordons , 2005 & 2007; Moed, 2010; Navarrete & Asio, 2014; Tsay & Ma, 2003; Wang, Song & Barabasi, 2013). Some related researches indicate that research activities of Iran and Iraq are negatively affected by the Gulf War and the Iran-Iraq war of the 1980s; and Iran seems to be recovering quickly while Iraq shows no signs of improvement (Uzun, 1996). Iran had an increasing growth in presenting articles after the Iran-Iraq war, which marks the period of stability and development (Moin, Mahmoudi & Rezai, 2005). Nigeria's productivity accounted for 1.22% of the country's national output and 1.63% of the world's total LIS output; and Algeria produced zero citations per LIS document during 1996-2006 (Onyancha, 2007). Among Middle East countries, Kuwait has second highest percentage of cited documents; and in terms of aggregate performance, Qatar ranks second (Gul, Nisa, Shah, Gupta, Jan & Ahmad, 2015). Qatar and United Arab Emirates (UAE) had the largest while Kuwait and Iraq had the lowest increase in publication counts during 1980-2014 (Moed, 2016).

Methodology

The study is confined to the scientometric analysis of research performance of OPEC countries in Library and Information Science (LIS) for the period of 1996 to 2015. The data were obtained from SCImago Lab of Scopus for the purpose on May 17, 2017. Out of 13 OPEC member countries, presently 11 OPEC countries data were obtained from the SCImago. The two OPEC member countries (Gabon and Indonesia) data were not found. Moreover, the assessment criteria selected was on the following parameters:

a) The country wise productivity of LIS documents.
b) The country wise citable and non-citable LIS documents.
c) The impact of citations.

d) The impact of self-citations.
e) The *h*-index performance.

Analysis

Country wise productivity of LIS documents

During 20 years of the study period, as per data obtained from SCImago Lab of Scopus, total 2285 LIS research documents have been found in OPEC member countries. Nigeria has the highest number of documents (39.64%) followed by Iran (31.29%), and Saudi Arabia (9.14%). The cumulative sum of documents of these top 3 countries represents 80% share of total research productivity of the OPEC member countries in the field of LIS. Algeria, Kuwait, Qatar, UAE, and Venezuela have research documents contribution in the range of 2-6% and the remaining three countries Ecuador, Iraq, and Libya have less than 1% contribution each (as shown in Table 1).

Table 1
Productivity of LIS documents

Rank	Country	Documents	%
6	Algeria	75	3.28
9	Ecuador	19	0.83
2	Iran	715	31.29
11	Iraq	4	0.17
4	Kuwait	124	5.42
10	Libya	6	0.26
1	Nigeria	906	39.64
7	Qatar	57	2.49
3	Saudi Arabia	209	9.14
5	UAE	123	5.38
8	Venezuela	47	2.05
	Total	2285	

Country wise citable and non-citable LIS documents

Citable documents include the number of research documents published by the journals in the previous years (selected year documents are excluded) and exclusively articles, reviews and conference papers are considered. Non-citable documents can be obtained by the subtraction of citable documents from total documents. Basically, it is current year research documents (output) published by the journals. Table 2 depicts the total citable and non-citable documents of OPEC member countries during the selected study period. Out of total 2285 LIS document from OPEC member countries, 98.55% documents are found to be citable and remaining 1.45% documents are non-citable. Among the countries, Nigeria has the highest citable documents (39.96%) and placed at 1st rank followed by Iran (31.52%), and Saudi Arabia (9.05%). The top three ranked countries produced 80.55% citable documents from total citable documents. Libya and Iraq both have less than 10 citable documents. From the total 33 non-citable documents, as shown in Table 2, UAE has the highest non-citable documents (7) followed by Nigeria (6), Saudi Arabia (5), and Iran (5). There is no non-citable document found for Iraq and Libya.

Table 2
Citable and non-citable LIS documents

Rank	Country	Citable doc.	% of citable doc.	Non-citable doc.
6	Algeria	73	3.24	2
9	Ecuador	18	0.79	1
2	Iran	710	31.52	5
11	Iraq	4	0.17	0
4	Kuwait	121	5.37	3
10	Libya	6	0.26	0
1	Nigeria	900	39.96	6
7	Qatar	54	2.39	3
3	Saudi Arabia	204	9.05	5
5	UAE	116	5.15	7
8	Venezuela	46	2.04	1
	Total	2252		33

Country wise citation impact of LIS documents

Citation analysis measures the impact of each article by counting the number of times they were cited by other articles. High level of citations to a scientific publication is interpreted as signs of scientific influence, impact, and visibility. Table 3 represents citations related data to OPEC member countries for LIS research productivity during 1996-2015 as per data obtained from Scopus database. Citations have been calculated by the number of citations received in the selected year by a journal to the documents published in the three previous years i.e. citations received in year X to documents published in years X-1, X-2, and X-3. From Table 3, it has been found that Iran is the highest citation receiving country with 3,424 citations to research documents that are 44.17% share of total citations (7,751) to OPEC member countries, and so got first rank followed by Nigeria (2^{nd} rank with 22.73% citations), and Saudi Arabia (3^{rd} rank with 11.08% citations). Iraq is the lowest citation receiving country (2 citations) which is only 0.02% share of total citations in OPEC member countries. The top 3 ranked OPEC countries citations share is 77.98%.

Citation per Paper (CPP) is a relative indicator computed as the average number of citation per paper. There are total 7751 citations for 2285 documents which give average 3.39 citations per paper (document) for all OPEC member countries. In terms of citations per paper, Libya (7.67), Kuwait (5.08), and Iran (4.79) are in the top 3 OPEC member countries whereas Iraq (0.5) is again in the last position.

Relative Citation Impact (RCI) is more robust than other citation indicators in the sense that it measures both the influence as well as visibility of research activity, irrespective of the level of evaluation either country or institute or author (Elango, Rajendran & Manickraj, 2013). It is calculated with the following formula:

$$RCI = \frac{\text{Country's share of total citations (\%)}}{\text{Country's share of total publications (\%)}}$$

If RCI = 1, indicates that the country's citation rate is equal to average citation rate; if RCI > 1, indicates that the country's citation rate is higher than the average citation rate and also implies high impact of research in that country; and if RCI < 1, indicates that the

country's citation rate is lower than the average citation rate and also implies that the research efforts are higher than its impact.

The calculated RCI for OPEC member countries is found the maximum for Libya (2.26) followed by Kuwait (1.49), Iran (1.41), UAE (1.32), and Saudi Arabia (1.21) that implies these countries have higher research impact. Amongst the remaining six countries, RCI is found the minimum for Ecuador and Qatar (0.91), Venezuela (0.71), Nigeria (0.57), Algeria (0.49) and the lowest for Iraq (0.14) which implies that these countries have higher research efforts but lower research impact.

Table 3
Citation impact of LIS documents

Rank*	Country	Citations	%	CPP	RCI
7	Algeria	126	1.62	1.68	0.49
9	Ecuador	59	0.76	3.11	0.91
1	Iran	3424	44.17	4.79	1.41
11	Iraq	2	0.02	0.5	0.14
4	Kuwait	630	8.12	5.08	1.49
10	Libya	46	0.59	7.67	2.26
2	Nigeria	1762	22.73	1.94	0.57
6	Qatar	177	2.28	3.11	0.91
3	Saudi Arabia	859	11.08	4.11	1.21
5	UAE	552	7.12	4.49	1.32
8	Venezuela	114	1.47	2.43	0.71
	Total	7751		3.39	

*Rank as per the number of citations.

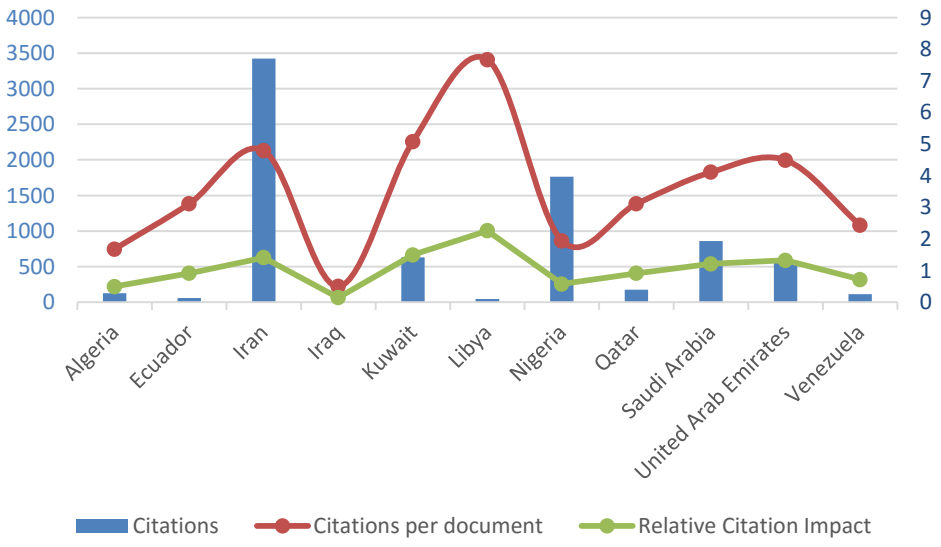

Figure 1. Citation impact of countries in LIS during 1996–2015

Country wise self-citations of LIS documents

Table 4 represents self-citations related data to OPEC member countries for LIS research productivity during 1996-2015. From the observation of Table 4, total 1,942 self-citations have been found that is 25.05% of total citations (7751) to OPEC member countries. Self-

citations are found the maximum for Iran (888) and occupied the first rank followed by Nigeria (2nd rank, 699), and Saudi Arabia (3rd rank, 108). The lower self-citations are found for Ecuador (13), Libya (2) and Iraq (0).

Self-citation per paper (document) is a relative indicator computed as the average number of self-citations per paper. There are total 1,942 self-citations for 2285 documents which give on an average 0.84 self-citations per document for all OPEC member countries. In terms of self-citations per document, Iran (1.24), Nigeria (0.77), and Kuwait (0.70) are in the top 3 OPEC member countries. The lowest self-citation is observed for Venezuela (0.31) whereas Iraq has no self-citation.

Table 4
Self-citations of LIS documents

Rank	Country	Self-citations	Ratio with total citations	Self-citations per document
6	Algeria	43	34.12	0.57
9	Ecuador	13	22.03	0.68
1	Iran	888	25.93	1.24
11	Iraq	0	0	0
4	Kuwait	88	13.96	0.7
10	Libya	2	4.34	0.33
2	Nigeria	699	39.67	0.77
7	Qatar	22	12.42	0.38
3	Saudi Arabia	108	12.57	0.51
5	UAE	64	11.59	0.52
8	Venezuela	15	13.15	0.31
	Total	1942	25.05	0.84

Country wise h-index performance

Table 5 displays the *h*-index metrics for OPEC member countries in the field of LIS during 1996-2015. Ranks have been assigned to every OPEC member country as per their *h*-index performance recorded by Scopus database during 1996-2015. Iran has the highest *h*-index (25) and achieved the 1st position. Nigeria is in 2nd position with 15 *h*-index followed by Saudi Arabia (the 3rd position with 14 *h*-index), and UAE (the 4th position with 12 *h*-index). Qatar and Venezuela both have same *h*-index (7) while Iraq has the lowest *h*-index (1) with the last position. Iran, Nigeria, Saudi Arabia, UAE, and Kuwait have *h*-index values in double digits whereas rests of the OPEC member countries have single digit *h*-index values.

Table 5
h-index performance

Rank	Country	*h*-index
7	Algeria	6
8	Ecuador	5
1	Iran	25
10	Iraq	1
5	Kuwait	11
9	Libya	2
2	Nigeria	15

Rank	Country	*h*-index
6	Qatar	7
3	Saudi Arabia	14
4	UAE	12
6	Venezuela	7

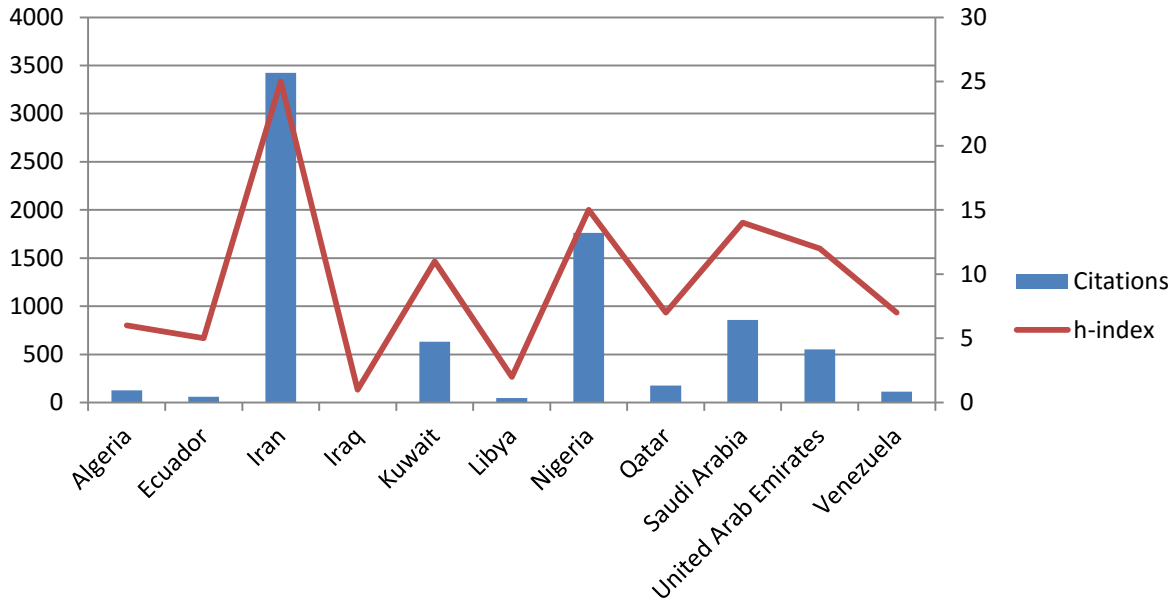

Figure 2. Citations and *h*-index dependency relation

Findings and Discussion

The research productivity of LIS field have been assessed for 20 years of time period and found that OPEC member countries contribution to LIS are only 2285 documents, out of which Nigeria (906) and Iran (715) have more than 70% contribution, and remaining contribution to LIS have been shared by 9 OPEC countries. Surprisingly, during 20 years of the research period, Iraq (4) and Libya (6) both have shown very poor research productivity amongst the OPEC members. The "developed countries have near about 95% of the global LIS publication productivity. The number of publications brought out by the universities is much higher than that of non-academic institution scholars in all countries…" (Davarpanah & Aslekia, 2008). The economic condition of the country affects the research productivity due to lack of sufficient research infrastructure. Gul, Nisa, Shah, Gupta, Jan & Ahmad (2015) also advocate that low productivity can be attributed due to the very poor economic condition of the country. Further Meo, Usmani, Vohra & Bukhari (2013) found a positive relation between spending on R&D and increase the number of universities and scientific journals on research publications. The research productivity of Iraq has been also affected by Gulf War and Iran-Iraq War (Uzun, 1996; Moin, Mahmoudi & Rezai, 2005). There are six countries (Iran, Iraq, Kuwait, Qatar, Saudi Arabia, and UAE) belongs to the Middle East which is suffering from different types of conflicts between each other. The conflict in the Middle East is one of the responsible factors for poor research productivity. "The problems and political differences in the educational systems of the Middle East have hampered the progress and productivity of the region to a greater extent in terms of research. The religious regimes can also be attributed to the low research productivity from some of the Middle Eastern countries" (Gul, Nisa, Shah, Gupta, Jan & Ahmad, 2015). It has been observed that except Iran, other Middle Eastern

countries have low research productivity whereas rests of the OPEC countries belongs to poor economic region (World Bank Group, 2017) and amongst them except Nigeria, rests have very poor research productivity. Therefore, LIS research productivity is affected with the research productivity of country; and thus found poor research productivity for the OPEC member countries. Nigeria and Iran are leading in LIS research amongst OPEC members.

The above-mentioned reasons for poor research productivity affect the counts of citable and non-citable documents for OPEC countries accordingly. In the case of citable documents, Nigeria, Iran, and Saudi Arabia have contributed altogether 80.55% citable documents whereas rests of the countries share are 19.45% only. Non-citable documents are basically current year research documents (output) published by the journals, and only 33 non-citable documents for all OPEC member countries showcase the current year research performance as well as give some insight for future also. Non-citable documents show the present publication efforts and research activity of countries and OPEC countries are having unsatisfactory progress. Citation-based measurements are considered as measures of quality and impact of research; and except Iran and Nigeria, rests of the OPEC countries have poor performance comparatively in terms of citations. After having Iran-Iraq War, Iran has improved the research performance and received 44.17% citations alone whereas Iraq has shown regress. Moreover, citations data are not satisfactory for Algeria, Ecuador, Iraq, Libya, Qatar, and Venezuela. The countries having fewer citations comparatively have higher CPP ratio than countries having higher citations. Libya's CPP is the highest (7.67) amongst all OPEC countries whereas Iran and Nigeria have 4.79 and 1.94 CPP ratios respectively (Table 3). Relative Citation Impact indicates the influence as well as visibility of research activity of country or institute or an author. Five OPEC countries have RCI value more than 1 that indicates the high impact of research in that country. Nigeria has received 22.73% citations and 39.64% documents but has RCI<1 which depicts that Nigeria has the higher level of research efforts but the lower impact to the world community. Surprisingly Libya has the highest (2.26) RCI while as usual the lowest RCI for Iraq (0.14) again.

"Author self-citations are highly problematic and suspect in determining the quality of scientific journals, but citing of scientific literature has to be considered part of social processes in the science system. If the citation expresses reward, self-citations distort necessarily the system as such" (Davarpanah & Aslekia, 2008). Self-citations have been observed for OPEC countries in which Iran, Nigeria, and Saudi Arabia have a higher percentage of self-citations out of total self-citations. The self-citation percentage with total citations have been found highest for Nigeria (39.67%) followed by Algeria (34.12%), Iran (25.93%), and Ecuador (22.03%). This indicates that Libya has more than 95% citations from other journals whereas Nigeria has only 60%. The lowest self-citation percentage indicates the highest citations from other journals which give positive citation impact of the country's research productivity. The *h*-index estimates the importance, significance, and broad impact of a scientist's or country's research output. The higher *h*-index of a country denotes significantly more valuable contributions than other countries. From the OPEC countries, Iran has the highest *h*-index (25) for LIS research whereas Nigeria (15) and Saudi Arabia (14) have remarkable *h*-index for their LIS research. The *h*-index value is dependent on the number of citations. Higher the number of citation tends to higher *h*-index and vice-versa (Fig 2).

Conclusion

Across the country level research performance in the field of Library and Information Science has shown the trends and developments of research as well as total research efforts made to develop the field of study by the Government. Further, it helps to develop a plan for a future course of action for the progress of the field particularly and country as a whole. Ding, Ge, Wu & Zheng (2013) advocate that "data obtained from such analyses are very helpful for judging the developmental level and trend and then can be used as indicators and evidence for better design and program of developing plans via various kinds of investment strategies". Moreover, Hazelkorn (2013) recommend carrying studies based on the comparative output of nations from time to time to know the performance and productivity. Scientometric studies measures the research performance across nations in a particular field to know the various pros and cons as well as comparative status amongst the group members. From the study, it has been established that Nigeria and Iran are dominating in the LIS research amongst OPEC member countries. However, it is also important to note that there is still a large gap amongst the OPEC member countries in terms of LIS research performance during the period of study. Governments have to take some positive course of action to develop the field at par with other academic disciplines of the country; and research progress of the field should be measured comparatively at regular interval.

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