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Status of Research Productivity and Higher Education in the Members of the Organization of Islamic Cooperation (OIC)

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ABSTRACT

Background: The research growth has directly linked with higher education and the number of researchers in the society. The aim of this paper is to evaluate the research productivity, the status of higher education and the estimation of scientists in the members of the Organization of Islamic Cooperation (OIC).

Method: The data for this retrospective study has been taken from open access online sources. The records of research productivity and the number of journals & other source publications have been downloaded from SCImage Journal and Country Rank (SJR). Times Higher Education (THE) world university ranking 2020 has been used to find out the quality universities in OIC countries and data on the number of researchers per million people has been obtained from the World Bank.

Results: A total of 39,46,933 documents published worldwide in the year 2018 as reflected in SJR, the share 57 OIC member countries have been 3,27,555 (8.29%). Iran and Turkey have been on the top with 60,268 (1.52%) and 45,582; (1.15%) publications respectively. There are 31,917 source publications are indexed in SJR in 2018, United States (US) has been on the top with 11,809 (36.99%) source publications. There are 1,087 (3.41%) source publications associated with OIC member countries. There are 1,396 universities of 92 countries are listed in the THE world university ranking 2020. Among the top 500 universities in the world, OIC members have 14 universities whereas a total of 179 universities are included by the Muslim world. UAE has the maximum number of scientists (n=2407) in one million people. The comparison of present data with similar previous studies showed that the growing tendency of publications found among OIC countries.

Conclusion: OIC member countries has been increasing the allocation for research and development (R & D) and enhancing the collaborative research activities within and outside of OIC countries. There is need to hire the veteran editors for scientific journals to improve the quality of publications and getting recognized by credible databases.

Keywords: Research Productivity; Bibliometric; Organization of Islamic Cooperation

Introduction

It is an irrefutable reality that Muslim had a glorious past especially in term of knowledge creation and provision of quality education from the 7th to 12th Century. In comparison to other religions of the world, Islamic teachings have been more clearly propagating the acquisition of knowledge. Allah says in Holy Quran,

“Allah will raise the status of those who believe among you and who are given knowledge by degrees.” (Surah Al-Mujadila 58:11).

Abu Umamah Al-Bahili reported, that two men were mentioned before the Prophet Muhammad, peace and blessings be upon him, (ﷺ) one of them was a worshiper and the other was a scholar. The Prophet said,

"The superiority of the scholar over the worshiper is like my superiority over the least of you."
(Sunan At-Tirmidhi 2685).

Abu Hurairah (May Allah be pleased with him) reported: The Messenger of Allah, Muhammad, peace and blessings be upon him (ﷺ) said,
"Allah makes the way to Jannah (paradise) easy for him who treads the path in search of knowledge."
(Sahih Muslim 2699).

Despite the golden past in terms of knowledge creation and the magnificent teaching of Islam, the deadlock was observed from 1400 to 1700 centuries due to political decentralization, religious sectarianism and moral deterioration. Islam M. (2008) highlighted some of the reasons for the decline of Muslims, Berber tribesmen destroyed the library containing four hundred thousand volumes in Cordoba, Spain in 1013; Genghis Khan and Halaku Khan destroyed the libraries and ruthlessly slaughtered the Muslim scholars in 1258; dynastic Muslim rulers didn't pay attention to the development of educational institutions from 1500 to 1700; the lack of eagerness to acquire the new knowledge paved the way for general illiteracy; inadequate support from government and beliefs on religious dogmas etc. further deteriorate the social, economic and defensive strength of the Muslims.

Presently, an estimated population of the world is 7.7 billion, among them, 1.8 billion are Muslims comprising almost 24% of the total population (www.worldometers.info/). The OIC was established on September 25th, 1969 in Rabat, Kingdom of Morocco. It is the second-largest inter-governmental organization after the United Nation, its membership comprised 57 Muslim majority countries spread on the four continents of the world. Most of OIC members, especially located in the Middle East are blessed with natural resources (Khoubnasabjafari, 2012).

The contemporary situation of Organization of Islamic Cooperation (OIC) members, the Muslim majority countries in the field of science & technology, research productivity and higher education has been improving rapidly (Hamid, 2015).

Bibliometric studies help to analyze the various parameters of scientific publications. The qualitative and quantitative evaluation of published documents has been providing the research performance of the researcher, subject area, department, institution and country. Progress of any country or region has been assessed by the quality research output because scholarly research has a direct impact on the economic and industrial growth of the specific nation, country and region (Haq & Alfouzan, 2017). Advancement in the field of science and technology depends on the dissemination of findings and results through publications and the outcomes of academic excellence are measured through scientific writing and publications (Meo et al. 2014).

Rizvi (2005) pointed out the prerequisite for productive and innovative research in OIC countries, a). state of the art infrastructure, b). well-educated and highly trained scientists, c). comprehensive management system for research monitoring, d). enough provision of funds for research and development, and e). taking practical measures to implement the research policies by removing the cultural, political and security hurdles. The resource-rich OIC members are working hard to fulfill these prerequisites and providing assistance to other members.

There are different organizations like Web of Science of Institute of Scientific Information, Scopus of Elsevier and Google Scholar, updating the record of worldwide publications and global bibliographic control (Martín-Martín et al. 2018). US National Library of Medicine maintained the publication's data

on biomedical sciences in an open-access Medline/PubMed database (Haq et al, 2019). Scopus, a commercial and subscription-based database, claimed to have comprehensive bibliographic coverage of global publications. SCImago Journal & Country Rank (SJR) is a freely accessible portal, owned by Scopus and provides scientific indicators of journals and country. SJR distributed all the scholarly publications into 313 subject categories, bibliographic data have been drawn from more than 30,000 titles of 5,000 international publishers. SJR released the citation indicators of documents published by 233 countries in 2018 (<http://www.scimagojr.com/>). The main aim of this study to present the status of research productivity and higher education amongst OIC countries in its comparison with the rest of the world.

Literature Review

Sarwar and Hassan (2015) assessed the research output in the field of Science and Technology of 11 OIC member countries. The data was taken from Scopus for the period of 2000 to 2011. Turkey found most productive followed by Iran, Malaysia, Egypt, Pakistan and Saudi Arabia. The majority of research carried out on veterinary sciences followed by Chemistry, Chemical Engineering, and Agriculture & Biosciences. The analysis of trends of transformed activity index in material sciences showed that Saudi Arabia has been on the top followed by Malaysia, Iran and Pakistan. Iran is on the top in Energy research, while Pakistan outclassed other countries in Mathematics and Computer Science publications.

Cavacini (2016) examined the scientific research development of 16 Middle East countries and find that Iran, Turkey, Saudi Arabia and Egypt have been growing rapidly in research productivity whereas Israel has been going down in 2014. Gul et al. (2015) studied the research performance of 15 Middle East countries from 1981 to 2013. Amongst the Muslim countries of Middle East, Turkey was first ranked, followed by Iran, Egypt, Saudi Arabia and Jordan. Lebanon has the second-highest citation ratio and Kuwait has the second highest cited papers. Qatar recorded the second-highest aggregate performance indicator with 0.92 followed by Saudi Arabia 0.79.

Meo et al. (2014) scrutinized the research publications produced by 193 member countries of the United Nations for the period of 1996 to 2000. This study compared the research productivity of 57 OIC members with the 133 other countries of the world. OIC country produced $16,074.18 \pm 5,411.4$ documents while the rest of the world produced $150,044.99 \pm 43,800.29$. The statistical analysis showed that the research productivity in OIC countries has been significantly low ($p=0.0001$).

Khoubnasabjafari et al. (2012) examined the research productivity of OIC members from 2006 to 2010 and compared this data with European Union. The data of publications was taken from Scopus. All 57 OIC member countries produced 9,64,989 documents, Turkey has been on the top with 2,56,342 (25.56%) documents followed by Iran ($n=1,24,462$; 12.92%), Egypt ($n=93,829$; 9.72%), Malaysia ($n=61,514$; 6.38%), Nigeria ($n=51,894$; 5.38%) and Saudi Arabia (51,078; 5.29%). Twenty-seven countries of European Union produced 1,21,04,372 documents in the same time span. Germany was on the top with 23,28,869 (19.24%) documents followed by France ($n=16,29,213$; 13.46%).

Meo at al. (2013) assessed that there has been a positive effect on research productivity in Pharmacological sciences in the 16 countries of Middle East, by adequate allocation for Research & Development (R & D), number of universities and research journals. Israel has spent 4.54% of its GDP on R & D, followed by Qatar (2.00%), Iran (0.72%) and Saudi Arabia (0.71%). Iran has the highest number of universities ($n=186$) followed by Turkey ($n=86$) and Saudi Arabia ($n=61$). Turkey has been on the first rank in publishing ISI indexed journal ($n=54$) followed by Iran ($n=39$) and both of these countries were on the first and second position in research publications. Although Israel is on the third position in publication number ($n=3434$) but has the highest number of citation impact and H-index publication. The study concluded that adequate funding on R & D produced highly influential papers.

Kumar and Jan (2014) investigated the research collaboration and productivity between two OIC member countries, Turkey and Malaysia in the field of energy fuel as reflected in Web of Science during the period of three years from 2009 to 2011. Turkey and Malaysia produced 1658 and 658 papers respectively. The average citation per paper showed that there has not a big difference as Turkey has 5.82 and Malaysia has 5.65 citations per paper. Malaysian researchers have been citing more international literature while Turkish authors mostly cited the local literature.

Meo et al. (2019) examined the research growth on medical education by Asian countries during the period of 1965-2015. There are two Muslim countries among the top ten Asian countries in medical education research, China is on the top followed by India, Japan, Israel and Georgia. Turkey and Lebanon stand on number eighth and ninth respectively. The study pointed out that Israel has allocated the highest funds for R & D, followed by Japan 3.28%. Amongst the Asian OIC members, Malaysia has been allotting 0.82% of their GDP on R & D followed by Turkey (0.7%), Iran (0.62%), UAE (0.49%). Pakistan (0.41%) and Saudi Arabia (0.13%).

Methodology

This is a retrospective study carried out at King Saud bin Abdulaziz University for Health Sciences. The relevant data has been retrieved from various freely accessible databases. The research output of OIC member countries has been downloaded from SCImago Journal and Country Rank (JCR) for the year 2018. The position of higher education has been traced out from Times Higher Education (THE) world university ranking 2020, and number of researchers per million people have been taken from the World Bank. Data has been presented in the tabulation format.

Results

Research Productivity

A total of 39,46,933 documents published worldwide in the year 2018. This may not be a complete picture of scientific and scholarly documents but SJR presented a big picture of published literature. The researchers affiliated to US produced 6,83,003 documents (17.30%) and stood on the first rank, followed by China (n=5,99,386; 15.18%) and United Kingdom (UK) (n=2,11,710; 5.36%). Almost 62% of the world knowledge has been produced by 10 countries (Table-1), while the rest of documents (38%) have been produced by 223 countries of the world.

Table-1; Top-10 countries in research productivity for 2018 (n=39,46,933)

S. No.	Country	Documents	Percentage
1	United States	6,83,003	17.30
2	China	5,99,386	15.18
3	United Kingdom	2,11,710	5.36
4	Germany	1,80,608	4.57
5	India	1,71,356	4.34
6	Japan	1,31,198	3.32
7	France	1,20,908	3.06
8	Italy	1,19,405	3.02
9	Canada	1,11,561	2.82
10	Australia	1,06,228	2.69
Total		24,35,363	61.70

A total of 57 Muslim majority countries are members of the OIC and their collective research output has been 3,27,555 (8.29%) documents in 2018. Iran has been in the top in OIC members and stands on number 16th in a global perspective with 60,268 (1.52%) documents, followed by Turkey (n=45,582; 1.15%). Two OIC member countries reached in the list of the top 20 most productive countries of the world and their share in top 20 countries has been 3.40%. Amongst the other members of OIC, Malaysia has been on the third rank with 33,295 (0.84%) documents, followed by Indonesia (n=32,456; 0.82%), Saudi Arabia (n=23,469; 0.59%), Egypt (n=22,018; 0.55%) and Pakistan (20,548; 0.52%). In the list of top 50 most productive countries of the world, only eight OIC member countries reached, while in the list of top 100, only 26 OIC member countries are included. There are seven OIC members with research output more than 10,000 documents and nine produced documents range from 5000 to 9999. Thirty-four produced less than 1,000 documents each. Majority of the research documents (n=2,64,127; 79.44%) has been produced by 10 OIC member countries as listed in table-2.

Table-2; Top-10 OIC member countries in research productivity for 2018 (n=3,27,555)

S. No.	World Ranking	Country	Documents	Percentage in OIC	Percentage in World
1.	16	Iran	60,268	18.12	1.52
2.	19	Turkey	45,582	13.71	1.15
3.	23	Malaysia	33,295	10.01	0.84
4.	24	Indonesia	32,456	9.76	0.82
5.	32	Saudi Arabia	23,469	7.05	0.59
6.	35	Egypt	22,018	6.62	0.55
7.	38	Pakistan	20,548	6.18	0.52
8.	49	Nigeria	9,299	2.79	0.23
9.	51	Tunisia	8,706	2.61	0.22
10.	52	Iraq	8,486	2.55	0.21

Source Publications

The paramount sources of publication are journals and conference proceedings, having a current, latest and up-to-date scientific materials. There are 31,917 source publications indexed in SJR in 2018, 24,701 (77.39%) are journals, 6123 (19.18%) conference proceedings, 773 (2.42%) book series and 373 (1.16%) trade journals. Almost half of the countries of the world (n=111; 47.63%) are credited to have source publications, while other 122 (52.37%) countries haven't any notable source publication to be indexed in SJR. US has been on the top with 11,809 (36.99%) source publications, followed by UK (n=5846; 18.31%), Netherlands (n=2050; 6.42%) and Germany (n=1889; 5.91%). Out of all 57 OIC member countries, 28 countries published source publications whereas the other 29 countries haven't any source publication indexed in SJR. All OIC members published only 1,087 (3.41%) source publications. Majority of source publications (n=932; 84.88%) are published from 6 countries; Turkey has been ranked first with 219 source publications, followed by Egypt (n=216), Iran (n=174), United Arab Emirates (UAE) (n=131), Pakistan (n=97) and Malaysia (n=95).

Table-3; Source Publications (n=31,917)

S. No.	World Ranking	Country	Number of Source Publications	Percentage in World
1.	1	United States	11,809	36.99
2.	2	United Kingdom	5,876	18.31
3.	3	Netherland	2,050	6.42
4.	4	Germany	1,889	5.91
5.	5	China	661	2.07
6.	18	Turkey	219	0.68
7.	19	Egypt	216	0.67
8.	23	Iran	174	0.54
9.	27	United Arab Emirates	131	0.41
10.	34	Pakistan	97	0.30

Higher Education and Number of Researchers

Higher education institutions and universities have been playing an important role in knowledge creation and research productivity. THE world university ranking 2020 has been used to find out the share of OIC members. A total of 1,396 universities of 92 countries are included in the ranking, University of Oxford, UK is the top-ranked university of the world, followed by California Institute of Technology, USA and University of Cambridge, UK. In the top 50 universities, 23 universities of US, 7 from UK, 3 each from Germany and Canada are included. There is not even a single university by OIC members reached in the top 200 universities of the world. There are two universities from Saudi Arabia, King Abdulaziz University and Alfaisal University reached between 201-300, five universities from Malaysia, UAE (2), Lebanon, Iran are grasped between in 301-400 ranking and 7 universities from Egypt (2), Turkey, Nigeria, Qatar and Pakistan reached between 401-500 rankings. There are 14 universities of OIC members in the top 500 universities of the World. Quaid-e-Azam University representing Pakistan in the list of top 500 universities.

USA has been on the top (n=172; 12.32%) with number of universities, followed by Japan (n=110), UK (n=100), China (n=81) and India (n=56). There are 179 universities of 25 OIC members, and 121 universities belongs to five OIC countries; Iran is in the top with 40 universities, followed by Turkey (n=34), Egypt (n=20), Pakistan (n=14) and Malaysia (n=13). Iran has been on the top with research productivity and even in the number of universities in OIC, so as USA is in the top of the list with research productivity and number of universities in the world similarly Iran in OIC group ranked first in both departments.

World Bank provided the data of numbers of the researcher in a proportion of the population by country. The highest numbers, 8,250 researchers in one million people are found in Israel, followed by Sweden (7593) and South Korea (7514). There 4652 researchers among the one million people in the USA, 4377 in UK and 1235 in China. The information about Saudi Arabia has not been available in records. In the list of the highest number of researchers among OIC member countries, UAE has been ranked first with 2407 researchers among OIC countries, followed by Malaysia (n=2358), Tunisia (n=1965), Turkey (n=1386), Egypt (n=669), Iran (n=671), Jordan (n=601) and Pakistan (n=354).

In the history of Noble prize, 12 Laureates have been awarded to OIC members. Amongst them, seven persons for Peace, two for literature and three persons in the field of sciences. Dr. Abdus Salam, a Pakistani scientist was awarded Noble prize in the field of Physics in 1979, an Egyptian scientist, Dr. Ahmed Zewail awarded in 1999 and Dr. Aziz Sancar from Turkey awarded in 2005, later two were awarded in the field of Chemistry.

Discussion

The share of OIC countries in global research output has 3,27,555 (8.29%), and 1,087 (3.41%) journals and source publication published are indexed in SJR in 2018. There are 14 universities from the Muslim world in the top 500 universities in the THE world university ranking 2020. Hamid (2015) reported that the OIC member countries average spend less than 0.5% of their GDP on R & D, while the rest of the world spends 1.78% and most advanced countries spend up to 3% on R & D.

The indicators of research productivity, global university rankings and average number of researchers showed that OIC members need to improve their allocation for R & D to compete with the rest of the world. Most of OIC members have already reformulated the education policy and making sure that every citizen of their countries has equal opportunities to get basic to advanced level and education. In order to view the growth of OIC countries, the data of research documents produced in 1999 was downloaded. A total of 12,45,754 documents was indexed in SJR and 57 OIC countries produced 27,412 documents, counted 2.20% of global output. The USA was on the first rank with 3,54,399 (28%) documents, followed by Japan (n=101040; 8.11%). There was no Muslim country in the top 20, Turkey was the first and productive Muslim country in 25th number with 7,979 (0.64%) documents, followed by Egypt on 39th number with 2984 (0.23%) documents and Saudi Arabia on third in OIC countries and overall 45th number with 1,898 (0.15%) documents, followed by Iran and Malaysia. There were five OIC members in the top 50 countries, now the situation has not been changed but also improved, the share of OIC countries in worldwide publications reached on 8.29% from 2.20% and now two OIC members reached in the top 20.

AlRyalat and Malkawi (2018) analyzed the Scopus indexed 20,359 publication affiliated with Jordan during the ten-year interval 2008 – 2017. There were 1,524 publications in 2008 and publications number reached on 2,407 in 2017, the publication increased with the ratio of 57.8% during on decade. Similarly, OIC countries produced 27,412 publications in 1999 and this number reached 3,27,555, the ratio of increase is remarkable during the last two decades. Sweileh (2015) examined the research growth on ophthalmology by Arab countries up to 2012. The increasing tendency has been observed in this study.

Bashir (2013) reported that US was on the top with almost 23% of the share in global research output from 1996 to 2010, the share of Pakistan was just 0.32%. The present study showed that the share of the USA has 17.30% and Pakistan has reached on 0.52%. The research growth of OIC members has been increasing. The progress in research publication by Saudi Arabia and its share in global perspective, percentage, ranking and annual growth rate have been browsed from SJR as an example as shown in Table-4. Saudi Arabia was on 51 position in 2009 with 4,536 documents and reached on 32nd place in 2018 with 23,469 documents with an average annual growth rate of 0.20.

Mehrad and Naseri (2012) observed that Scopus indexation mainly includes the literature published in English and European languages. The research produced in Arabic, Persian, Turkish and Urdu language by OIC member countries has not been part of SJR. This study further revealed that more than half of the research produced by OIC group was published in Non-English languages, mainly comprises in Arabic (27%) and in Persian (19%) have not been indexed in Scopus.

Table-4, Research productivity of Saudi Arabia for 2009-2018

Year	Global Research Output	Share of Saudi Arabia	Percentage	Ranking	Annual Growth Rate
2009	2604211	4536	0.17	51	
2010	2771765	6483	0.23	46	0.42
2011	2977159	9556	0.32	43	0.47
2012	3186037	12370	0.38	41	0.29
2013	3340159	15318	0.45	37	0.23
2014	3460740	18125	0.52	35	0.18
2015	3484050	19750	0.56	34	0.08
2016	3638761	21054	0.57	33	0.06
2017	3777080	21650	0.57	33	0.02
2018	3946933	23469	0.59	32	0.08
		15231 papers per year	Average Growth Rate		0.20

English is the second and third language in all the Muslim world, proficiency of writing academic English language also barred in scholarly communication. Now the refresher courses for English language proficiency has been carried out time to time in research organizations and editorial services have been given advice to young scholars to enhance their language skill (Elnadeef, & Abdala, 2019). There are 97 source publications by Pakistan in SJR, although there are 381 Higher Education Commission (HEC) recognized journals. Similarly, the other OIC countries have numbers of journals that are not indexed in SJR and other global databases. Journal editorial teams have been getting the services of professional editors to acquire the international recognition of their source publication. Information communication technologies (ICTs) are playing a very vital role in the establishment of knowledge-based societies. The provision of digital content to scholars and researchers via state-of-the-art ICTs equipment could also boost the research output. Ministry of Higher Education of Saudi Arabia subscribed 300 scholarly databases and composed under the Saudi Digital Library, accessible to the scholars of all Saudi universities and research institutions have a positive effect on research productivity. Wahab and Kefeli (2017) suggested practical measures to improve the contemporary situation of OIC group. The developed OIC countries are providing accessibility of scientific databases to their communities, there is need to extend these services to less-developed countries. The researchers should amplify scientific relationship and research collaborative efforts within OIC members along with the researchers of talent-rich countries. They should develop strategies to reduce the brain drain issue by encouraging the skilled researchers, technologists and educationalists to work in their native country.

Conclusion

The long-term and sustainable growth of the OIC group depend on the educational, scientific and technological development of all member countries. All OIC member countries should seriously sit together to resolve their internal and external issues and pay more attention to the development of knowledge, science and technology. The literacy ratio is getting amplified in resource-rich countries, and they should provide necessary financial and technological assistance to deprived and less developed OIC countries. It would be a great initiative if OIC countries could attract their native but non-resident scientists with lucrative packages to overcome the brain drain dilemma and hire foreign researchers to train young scholars in developing analytical thinking and research skills.

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