

Evaluation of Iran Scientific Productions based on ISI Statistics through 2006-2007

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August 30, 2008

Abstract

Using indicators and statistics of ISI, this paper comparatively evaluates Iran indexed scientific productions through 2006 to 2007. According to the number of indexed scientific production in WoS, Iran is in a good condition in terms of the growth rate. Tehran University had the most scientific productions in WoS in 2007. Also, according to the statistics of ESI, Iran is in the second place after Turkey among Islamic countries and is in the fortieth place in the world, during the last ten years. Most of the scientific productions of Iran was indexed in SCIE section of WOS and published in English "article" formats. According to JCR statistics, three Iranian Journals in 2005 were indexed in SCI section of this database and three more journals were added to it in 2006. Shiraz University had the most journals in JCR in 2006.

1 Introduction

Scientific Products of each country which are indexed in international indexes indicate scientific activities of that country at international level. Therefore, it has always been crucial for the research administrators to consider these conditions in order to evaluate their scientific activities. Scientometric experts generally employ bibliometric indicators to analyze the situations of papers at international level. Bibliometric indicators include 'the number of scientific products', 'the number of citations to the scien-

tific products', 'citations per scientific product', 'the impact factor', 'the median impact factor', 'the aggregate impact factor', 'cited half life', 'citing half life', 'the total number of citations', etc. The significance of these bibliometric indicators in evaluation of scientific activities is so great that they are considered as a part of the most important output indicators in some of international manuals which provide indicators for evaluation and measurement of science, technology and innovation. Integrating the results of bibliometric studies and other science and technology indicators, such as input and process indicators, scientometric experts would be able to investigate the scientific developments of the countries.

WoS, JCR and ESI databases have been used in order to investigate scientific developments of Iran during 2006 and 2007.

2 Method

- The data in this account was collected from WOS, JCR and in some cases ESI during January 2008.
- According to the nature of JCR, the citation report of publications in each year is presented in the following year.

Therefore, the data employed in this research, which have been the most recent data available in JCR, belong to the year 2006.

Scientific products, the entities which have had at least one scientific product have been

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considered acceptable. The entities with no products were not included in the assessment.

Iranian papers in WOS in 2007 refer to all scientific products which have been indexed in WOS in 2007.

WoS was searched by country (cu) field by limiting it to the year 2006.

3 Results

3.1 Iran vs. top 20 countries in 2007

According to the latest data available in ESI ___ during the years between January 1, 1997 and June 30, 2007___ Islamic Republic of Iran, with 27529 papers and outpacing Egypt, is now in the fortieth place among 145 ranked countries (Thomson Scientific, 2008a). Furthermore, Iran is in the second place after Turkey in Islamic world in both ESI and WoS. According to the statistics of ESI, Iranian papers have been cited 85629 times during the same decade. Therefore, the citations per paper have been 3.11. Although the total numbers of citations and the citations per paper have increased in comparison with the previous decade, Iran's rank has not altered compared with the previous period.

Table 1.1 Top 20 Countries in ESI during January 1997 and August 2007

Total Number of Citations		al Number of Citations	
Country	Number	Country	umber
U.S.A.	39027868	Switzer-land	5847
England	7955521	Spain	3541
Germany	7935567	Sweden	3237
Japan	6612826	China	4810
France	5414557	Belgium	5296
Canada	4377986	Scotland	5716
Italy	3594444	Den- mark	9465
Nether-lands	2837971	Israel	3417
Australia	2442466	Russia	7928
South Korea	1005008	Finland	501

Table 1.2 Top 20 Countries in ESI during January 1997 and August 2007

Total Number of Papers		Total Number of Papers	
Country	Number	Country	Number
U.S.A	2864275	Russia	275945
Japan	777992	Spain	270139
Germany	738067	Australia	249892
England	653177	Netherlands	220881
France	529636	India	215847
China	471890	South Korea	192361
Canada	393143	Sweden	168574
Italy	371205	Switzerland	159667
Poland	121061	Brazil	137159
Belgium	118411	Taiwan	130281

Table 1.3 Top 20 Countries in ESI During January 1997 and August 2007

Citations per Paper		Citations per Paper	
Country	Number	Country	Number
Bermuda	18.45	Sweden	12.18
Switzer-land	14.32	England	12.18
Gambia	13.76	Finland	11.57
Panama	13.68	Hong Kong	11.25
U.S.A.	13.63	Canada	11.14
Denmark	12.91	Belgium	10.94
Nether-lands	12.85	Germany	10.75
Scotland	12.61	Guinea-Bissau	10.60
Gabon	12.53	Israel	10.35
Iceland	12.52	Austria	10.33

This is while in the previous ranking which considers the years between January 1, 1997 and April 30, 2007, Islamic Republic of Iran, with 26495 papers, was in the forty-first place and the third place among Islamic countries after Turkey and Egypt. Besides, during the years between January 1997 and August 31, 2007, Iran has been in the 42nd place in the world (In-cites.com, 2008).

Table 1.1 and 1.2 and 1.3 demonstrates data from the top 20 countries during the years between January 1997 and June 30, 2007. In the first column, countries are ranked according to the total number of citations. The number of

papers of these countries and the number of citations per paper are respectively presented in the second and third columns.

3.2 Iranian Papers in 2006 and 2007, based on Statistics of WoS

The total number of Iranian papers in WoS in 2007 consists of 9061 papers which demonstrate 32.28 percent growth in comparison with the total number of papers in 2006 which was only 6748 papers. The number of papers in 2007 in the three sections of SCIE, SSCI and A&HCI has been respectively 8938, 351 and 30 papers (Thomson Scientific, 2008b). Using the data in table 2, it is possible to compare these figures with the previous year. As observed in this table, the number of papers in 2007 in SSCI and A&HCI has had a considerable growth (Thomson Scientific, 2008c).

Table 2. Iranian Papers in 2006 & 2007, based on Statistics of WoS

Statistics of WoS			
Database	2006	2007	Growth Rate in percent
WOS	6748	9061	34.28
SCIE	6682	8938	33.76
SSCI	193	351	81.87
A & HCI	16	30	87.5

3.3 Iranian Papers in 2006 and 2007, by types of documents

The number of papers in 2006 and 2007 in WoS is presented in table 3. As it is demonstrated in this table, types of Iranian papers in 2007 enjoyed a greater variety in comparison with the year 2006. However, most types of Iranian papers in WoS during 2006 and 2007 have been provided as "article" and "abstract of conferences". The significant point in this regard is the growth in the number of "book reviews" and "biographies" compared with 2006.

The increase in the variety of papers in Iran could indicate the increase of Iranian research-

ers' attention to other types of documents rather than research articles which could be indexed in "Institutes for Scientific Information".

Table 3. Iranian Papers in 2006 vs. 2007, by Type of Document

Type of Document	2006	Percentage in 2006	2007	Percentage in 2007	Growth Rate in Percent
Article	5832	86.4	758	83.6	30
Abstract of Conferences	652	9.66	108	11.9	66.5
Letter	106	1.57	165	1.82	55.6
Review	81	1.2	114	1.26	40.7
Editorial	52	0.77	81	0.89	55.7
Correction	19	0.28	17	0.19	-
News	6	0.88	4	0.04	10.52
Book Review	1	0.14	11	0.12	-
biography	0	0	2	0.02	33.33
					100
					0
					-

3.4 Iranian Papers in 2006 & 2007, by language

As mentioned in table 4, most of Iranian papers in WoS were in English in both 2006 and 2007; however, the variety of languages of Iranian papers during 2007 is considerable.

Table 4. Iranian Papers in 2006 vs. 2007, by Language

Language	2006	2007
English	6745	9048
Germany	2	2
French	1	5
Chinese	0	2
Spanish	0	1
Italian	0	1
Turkish	0	1
Russian	0	1

In contrary to the year 2006, six papers out of the total number of Iranian papers in WoS were published in Chinese, Spanish, Italian, Turkish and Russian. Moreover, the number of papers in French had a significant growth compared with the year 2006 (Noroozi Chakoli; Nourmohammadi; Vaziri; Etemadifard, 2007). The variety of languages in Iranian papers could indicate shared scientific interactions between Iranian and other countries researchers. These interactions might include the exchange of instructors and students, the conduct of shared research projects, etc. However, this fact should be taken into consideration that most of papers

in the world, based on the statistics of WoS, are published in English (Noroozi Chakoli; Nourmohammadi, 2007).

3.5 Iranian Papers in 2007, by Subject Area

Capability of WoS in representing search results by subject areas enables researchers to classify papers of each country by subject areas. In the current research, all 9061 Iranian papers in 2007 were organized according to the subject areas in WoS. Most of Iranian papers were in 5 different categories which are presented in tables 5 and 6. As observed in table 5, most of Iranian papers were related to 'CHEMISTRY, MULTIDISCIPLINARY' which accounts for 650 papers or 7.17 percent of Iranian papers available in WoS in 2007. Other categories are shown in table 5.

Table 5. Iranian Papers in 2007, by Subject Area

Subject Area	Number	Percentage
CHEMISTRY, MULTIDISCIPLINARY	650	7.17
CHEMISTRY, PHYSICAL	386	4.26
Pharmacology & Pharmacy	349	3.85
Mathematics, Applied	342	3.77
CHEMISTRY, ANALYTICAL	338	3.73

A comparison of categories in table 6, which is concerned with the Iranian papers in WoS in 2006, and table 5 reveals that although the number of papers in different branches of Chemistry still outnumbers the other categories, there has been a growth in Iranian papers in 2007 in subject areas such as Pharmacology & Pharmacy and Chemistry, Analytical in comparison to the year 2006.

Table 6. Iranian Papers in 2006, by Subject Area

Subject Area	Number	Percentage
CHEMISTRY, MULTIDISCIPLINARY	443	6.6
CHEMISTRY, PHYSICAL	285	4.2
CHEMISTRY, ORGANIC	268	4.0
CHEMISTRY, ANALYTICAL	267	3.9
ENGINEERING, CHEMICAL	258	3.8

This point should be taken into consideration that it is essentially inaccurate to compare different fields of study with each other, regarding the number of papers they have published (Noroozi Chakoli; Nourmohammadi, 2007, p. 52). However, comparison of scientific products in a special field with similar fields of study in the countries of the same level can be a suitable context for providing information about the situations of each field of study in associated countries (Gange; Archambault, 2004).

3.6 The top 20 organizational contributors in 2007, in WoS

Twenty Iranian organizations which had the most number of papers in WoS during 2006 and 2007 are listed in tables 7 and 8. According to these tables, "Institute for Studies in Theoretical Physics and Mathematics" is the only non-academic organization which is among the top 20 organizations in both 2006 and 2007. However, in comparison with the year 2006, the total number of papers and contribution of this organization has decreased in 2007.

Table 7. Top 20 Organizational Contributors in 2007

Organization	Number of Papers	Percentage
Tehran University	1156	12.76
Tehran University of Medical Sciences	719	7.94
Tarbiat Modares university	574	6.33
Sharif University of Technology	572	6.30
Shahid Beheshti University of Medical Sciences	478	5.28
Shiraz University	404	4.46
Amir Kabir University of Technology	398	4.39
University of Science and Technology	326	3.60
Shiraz university of Medical Sciences	281	3.10
Isfahan University of Technology	246	2.72
Tabriz University	234	2.58
Ferdowsi University of Mashad	218	2.41
Buali Sina University	205	2.26
Tabriz University of Medical Sciences	198	2.19
Isfahan University	196	2.16
Shahid Beheshti University	188	2.07
Institute for Studies in Theoretical Physics and Mathematics	177	1.95
Iran University of Medical Sciences	158	1.74
Mazandaran University	158	1.74
Isfahan University of Medical Sciences	141	1.56

On the other hand, “Tehran University” has published the most number of papers in WoS in both 2006 and 2007. The contribution of “Tehran University” and “Tehran University of Medical Sciences” regarding the number of papers in 2007 has increased in comparison with the other organizations. Each of these universities had respectively a share of 11.77 and 7.58 percent in 2006; however, their contributions have increased to 12.76 and 7.94 percent in 2007.

In addition to these universities, there has been a growth in the contribution of “Tarbiat Modares University”, “Shahid Beheshti University of Medical Sciences”, “Amir Kabir University of Technology”, “University of Science and Technology”, “Shiraz University of Medical Sciences”, “Tabriz University”, “Buali Sina University”, “Tabriz University of Medical Sciences” and “Shahid Beheshti University” in comparison with the previous year. In contrary, there has been a decrease in the contribution of “Sharif University of Technology”, “Shiraz University”, “Isfahan University of Technol-

ogy”, “Ferdowsi University of Mashad”, “Isfahan University”, “Institute for Studies in Theoretical Physics and Mathematics”, “Iran University of Medical Sciences”, “Mazandaran University”, “Isfahan university of Medical Sciences”, “Khaje Nasir Toosi University of Technology” and “Alzahra University”.

Table 8. Top 20 Organizational Contributors in 2006

Organization	Number of Papers	Percentage
Tehran University	795	11.77
Tehran University of Medical Sciences	511	7.58
Sharif University of Technology	461	6.83
Tarbiat Modares University	412	6.1
Shahid Beheshti University of Medical Sciences	336	4.98
Amir Kabir University of Technology	331	4.9
Shiraz University	327	4.58
University of Science and Technology	234	3.47
Isfahan University of Technology	213	3.16
Shiraz University of Medical Sciences	199	2.95
Institute for Studies in Theoretical Physics and Mathematics	179	2.64
Ferdowsi University of Mashad	175	2.59
Isfahan University	173	2.56
Tabriz University	148	2.2
Buali Sina University	143	2.12
Iran University of Medical Sciences	125	1.85
Mazandaran University	122	1.81
Tabriz University of Medical Sciences	115	1.71
Khaje Nasir Toosi university	115	1.71
Alzahra University	114	1.69

3.7 Sources Publishing Iranian Papers in 2007

WoS included 10000 sources in 2007 of which 6822, 2013 and 1165 sources were respectively indexed in SCIE, SSCI and A&HCI. Search results show that 9061 Iranian papers in WoS were published in 2304 sources in 2007. In other words, 2304 out of 10000 sources of WoS in 2007, which account for 23.04 percent of the total number of sources, played an important role in the publication of Iranian scientific products. These sources were mainly constituted of journals.

In 2006, however, a total number of 6748 Iranian papers in WoS were published in 1928 sources. It should be mentioned that 9718

sources were indexed in WoS in 2006. 6610, 1953 and 1155 sources were respectively indexed in SCIE, SSCI and A&HCI. These figures demonstrate that 1928 out of 9718 sources, mainly journals, were considered crucial in the publication of Iranian papers. This number accounts for 19.84 percent of sources in WoS.

The first 30 sources which had the greatest contribution to the publication of Iranian papers, the total number of articles published in these sources and the contribution of each source in the publication of Iranian papers are demonstrated in table 9 in order to reveal the most significant sources in the publication of Iranian papers in 2007. According to table 9, APPLIED MATHEMATICS AND COMPUTATION, with 2.08 percent, had the greatest contribution in publishing Iranian papers in 2007. This journal which is mainly concerned with Applied Mathematics published 189 Iranian papers in 2007. It should also be mentioned that this journal had the greatest contribution in the publication of Iranian papers in 2006 as well.

Table 9 also demonstrates that 5 out of 9 Iranian journals which were included in WoS in 2007 are among the 30 journals which published the most number of Iranian papers. These journals are highlighted in the 7, 9, 18, 26 and 27 rows of table 9.

Table 9. Sources Publishing Iranian Papers in 2007

Title	Iranian Papers per Source	Percentage
APPLIED MATHEMATICS AND COMPUTATION	189	2.08
ASIAN JOURNAL OF CHEMISTRY	121	1.34
TRANSPLANTATION PROCEEDINGS	82	0.90
ACTA CRYSTALLOGRAPHICA SECTION E-STRUCTURE REPORTS ONLINE	76	0.84
ANNALS OF NUTRITION AND METABOLISM	76	0.84
SAUDI MEDICAL JOURNAL	70	0.77
IRANIAN JOURNAL OF PUBLIC HEALTH	68	0.75
JOURNAL OF APPLIED POLYMER SCIENCE	68	0.75
IRANIAN JOURNAL OF SCIENCE AND TECHNOLOGY TRANSACTION B-ENGINEERING	64	0.71
ALLERGY	59	0.65
MEDICAL HYPOTHESES	57	0.63
ACTA PHARMACOLOGICA SINICA	56	0.62

3.8 Iranian Journals in WoS in 2007

Seven Iranian journals are among 10000 journals which were indexed by WoS in 2007. As shown in table 10, these Iranian journals published 283 Iranian papers in 2007. Therefore, they had an average contribution of 3.12 percent in the publication of Iranian papers. In other words, it could be stated that 3.12 percent of Iranian papers indexed in WoS in 2007 were published by seven Iranian journals mentioned in table 10. These journals are published by six Iranian organizations which are all considered as public institutes. However, another interesting fact is the existence of non-academic publishers alongside with academic publishers.

Table 10. Iranian Journals in WoS in 2007

Title	Number of Papers published in Journal	Number of Iranian Papers in Journal	Percentage of Iranian Papers in Journal
JOURNAL OF THE IRANIAN CHEMICAL SOCIETY	55	37	27.67
IRANIAN POLYMER JOURNAL	80	43	57.53
IRANIAN JOURNAL OF SCIENCE AND TECHNOLOGY TRANSACTION B-ENGINEERING	73	64	67.87
IRANIAN JOURNAL OF PUBLIC HEALTH	70	68	14.98
IRANIAN JOURNAL OF CHEMISTRY & CHEMICAL ENGINEERING-INTERNATIONAL ENGLISH	38	37	37.97
DARU-JOURNAL OF FACULTY OF PHARMACY	30	25	83.33
IRANIAN JOURNAL OF FISHERIES SCIENCES	9	9	100

3.9 Iranian Journal in JCR in 2006

The data in this section have been provided based on JCR. Considering the fact that reports of this database are always presented with a one-year delay, the data available for this research dates back to the year 2006. Furthermore, it should be mentioned that according to JCR, Iran had no journals in the SSCI section of this database in 2006 and three Iranian journals were included in SCI.

Six Iranian journals mentioned in table 11 were included in SCI. The first journal pointed out in this table belongs to "Iranian Chemical

Society”, the second and third journals belong respectively to “Iran Polymer Institute” and “Jahad-e-Daneshgahi” and the last three journals belong to “Shiraz University”. Although Journal of the Iranian Chemical Society had not been included in the journals of JCR until the year 2006, it had the highest impact factor (IF) among these six Iranian journals. This fact could indicate that even the journals which were not included in JCR can enjoy the highest IF after joining this database. This journal mainly deals with Chemistry, Multidisciplinary. 123 other journals which are concerned with the same subject published 27709 articles in 2006. In addition, the total cites to these journals were 874894 times in 2006. ‘MIF and ‘AIF’ of this group were respectively 0.98 and 3.37.

Table 11. Iranian Journals In SCI Section of JCR in 2006

Journal	Total Number of Citations	Impact Factor	Articles
Journal of the Iranian Chemical Society	46	0.644	52
Iranian Polymer Journal	160	0.386	83
Iranian Journal of Chemistry & Chemical Engineering-International English Edition	63	0.209	17
Iranian Journal of Science and Technology	28	0.100	0
Iranian Journal of Science and Technology B	8	0.064	44
Iranian Journal of Science and Technology A	5	0.041	14

A comparison of tables 11 and 12 demonstrates that Iranian Journal of Science and Technology A, Iranian Journal of Science and Technology B and Journal of the Iranian Chemical society, which belong to “Shiraz University” and “Iranian Chemical Society”, joined to the journals indexed in JCR in 2006. In 2005, however, the three journals pointed out in table 12 were the only Iranian journals which were included in SCI and Iranian Journal of Chemistry & Chemical Engineering-International English Edition had the highest IF among the Iranian journals in JCR in 2005. This journal is concerned with the two subjects of Chemistry, Multidisciplinary and Engineering, Chemical. Another significant point to be mentioned is the success of “Shiraz University” in having its three technical journals indexed in JCR. As mentioned earlier, half of

Iranian journals indexed in JCR in 2006 belong to “Shiraz University”.

Table 12. Iranian Journals In SCI Section of JCR in 2005

Journal	Total Number of Citations	Impact Factor	Articles
Iranian Journal of Chemistry & Chemical Engineering-International English Edition	66	0.327	35
Iranian Journal of Science and Technology	28	0.057	11
Iranian Polymer Journal	120	0.316	113

3.10 Iranian Highly Cited Papers in 2007

Data about Iranian highly cited papers were retrieved from WoS on January 31, 2008.

Title of Paper	Author	Number of Citations
HAXI deficiency causes autosomal recessive severe congenital neutropenia (Kostmann disease)	Klein C, Grudzien M, Appaswamy G, et al	20
LRP6 mutation in a family with early coronary disease and metabolic risk factors	Mani A, Radhakrishnan J, Wang H, et al.	16
Construction of a highly selective PVC-based membrane sensor for Ce(III) ions	Zamani HA, Ganjali MR, Adib M	15
The holographic dark energy in non-flat Brans-Dicke cosmology	Setare MR	14
Application of He's homotopy perturbation method to functional integral equations	Abbasbandy S	12
On Water: A practical and efficient synthesis of quinoxaline derivatives catalyzed by CuSO ₄ center dot 5H ₂ O	Heravi MM, Taheri S, Bakhtiari K, et al.	11
Piperazinedium bis(pyridine-2,6-dicarboxylato)nickelate(II) tetrahydrate	Aghabozorg H, Gharamaleki JA, Ghasemikhah P, et al.	10
Part-per-trillion determination of chlorobenzenes in water using dispersive liquid-liquid microextraction combined gas chromatography-electron capture detection	Kozani RR, Assadi Y, Shemirani F, et al.	10
Clinical and molecular genetic spectrum of congenital deficiency of the leptin receptor	Farooqi IS, Wangenstein T, Collins S, et al.	10
Piperazinium hexaaquacobalt(II) bis[bis(pyridine-2,6-dicarboxylato)cobaltate(II)] octahydrate	Aghabozorg H, Gharamaleki JA, Ghadermazi M, et al.	9

In this report, top 20 highly cited papers were individually analyzed. On the same basis, the article of HAXI deficiency caused autosomal recessive severe congenital neutropenia

(Kostmann disease), with 20 citations, had the highest rank among Iranian papers in WoS in 2007. The data about the rest of Iranian highly cited papers are presented in table 13. In addition to the title of papers, their subject area, author and the total number of citations to them are also mentioned. Employing the above-mentioned information, it would be possible to identify the most effective Iranian papers.

3.11 Top 20 Iranian Authors in WoS in 2007

Data concerning the top 20 authors of Iran are presented in table 14. What is meant by the top authors in this research is the ones who had the most number of papers during a year. M.R. Ganjali, with 69 papers, is considered as the most prolific author in Iran in 2007.

Table 14. Top 10 Iranian Authors in 2007

Author	Number of Papers	Author	Number of Papers
GANJALI, MR	69	MORSALI, A	35
NOROZI, P	63	SABOURY, AA	35
HERAVI, MM	59	AMINI, M	33
SHOJA, MM	59	KHAVASI, HR	32
TUBBS, RS	54	SHAMSIPUR, M	32
ABDOLLAHI, M	48	ZOLFIGOL, MA	32
LARIJANI, B	44	OAKES, WJ	30
RAMAZANI, A	41	SHAFIEE, A	29
MOOSAVI-MOVAHEDI, AA	39	POURPAK, Z	25
DEHGHAN, M	27	GANJI, DD	23

In fact, it could be stated that 0.76 percent out of Iranian papers in 2007 belongs to this author. P. Norouzi, with 63 papers, is on the second rank. The further information about the other Iranian authors in 2007 is presented in table 14.

4 Conclusion

The results of this research reveal that there has been a considerable growth in the number of Iranian papers at international level. Besides, there has been a greater variety in the type of documents and languages of Iranian papers in comparison with the year 2006. The improvement of Iran scientific rank in ESI and the increase in the number of Iranian journals in JCR could indicate the increase in the scientific ac-

tivities of Iranian researchers in 2007. "Tehran University" and "Tehran University of Medical Sciences" succeeded in publishing a greater number of papers in WoS. "Shiraz University" had also great success in publishing three journals in JCR database. "Institute for Studies in Theoretical Physics and Mathematics" is again the only non-academic organization among the top 20 organizations in WoS in 2007.

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