

The Current Situation and Improvement Suggestions for Research Paper Publications in Turkey

Türkiye'deki araştırma makalesi yayınlarının mevcut durumu ve iyileştirme önerileri

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Özet

Uluslararası araştırma yayınları bakımından Türkiye'nin dünyada ve Orta Doğu bölgesindeki sıralaması belirlenmiştir. İlk önce toplam yayın sayısı, atıf sayısı, H-indeksi, uluslararası işbirliği olan makalelerin yüzdesi ile ilgili ölçümler kullanılarak halihazırdaki durum tespiti ve analizi yapılmıştır. Mevcut durumun tatmin edici olmadığı bulunmuştur. Daha sonra mevcut durumun iyileştirilmesi konusundaki öneriler sunulmuştur. Türkiye Bilimsel ve Teknolojik Araştırma Kurumu, Yükseköğretim Kurulu, Türkiye Bilimler Akademisi, Üniversiteler gibi bilimsel kurumların mevcut politikaları ve alması gereken önlemler tartışılmıştır. Bilimsel çalışma ve yayınları arttırmak için yaygın bilimsel ödül programları ihdas edilebilir. Diğer önemli bir husus, araştırmacıların maaşlarının artırılmasıdır. Yükselme için daha yüksek temel kriterlere ihtiyaç vardır. Bilimsel araştırma destek politikalarının gözden geçirilmesi gerekir. Son öneri üniversitelerin uluslararasılaşmasıdır.

Anahtar sözcükler: Bilim politikaları, Türkiye'de araştırma, uluslararası yayınlar.

Abstract

The current ranking of Turkey in the world and in the Middle East region has been determined in terms of international research publications. The total numbers of publications, the total numbers of citations, H-index, and the percentage of papers with international collaborations have been used to determine and analyze the current situation first. It has been found that our current situation is not satisfactory. Then, suggestions for improvement of the current situation have been given next. Current policies and measures to be taken by the scientific institutions such as The Scientific and Technological Council of Turkey, Council of Higher Education, Turkish Academy of Sciences, and Universities have been discussed. To boost the scientific research and publications, extensive scientific award programs may be established. Increasing the salaries of research people is another important topic. Higher basic criteria for promotion are needed. Funding of scientific research policies should also be reconsidered. The last suggestion is the internationalization of universities.

Keywords: International publications, research in Turkey, science policies.

Research papers are among the major sources of development in science. Original ideas can be conveyed to international experts through such papers. It is not a coincidence that the most developed countries in the world such as USA contribute more to the literature. Countries, which pay more attention to support innovation and research, and provide the circumstances for creating such an environment, are advantageous over the others that pay little importance to such issues. Developing original ideas and supporting innovation must become part of our lives at least

for some of us if we want to be in the higher ranking list of innovation and research.

In this paper, first the current situation of Turkey in terms of research paper publication has been analyzed. The number of publications, number of citations received, the H-index and international collaborations are the indicators used for comparisons with other countries. Having determined that the current situation is not satisfactory, suggestions for improvement of the situation have been discussed under the next 5 headings. The paper ends up with the concluding remarks.

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Analysis of the Current Situation

In this section, the current situation in terms of research publications have been determined and analyzed in detail. The world ranking in terms of total number of publications between 1996 and 2013 are given in Table 1 (SCImago, 2014). It is not a surprise to see United States as the number 1 country in the list, because research publication numbers are one of the major indicators of research and development of the country. Turkey is the 20th in the list. Turkey seems to perform better than some of the European countries such as Belgium, Austria, Denmark, Finland, Greece, Czech Republic and Norway. However, all those countries are much lower in population than Turkey and the Turkey's rank might be lower if a population-based comparison was available.

In terms of citations received by those publications, Turkey is the 27th, a lower value (SCImago, 2014). Citations received are frequently considered as a quality measure of publications although exceptions always exist. Most of the previously mentioned European countries received more citations than Turkey with less number of papers. This means that Turkey is not as good in quality as it is in quantity.

Another ranking measure is H-index that is proposed by Hirsch (2005). It was originally developed to quantify an individual's scientific research output. H-index 10 means, the person has 10 papers with over at least 10 citations. The index is a combinational measure of quantity as well as quality. Later, the index was also used for journals, countries etc. Turkey is 37th worldwide in terms of H-index (SCImago, 2014). As a combinational measure of quantity and quality, Turkey performs

Table 1. Ranking of total number of publications of countries (SJR powered by Scopus, 1996–2013).

Country	Documents	Citable documents	Citations	Self-citations	Citations per document	H-index
1 United States	7,846,972	7,281,575	152,984,430	72,993,120	22.02	1,518
2 China	3,129,719	3,095,159	14,752,062	8,022,637	6.81	436
3 United Kingdom	2,141,375	1,932,907	37,450,384	8,829,739	19.82	934
4 Germany	1,983,270	1,876,342	30,644,118	7,966,777	17.39	815
5 Japan	1,929,402	1,874,277	23,633,462	6,832,173	13.01	694
6 France	1,421,190	1,348,769	21,193,343	4,815,333	16.85	742
7 Canada	1,110,886	1,040,413	18,826,873	3,580,695	20.05	725
8 Italy	1,083,546	1,015,410	15,317,599	3,570,431	16.45	654
9 India	868,719	825,025	5,666,045	1,957,907	8.83	341
10 Spain	857,158	800,214	10,584,940	2,629,669	15.08	531
11 Australia	782,149	723,460	11,447,009	2,449,459	18.24	583
12 South Korea	658,602	642,983	5,770,844	1,281,366	11.49	375
13 Russian Federation	639,598	629,671	3,664,726	1,088,981	6.00	355
14 Netherlands	614,552	574,144	12,103,482	2,003,644	23.03	636
15 Brazil	529,841	510,194	4,164,813	1,415,014	10.98	342
16 Taiwan	446,282	434,662	3,993,380	930,383	11.35	300
17 Switzerland	445,163	419,372	9,238,679	1,261,471	24.53	629
18 Sweden	417,156	397,095	8,069,960	1,267,282	21.76	567
19 Poland	387,982	378,483	2,939,536	768,212	8.93	336
20 Turkey	348,836	330,411	2,417,631	624,695	9.07	237
21 Belgium	335,160	316,462	5,658,300	820,146	19.68	502
22 Israel	247,561	234,696	4,346,150	607,046	19.29	456
23 Iran	245,221	238,554	1,135,790	445,205	9.15	158
24 Austria	241,610	227,014	3,668,207	505,720	18.04	416
25 Denmark	234,852	221,544	4,653,794	670,279	23.38	476
26 Finland	212,195	204,004	3,677,439	583,752	19.94	407
27 Greece	203,437	190,628	2,254,244	383,567	13.40	295
28 Mexico	188,449	181,539	1,642,228	350,720	10.91	261
29 Czech Republic	185,849	180,816	1,550,054	372,370	10.09	268
30 Norway	183,463	172,258	2,802,491	452,749	18.83	362



even worse than the number of publications and citations. As high quality papers with higher citations increase, H-index of Turkey will definitely increase.

A regional comparison can also be made. Turkey is the first in terms of total number of publications in the Middle East region as shown in Table 3 (SCImago, 2014). Israel and Iran then follows. On the yearly basis of publications, the figures are promising. Turkey is steadily and substantially increasing its publications each year. Israel's improvement is marginal and Iran is even on the decline in the last years (Figure 1).

As far as the total number of citations is considered, Turkey goes back to the second rank after Israel and the gap between the countries is very high (Table 4).

Turkey is again the second in terms of H-index in the region with a number of 237. Israel's H-index is almost the

double with a number of 456. Turkey should aim to be the leader in the region.

As can be seen from Table 5, Turkey ranks 15th in medicine which is better than its average rank of 20. Strong financial support to medicine might be a reason of performing over the average. In engineering the rank is 23, while it is 24 in mathematics. In agricultural and biological sciences, the performance is on the average of 20. Especially in arts and humanities, business, management, accounting, economics and finance, Turkey needs further improvements.

Another factor that improves the quantity and quality of papers is the international collaborations. Turkey's international collaboration papers are under 20% within all papers, which is a relatively low value (Figure 2). The international collaboration numbers decreased much within time for Iran

Table 2. Ranking of total number of citations of countries (SJR powered by Scopus, 1996–2013).

Country	Documents	Citable documents	Citations	Self-citations	Citations per document	H-index
1 United States	7,846,972	7,281,575	152,984,430	72,993,120	22.02	1,518
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24 Poland	387,982	378,483	2,939,536	768,212	8.93	336
25 Norway	183,463	172,258	2,802,491	452,749	18.83	362
26 Hong Kong	180,958	172,610	2,448,025	340,370	15.53	325
27 Turkey	348,836	330,411	2,417,631	624,695	9.07	237
28 Greece	203,437	190,628	2,254,244	383,567	13.40	295
29 New Zealand	146,264	135,988	2,084,166	327,237	17.20	318
30 Singapore	171,037	163,153	2,051,237	278,461	14.42	308



Table 3. Ranking of total number of publications of countries in the Middle East (SJR powered by Scopus, 1996–2013).

Country	Documents	Citable documents	Citations	Self-citations	Citations per document	H-index
1 Turkey	348,836	330,411	2,417,631	624,695	9.07	237
2 Israel	247,561	234,696	4,346,150	607,046	19.29	456
3 Iran	245,221	238,554	1,135,790	445,205	9.15	158
4 Egypt	104,784	102,181	659,779	132,942	8.42	148
5 Saudi Arabia	74,210	71,129	403,827	63,995	8.09	144
6 United Arab Emirates	22,874	21,785	131,259	14,245	8.42	100
7 Jordan	22,753	22,273	136,316	18,084	8.04	92
8 Lebanon	15,840	14,744	123,586	12,411	10.72	109
9 Kuwait	15,446	14,933	113,984	14,771	8.52	92
10 Oman	9,663	9,076	56,077	6,914	7.96	74
11 Qatar	7,692	7,326	34,654	4,056	6.63	60
12 Iraq	7,603	7,233	20,555	2,644	5.37	46
13 Syrian Arab Republic	4,591	4,420	36,200	4,631	10.91	64
14 Bahrain	3,753	3,490	16,340	1,735	5.59	43
15 Palestine	3,343	3,193	18,626	2,580	8.43	48
16 Yemen	2,074	2,018	11,792	1,390	9.04	42

and reached the same level of Turkey’s but the numbers seem to increase almost steadily for Israel.

Suggestions for Improvements

From the previous section, one can easily conclude that Turkey needs to improve both quantity and quality of the international research papers. In this section, the programs developed by

the Turkish institutions that serve to this goal have been briefly discussed under five subtitles and new suggestions have been outlined.

Extensive Scientific Award Programs

Each research-oriented institution should pay more attention to research and development and should develop more mecha-

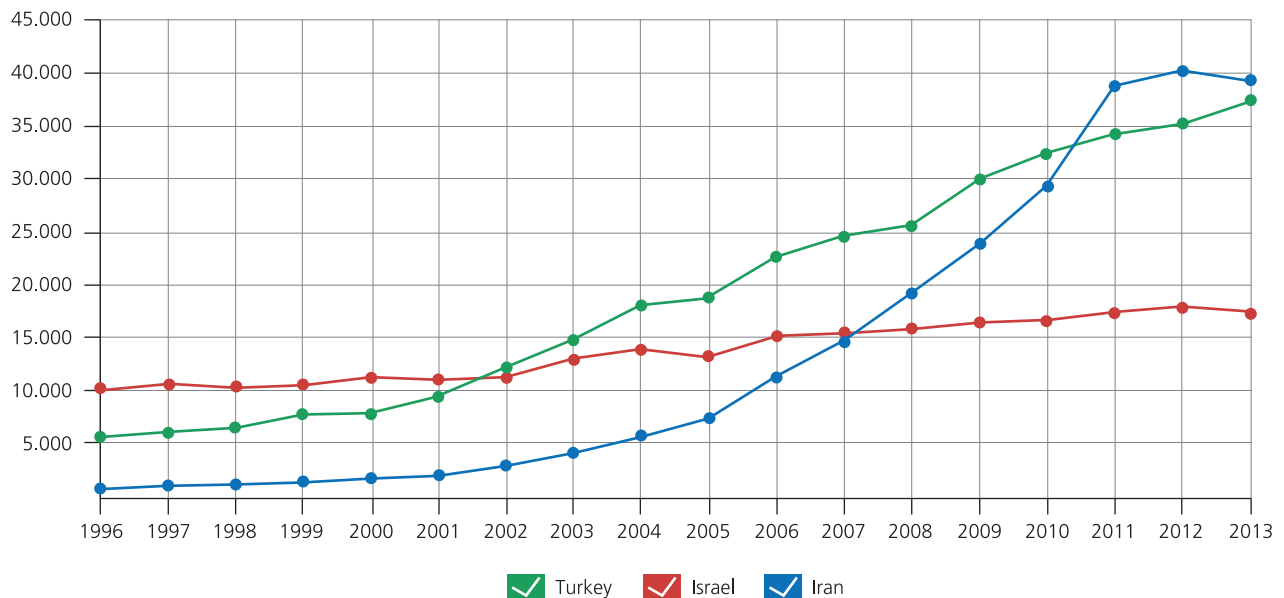


















Fig. 1. Number of publications corresponding to the years for different countries (SJR powered by Scopus, 1996–2013)

Table 4. Ranking of total number of citations of countries in the Middle East (SJR powered by Scopus, 1996–2013)

	Country	Documents	Citable documents	Citations	Self-citations	Citations per document	H-index
1	 Israel	247,561	234,696	4,346,150	607,046	19.29	456
2	 Turkey	348,836	330,411	2,417,631	624,695	9.07	237
3	 Iran	245,221	238,554	1,135,790	445,205	9.15	158
4	 Egypt	104,784	102,181	659,779	132,942	8.42	148
5	 Saudi Arabia	74,210	71,129	403,827	63,995	8.09	144
6	 Jordan	22,753	22,273	136,316	18,084	8.04	92
7	 United Arab Emirates	22,874	21,785	131,259	14,245	8.42	100
8	 Lebanon	15,840	14,744	123,586	12,411	10.72	109
9	 Kuwait	15,446	14,933	113,984	14,771	8.52	92
10	 Oman	9,663	9,076	56,077	6,914	7.96	74
11	 Syrian Arab Republic	4,591	4,420	36,200	4,631	10.91	64
12	 Qatar	7,692	7,326	34,654	4,056	6.63	60
13	 Iraq	7,603	7,233	20,555	2,644	5.37	46
14	 Palestine	3,343	3,193	18,626	2,580	8.43	48
15	 Bahrain	3,753	3,490	16,340	1,735	5.59	43
16	 Yemen	2,074	2,018	11,792	1,390	9.04	42

nisms to promote such activities. The motivation of researchers will then lead to more effective and qualified research. The Counsel of Higher Education (YÖK; The umbrella institution for all universities responsible from accreditation, management, auditing etc.) did not establish yet any direct awards for scientific excellence. YÖK has to develop awards in different achievement categories. Such awards were established long ago by the Scientific and Technological Research Council of Turkey (TUBITAK). Science Awards, Young Researcher Awards, and Publication Awards are some examples. Very recently, TUBITAK has changed its publication award policy and has given a quadratic financial support formula for international research papers (SCI, SSCI, AHCI) where journal points are calculated with respect to normalized impact factors of the journals ($0 \leq \text{journal point} \leq 100$).

$$\text{Payment (TL)} = 500 + (5000 - 500) \left(\frac{\text{Journal point}}{100} \right)^2$$

Instead of squaring, the power may be n and if n reaches infinity then

$$\lim_{n \rightarrow \infty} 500 + (5000 - 500) \left(\frac{\text{Journal point}}{100} \right)^n = \begin{cases} 500 & \text{if } jp < 100 \\ 5000 & \text{if } jp = 100 \end{cases}$$

If one does not want to give money to intermediate points, then n should be increased. But this would not be a fair evaluation of a journal paper because journals with points near 100 cannot be distinguished from journals near 0. I suggest the below linear formula because the gap is already high, 10 times for a top journal compared to bottom ones.

$$\text{Payment (TL)} = 500 + (5000 - 500) \left(\frac{\text{Journal point}}{100} \right)$$

Turkish Academy of Sciences (TÜBA) uses indirect programs. They cover certain amount of annual research expenses of their full and associate members which are selected based on their scientific achievements. There are also support programs for young researchers. The budget of the institution to promote research should be substantially increased and a variety of new award programs must be established.

Scientific award programs are not common in many of the Turkish universities. The ones, which have such programs, usually give financial support for each international paper published. Since such programs cannot be financed by the Ministry of Finance for state universities, they try other local sources (university associations etc). But those financial sources may not be sustainable for a long period and some universities shut down those programs in the past.

Table 5. Rank of Turkey worldwide in the subject areas (SJR powered by Scopus, 1996–2013).

Subject Area	Rank
Medicine	15
Social Sciences	18
Agricultural and Biological Sciences	20
Engineering	23
Mathematics	24
Arts and Humanities	25
Business, Management and Accounting	25
Economics, Econometrics and Finance	25



An extensive award program has been established in Celal Bayar University, Manisa in 2011 soon after resuming the position of presidency. The categories of the awards are annual publication award, citation award, project award, patent award, science award, thesis award, and scientific journal service award. The annual publication award is given to those who published enough international journal papers (SCI, SSCI, AHCI papers) in the previous year. Three categories of the award exist which are social sciences, natural sciences and engineering, and health sciences. Citation award is given to a person with high number of cumulative citations and is given once for a specific person. Project award is given to each project supported from an external source. Patent award is given to each patent approved. Science Award is issued for cumulative lifelong achievements (number of papers, citations, H-index, recommendations etc.). Thesis award is given to graduate students and to their supervisors. Scientific journal service award is given to those who serve as editors or reviewers in SCI, SSCI and AHCI journals. In order to motivate the academicians, their scientific achievements are announced in the university's main website. If one gets science award or any of the other category awards (three of them), he/she is supported by the university and a research budget that he/she can freely use is allocated.

Increase in Salaries of Academicians

Salaries in state universities should be doubled immediately if we want qualified Turkish academicians to come back from

developed countries and serve our country. As the private universities are influenced too much by the state universities, this salary increase will lead to an increase in salaries of academicians in the private universities accordingly. For foreigners, satisfactory salaries can be given (up to 5 times those of Turkish academicians) in state universities but this fact is not known widely by foreigners and not many applications are received. It is very uncommon for state universities to advertise also such positions. The recent increase in salaries after resuming Prof. Ahmet Davutoğlu the prime minister position is a positive step, yet not adequate enough to attract high quality people to research.

Higher Research Criteria for Promotion

The associate professorship title is entitled by The Inter-University Council (ÜAK). Full professorship and assistant professorship titles are entitled by the universities but their standards are somewhat related to the associate professorship. The Inter-University Council should announce higher base standards for associate professorship titles. The base standards established in 90s, although quite low, boosted the number of international publications of Turkey but nowadays we need much higher standards for a substantial increase. The base standards deal with the number of international papers only. Yet we need much sophisticated standards such as citations, H-index, patents, projects etc. Number of paper criterion even should be increased.

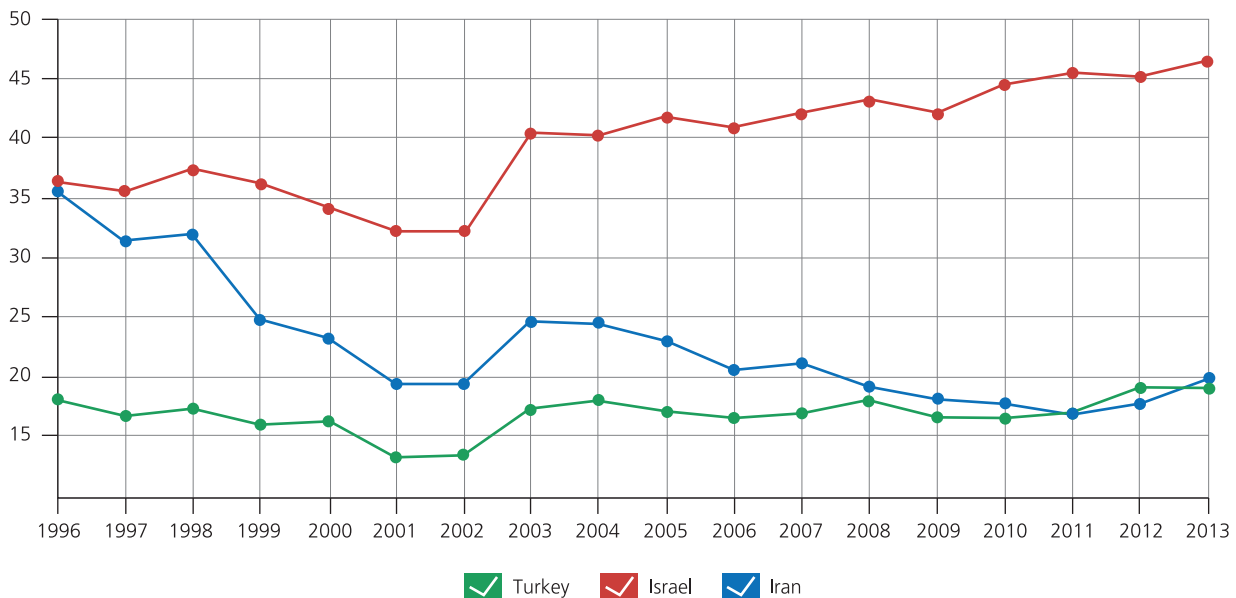


Fig. 2. International collaboration percentages of total papers published by different countries (SJR powered by Scopus, 1996–2013)

Increase in Funding of Scientific Research

TUBITAK should increase the limits of university projects. The current limit of 360,000 TL is low. New programs are about to appear with higher limits. With an increase in the budget, the number of supported projects by TUBITAK may increase. New programs encouraging researchers are announced recently. One such interesting program financially supports (additional salary) recent PhDs taken from abroad upon returning to a Turkish research institution.

Budgets of scientific research projects of state universities rely highly on money gained by own private resources of universities. More state funding is needed. Collaborations of universities and industry are not satisfactory. More efforts from both sides in this issue are highly recommended. Technoparks may be a systematic way of establishing such relations. Building a technopark is costly and initial state funding is necessary. The current state funding programs are not satisfactory.

Internationalization of Universities

As can be seen from ■ Figure 2, the internationally collaborated papers are below 20%. These figures should be over 40% in the future. For collaborations with European countries, Erasmus program served successfully for internationalization of Turkish universities. While universities were complaining from insufficient Erasmus funds, they are shocked to hear that there will be budget cuts for 2015. For the last 3 years, the Council of Higher Education supported all short visit applications (up to three months) of professors to foreign countries but ended the program due to financial deficit. Such programs are effective for internationalization and building relationships. Another newly established program of the Council of Higher Education,

namely the Mevlana program initiated in 2013 supports international visitors as well as Turkish research travelers. Funding of such programs may lead to progress in internationalization in the future.

Turkish universities, especially the state universities should hire more international academicians and to reach this goal, effective convey of knowledge about salaries and standards of living is needed. Turkish universities all passed also through Bologna process which helped in the internationalization.

Concluding Remarks

If Turkey aims to be within the first 10 developed countries, it has to take some measures to boost its research and development. In this work, one indication of development, namely the quantity and quality of international research papers have been elaborated in detail. First the current situation has been analyzed in detail. The rank of the country in the world and within the region has been discussed using SJR database powered by Scopus. Then suggestions for improvements have been made. Actions to be taken by the government and the research institutions have been briefly discussed.

If right decisions are taken by the governments, Turkey will be a strong candidate for developed countries by the year 2023.

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