
SUSTAINABILITY AND IMPACT STUDY OF PATENT LITERATURE FOR SCHOLARLY COMMUNICATION

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Abstract

A patent is an important source of scholarly information and forms a link for scholarly communication in any discipline. The role played by and the influence of patents on scientific invention and innovation has become integral part of R&D, Product development, marketing and many scientific and commercial activities. The purpose of this paper is to analyze the citations for the popular journal called Scientometrics available in the patents issued by the United States Patent and Trademark Office (USPTO). This study provides an overview on the importance of patent citations to scientific journals and provides the citations from the patents available in the USPTO database for Scientometrics Journal, a journal in the field of Library and Information Science (LIS) and Scholarly metrics. This study identifies to



what extent the articles from the Scientometrics journal are used and cited by inventors of the patents in the USPTO. We analyzed the patent citations to Scientometrics. The results show that the total number of core patent citations to Scientometrics journal papers on the USPTO were 53 out of 64 retrieved results. The technical papers (or technology-oriented papers) related to various scientific, technical, the World Wide Web, and search engines published in Scientometrics journal attracted more citations from patents.

Keywords : *Citation, Patent Citation, Patent analysis; Patent metrics, USPTO, Scientometrics journal*

Introduction

Patents are considered as an important source of scientific, technical, competitive and product information. A patent grants an exclusive right an invention or inventor, it can be granted for a product or a process that provides, a new way of doing something, offers a solution to a problem by disclosing to the general public granted by a governing authority of a particular country (WIPO, 2020). It is a form of intellectual property (IP) which provides the patent owner the legal right to prevent others from unauthorized using of an invention for a specified period time (Farley and Isaacs, 2020). They consist of various types of information such as applicant and inventor details, International Patent Class (IPC), detailed technical information, citations to prior research or patents, patent claims, geographical identification, patent issuing organization and so on (Srivastava, 2019). Patents play a vital role in the research and development; a patent allows inventors to register their inventions at a national and international level (Sun, 2003). A patent is a form of intellectual property that grants its owner with a legal right to reproduce, use and sell an invention for a limited period of time, in enabling public disclosure of the invention (Correa, 2000). In most countries, patent rights fall under civil law and the patent holder



can sue someone infringing the patent in order to enforce his or her rights (Patent, 2020).

The United States Patent and Trademark Office (USPTO) is part of the federal agency of the U.S department of commerce. The main role of the USPTO is to grant the patents for the new discoveries and to protect the registered trademarks (Alexandria & Virginia, 2015). The USPTO formed on January 2, 1975 headquartered in Washington D.C., USA (USPTO, 2019).

Patents are like any scientific and technical journal papers provide references to the sources of information used/ referred for the invention or innovation (De Almeida et al., 2020). These references may point to the prior works such as patents ('prior art'), articles and so on, in order to prove novelty in view of the present developments and to the non-patent items too ("Patent," 2020b), particularly scholarly publications, may be termed as the scientific but non-patent references (van Raan, 2016).

Patent citations, particularly the citations to scientific references, are considered as the most popular indicators to track the relation between science and technology (Aksnes et al., 2019). During the patent granting procedure, the examiners reviews the prior art and list them in the front page of the patent document in order to ensure the innovative and usefulness of the invention (Bekkers et al., 2020). Compared with the references provided by the inventors or applicants, the examiners references are determinant for the patent granting (Gimeno-Fabra and Potterie, 2020). The patent examiners can add new references or remove the existent ones given by the inventors or applicants (Narin & Olivastro 1998; van Looy et al. 2006).

Non-patent references (e.g., journal papers) represent explicit connections between scientific research and technological innovations and thus can





describe the features of science–technology linkages (Beck et al., 2020). Journal papers cited in patent applications can be used as indices to analyze the relationships between academic research and technology, which are called science linkages (Sun et al., 2020). It can also be used to measure the strength of the relationship between science and technology, or science intensity (Fukuzawa & Ida, 2016; Meyer 2000; Tijssen et al. 2000).

Patent citations for an open access journal by Noruzi (2018), explains the importance by revealing that 13 published articles in Webology journal were used and cited in the patents granted by USPTO to indicate the quality of journal and papers having a tech-orientation. If there is no patent reference for a journal paper (Sarin et al., 2020), it can be attributed to possible disconnect between scientific research and technological inventions. More often this phenomenon describes the science & technology linkage (Ida and Fukuzawa, 2013); (Meyer, 2000) with invention.

In the current study, we focus particularly to find patent citations to a popular and high impact factor journal in science metrics called as “Scientometrics”. The Scientometrics journal (eISSN: 1588-2861) has been publishing since 1979 by Springer and is considered as one of the top library and information science journals (with a five year impact factor of 3.073 as on 2019) and has been indexed in almost all citation databases. It publishes original research, short communications, preliminary reports, review papers, letters to the editor and book reviews on scientometrics and also in library science field (“Scientometrics,” 2020). Now it has also implemented hybrid open access (Springer, 2020) publishing model.

Materials and Methods

For the study purpose we used USPTO patent database (<https://www.uspto.gov/>) to find the patent citations for the Scientometrics journal. A simple search keyword “Scientometrics” was used to search in USPTO data search field, there were 53 citations links from 64 results retrieved as



on 31 July 2020. Further, we analysed 64 results by exporting them into MS-Excel, sorted the results year-wise and selected only the recent five years patents (2014 to 2018). There were a total of 17 patents selected for further analysis of citations found in the patent field of OREF (Other References).

Results

The number of citations to a journal article found in patents indicates that the journal is a tech-oriented (Noruzi & Abdekhoda, 2014) one. Table-1 shows the number of citations to the Scientometrics journal in patents issued by the USPTO. There were 17 patents cited from Scientometrics by inventors' in the patents field for the last 5 years (2014-2018) period.

Table-1: Number of citations to Scientometrics in patents

Sl. No.	Patent No.	USPTO Title
1	1,04,94,575	Sulfur adsorbent and a method of separating sulfur compounds from a sulfur-containing mixture
2	1,04,30,499	Link association analysis systems and methods
3	1,03,05,748	Dynamic computer systems and uses thereof
4	1,02,84,506	Displaying conversations in a conversation-based email system
5	1,02,82,378	System and method for detecting and forecasting the emergence of technologies
6	1,02,61,953	Document review management system
7	1,01,08,589	Link association analysis systems and methods
8	1,00,07,730	Compensating for bias in search results
9	1,00,07,719	Compensating for individualized bias of search users
10	99,53,049	Producing a ranking for pages using distances in a web-link graph
11	99,16,290	Link association analysis systems and methods



12	98,78,923	Adsorbent comprising bisphenol, formaldehyde and hexadamine terpolymer with adsorbed Pb
13	97,96,604	Cross-linked (bisphenol-S, formaldehyde, 1,6-hexadamine) terpolymer for the adsorption of Pb.sup.2+ ions from aqueous solutions
14	97,42,853	Dynamic computer systems and uses thereof
15	96,59,104	Link association analysis systems and methods
16	95,30,097	Associative relevancy knowledge profiling architecture, system, method, and computer program product
17	94,18,105	Email conversation management system

The data in table-2 indicates the presence of citations for Scientometrics journal in patents. The table illustrates the linkage between a scientific journal and industrial innovation (technology) in the field. Table-2 also shows details about the papers cited by patents issued by the USPTO.

Table-2 : Scientometrics Journal Papers cited by Patents

Sl. No.	Scientometrics Journal Paper title	Author	Patent No.	Inventors	Year
1	Citation review of lagergren kinetic rate equation on adsorption reactions, <i>Scientometrics</i> 59 (2004) 171-177	Y. S. Ho	1,04,94,575	Al-Hooshani; Khalid, Ganiyu; Saheed A.	2018
2	A microscopic link analysis of academic institutions within a country—the case of Israel," <i>Scientometrics</i> , 2004, vol. 59, No. 3, pp.391-403	Bar-Ilan	1,04,30,499	Soon-Shiong; Luke, Soon-Shiong; Patrick	2018
3	Agent-Based Computing From Multi Agent Systems to Agent-Based Models: A Visual Survey," <i>Scientometrics</i> 89(2):479-499	Niazi, M. et al.	1,03,05,748	Auerbach; Michael H.	2017



4	Threaded Email Messages in Self-Organization and Science & Technology Studies Oriented Mailing Lists, Kluwer Academic Publishers— <i>Scientometrics</i> , Jul. 1, 2000, 48(3), pp. 361-380	Zelman	1,02,84,506	Buchheit; Paul T., Chang; Bay-Wei W., Lim; Jing Yee, Rakowski; Brian D., Singh; Sanjeev	2017
5	Patent citations in a novel field of technology: what can they tell about interactions bet' emerging communities of science & technology? <i>Scientometrics</i> , (2000), 48(2), 151-178.	Meyer, Martin	1,02,82,378	Eusebi; Christopher A.	2014
6	Quantifying the quality of peer reviewers through Zipf's law", <i>Scientometrics</i> , Sep. 5, 2015, 22pg.	Ausloos et al.	1,02,61,953	Richardson; Joshua John, Le-Chevalier; Vincent, Havriuk; Kostiantyn, Alexandrovich; Semenov Vasil	2017
7	A microscopic link analysis of academic institutions within a country—the case of Israel," <i>Scientometrics</i> , 2004, 59 (3), 391-403	Bar-Ilan	1,01,08,589	Soon-Shiong; Luke, Soon-Shiong; Patrick	2018
8	Negative Results are Disappearing from Most Disciplines and Countries," In Journal of <i>Scientometrics</i> , 90(3), Jan. 2012	Fanelli	1,00,07,730	Horvitz; Eric Joel, Awadallah; Ahmed Hassan, White; Ryen William	2015
9	Negative Results are Disappearing from Most Disciplines and Countries," In Journal of <i>Scientometrics</i> , 90 (3), , Jan. 2012	Fanelli	1,00,07,719	Horvitz; Eric Joel, Awadallah; Ahmed Hassan, White; Ryen William	2015
10	Reference Standards for Citation Based Assessments," <i>Scientometrics</i> , vol. 26, No. 1 (1993), pp. 21-35	Schubert, A. et al.	99,53,049	Hajaj; Nissan	2015

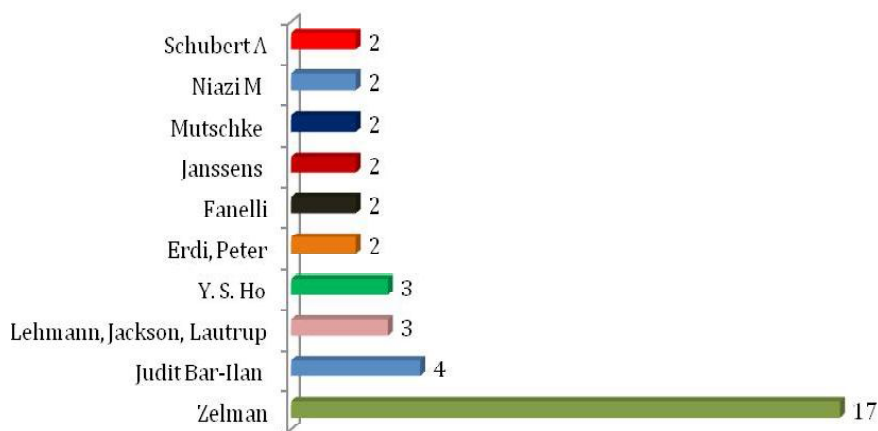


11	A microscopic link analysis of academic institutions within a country—the case of Israel, <i>Scientometrics</i> , Mar. 2004, pp. 391-403, vol. 59, Iss. 3,	Bar-Ilan, Judit	99,16,290	Soon-Shiong; Luke, Soon-Shiong; Patrick	2017
12	Citation review of lagergren kinetic rate equation on adsorption reactions, <i>Scientometrics</i> , 59 (2004) 171-177	Y. S. Ho	98,78,923	Al Hamouz; Othman Charles Sadeq, Saleh Awadh; Tawfik Abdo	2017
13	Citation review of lagergren kinetic rate equation on adsorption reactions, <i>Scientometrics</i> , 59 (2004) 171-177	Y. S. Ho	97,96,604	Al Hamouz; Othman Charles Sadeq, Saleh Awadh; Tawfik Abdo	2014
14	Agent-Based Computing From Multi-Agent Systems to Agent-Based Models: A Visual Survey," <i>Scientometrics</i> 89(2):479-499	Niazi, M. et al.	97,42,853	Auerbach; Michael H.	2014
15	A microscopic link analysis of academic institutions within a country—the case of Israel," <i>Scientometrics</i> , vol. 59, No. 3 (2004) pp. 391-403.	Bar-Ilan	96,59,104	Soon-Shiong; Luke, Soon-Shiong; Patrick	2014
16	Hypothesis Generation Guided by Co-Word Clustering, <i>Scientometrics</i> , vol. 56, No. 1, (2003) 111-135 (XP055181621).	Stegman, J. et al.	95,30,097	Prestigiacomo; Anthony	2014
17	Threaded Email Messages in Self-Organization and Science & Technology Studies Oriented Mailing Lists, Kluwer Academic Publishers— <i>Scientometrics</i> , Jul. 1, 2000, vol. 48, Iss. 3, pp. 361-380.	Zelman	94,18,105	Buchheit; Paul, Singh; Sanjeev	2014



The technical papers published in Scientometrics journal attracted more patent citations. Table-3 presents authors for whom their papers are cited by patents.

Figure-1: Top 10 highly cited Authors by Patents



Discussion and Conclusion

In this study, we analyzed the patent citations to the Scientometrics journal. The results of the study show that 53 patent citations to the Scientometrics journal found from the patents available in the USPTO database. Sung et al., (2015) opined that patent citations of the paper show the linkage between science and non-science or science and technology-related and citations impact of the journal Scheerooren and Kamalski, (2013). It is reflecting the type of scholarly literature published (Example: research papers, technical papers, conceptual-theoretical papers, case studies and so-on). In this point of view, Scientometrics journal papers are cited from patent inventors, it is showing the technological, scientific and innovative research papers are published by Scientometrics journal from LIS professionals aboard.



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