Journal Metrics for the Identification of Core Knowledge of Journal: A Case Study on Plos One

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ABSTRACT: *Scientific output of Tehran University of Medical Sciences (TUMS) has been decreased and increased during recent years as reflected in Scopus database. A total number of articles under TUMS affiliations reviewed and analyzed, then compared with other universities. The results showed that the number of publications of most universities in Plos One, a multidisciplinary and peer-reviewed journal, dramatically increased. The purpose of this paper is to conduct a scientometric analysis of the body of literature contained in Plos One, a peer-reviewed journal, to advance our understanding of the body of knowledge in this journal. However, Plos One journal publishes a large number of articles in different fields, e.g. Clinical Medicine (almost, 54000) and expected to grow in the future. Researchers need to become aware of and use knowledge of journals that might tend to accept more papers. A number of articles published in this journal was carefully reviewed and subjected to scientometric data analysis techniques. The most influential articles were selected and their cited and citing works were scientometrically analyzed.*

1. Introduction

Science is a systematic study of the natural world. It encompasses methods for knowledge creation, the body of knowledge accumulated from applying these methods, and the cultural values and norms that guide scientific inquiries. Scientific studies generate and present knowledge in the form of testable or falsifiable theories, hypotheses and predictions about the phenomenon of interest (González-Alcaide, et.al. 2018). The key motivation of researchers is the pursuit of true knowledge for the sake of knowledge (Patel, 2018) and the engagement in science for the sake of science (Fuller, 1997).

Plos One is a multi-disciplinary journal in nature. It builds its theoretical core on knowledge from various fields, including information technology, organizational science, and cognitive science and so on (Heneberg, 2016). On the one hand, it already includes types of papers (Bontis and Serenko, 2009), conference papers (Serenko et al., 2009), reviews (Grant, 2002) and case studies.

Does it exhibit signs of academic journal? Is it a scientific fad? There have been calls to answer these critical questions, but more research is needed. The Plos One journal grew from the work of academic practitioners who developed and applied the academics concepts.

The purpose of the present study is to investigate the intellectual core knowledge of the Plos One journal in order to understand whether it has become (or is moving towards becoming) a reference journal. To answer this critical questions, a scientometric analysis of the most influential articles published in the Plos One journal was done.

2. Methodology

In this study, a scientometric analysis of the most influential articles published in the Journal of Plos One was done. This journal was chosen because it has the highest rate of publications and the world's first multidisciplinary Open Access journal (Plos One, third anniversary: Retrieved at http://journals.plos.org/plosone/s/journal-information), 177,132 documents and 425,015 citations.

However, it provides a very comprehensive coverage of the scientific domain of interest by concentrating on the various aspects of science. The use of the most influential articles is a recognized technique in citation analysis (van Zeebroeck et al., 2008). All articles included in PLOS ONE h-index as of May 1, 2016 were selected based on Google Scholar by means of the Harzing's Publish or Perish tool (see www.harzing.com/pop.htm for further information).

The *h*- index, introduced by Hirsch (2005), is a measure of scientific impact of individuals, journals and institutions. With respect to journals, the h-index states that a journal has index h if h of its Np articles have at least h citations each and the other (Np – h) articles have fewer than h citations each. The key benefit of the h-index is that it can differentiate between journals generating most of their citations from only a few articles, and those producing well-cited works relatively consistently. It is also a very useful tool in journal ranking development (Saad, 2006; Moussa and Touzani, 2010).

Articles included in the journal's h-index are usually considered the most significant works that ever appeared in this outlet.

As a tool for citation analysis, the use of Google Scholar offers various advantages. In contrast to Thomson Scientific (formerly known as the Institute for Scientific Information, or ISI), Google Scholar covers a wide variety of publications including open-access journals, books, book chapters, conference proceedings, professional magazines, patents and industry reports (Harzing and van der Wal, 2008). Even though some of these publications are not peer-reviewed (e.g. reports, working papers, government publications, etc.), they are legitimate sources of citations which benefited from ideas expressed in the cited work. In addition, Google Scholar contains non-English publications (Nisonger, 2004; Kousha and Thelwall, 2007), whereas Thomson is mostly limited to English language articles. Therefore, Google Scholar is the most acceptable tool to achieve the purpose of this study.

The following steps were followed to obtain and analyze the data:

1. All 166 articles included in the h5-index of Plos One were selected.

2. Since Google Scholar, as all other article databases, may contain errors, omissions and duplicate entries, a manual analysis of the h5-index articles was done and appropriate adjustments were made.

3. A list of 166 citing (publications based on h5-index) and 400 journals (cited the examined Plos One articles) works was created (for a detailed definition of citing publications, refer to Taneja et al. (2009)).

4. English language was identified for each citing and cited work.

5. For citing works, six categories of citations were identified: each area of quartile citations (Q1, Q2, Q3, Q4); and non-indexed journal citations.

6. From the list of citing papers, 400 papers appearing in the list were selected (cited highest to lowest). The journal of each paper selected and analyzed to determine whether the journal of the study is categorized into 4 groups based on IF.

3. Results

Table 1 presents self-citation pattern. It shows that the observed self-citation rate is low which demonstrates that the Plos One does not exhibit a problematic self-citation behavior.

Tables 2 shows categories of journal score, respectively. First, the top 25% of the IF distribution; second Q2 for middle-high position (between top 50% and top 25%); Q3 middle-low position (top 75% to top 50%); Q4 the lowest position (bottom 25% of the IF distribution) ; and non-reviewed journals.

The most influential articles frequently cited in Q1 journals; contribute to the state of knowledge and disseminates this knowledge within peer-reviewed literature and, to a lesser extent, practitioner publications.

	Citing works		Cited works	
	n	%	*n*	%
Journal self-citations	400	9.25	37	3.52

(the cit*ed* work is a paper that has been mentioned in the references of other works, and the cit*ing* work is the one that contains the references.)

Table 1. Self-citation behavior

Categories of journal quartile scores	Number	%
Q1	200	50
Q2	7	1.75
Q3	1	4
Q4	0	0
Non-indexed	192	48

Table 2. Categories of cited works

Categories of citing works	Number	%
Peer-reviewed journals	400	100
Theses, dissertations, graduate or undergraduate research projects	0	
Peer-reviewed conference proceedings	0	
Book chapters	0	
Books	0	

Table 3. Categories of citing works

Table 3 shows categories of citing works, respectively. First, peer-reviewed journals, theses, dissertations, graduate or undergraduate research projects, Peer-reviewed conference proceedings, book chapters and books which represent scientific growth (Andersen and Hammarfelt, 2011). Therefore, the Plos One journal is in the phase of academic expansion. Second, the most articles use refereed sources. In other words, the Plos One articles are used to extend the theoretical body of knowledge and disseminates it within peer-reviewed literature.

4. Conclusion

The goal of this study is to explore the intellectual core and impact of the Plos One on the state of theory and practice. For this, 400 articles were subjected to scientometric analysis. Based on the findings, the Plos One journal does not exhibit a problematic self-citation behavior.

Journal self-citations, when the paper published in a journal cites works published in the same outlet, are also considered a norm. However, excessive self-citations are dangerous because they may bias bibliometric indices, inflate journal rankings, and misdirect the development of the journal. In some extreme, unethical cases, journal editors force authors to cite their journal as a condition for final paper acceptance after the formal review process (Bjørn-Andersen and Sarker, 2009), and self-citations may constitute up to 85 percent of all journal's citations (Monastersky, 2005). Fortunately, the rate of self-citations in Plos One is within an acceptable range. To the best knowledge of the authors, no incidents of forced citations have been reported by Plos One researcher. In some journals, in addition to the references of the article, the references should reference some articles from the same journal. Nevertheless, Plos One stakeholders should be aware of potential danger of extreme self-citations or forced citations.

5. Limitations and Future Research

This study has had several limitations. First, only articles included in the Journal Plos One's h-index were analyzed. However, Plos One is the discipline's premiere journal, and its well-cited papers represent the field in general. In addition, not a large number of citations (almost 400) were analyzed. Third, there are issues with citation analysis. For example, there is no proof that the authors of citing papers actually read the original work or interpreted the ideas correctly. Negative citations, when the cited paper is critiqued, were not excluded in this study.

Nevertheless, none of the limitations above were fatal. This study empirically explored the intellectual core and impact of the Plos One jornal from the reference perspective. This investigation calls for future scientometric research to better understand where the Plos One journal was, where it is, and where it wants to be. Stakeholders should debate the Plos One's progress towards becoming a reference journal.

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