Journal of Studies in Library and Information Science
(*JSLIS*)

Shahid Chamran
University of Ahvaz

Research Paper

Publication rate and activity of Iranian researchers in the field of industrial management in social networks

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Abstract

Background and Objectives: The significant influence of scientific and citation networks among scientific societies has caused that while identifying influential individuals and universities in each field, the issue of knowledge sharing is also highly considered. With this in mind, the present study investigates the relationship between Mendeley academic social network Altmetrics indices and Scopus, Web of Science, and Google Scholar databases in the field of economy, management, and accounting.

Methodology: The present study is applied research that has been done in a descriptive-survey method with the Altmetrics approach. The statistical population of the research includes Iranian Authors and researchers in the field of economy, management, and accounting who had indexed documents in the Scopus database in the period of 2000-2019. 160 of the most prolific authors have been introduced and reviewed by Scopus. In order to analyze the data, in addition to descriptive statistics, in the inferential statistics section using Excel and SPSS software, a simple and multiple correlation test between the studied indicators has been used.

Findings: The results show a significant and positive relationship between the indicators studied in Mendeley with the scientometric indicators of Scopus, Web of Science, and Google Scholar databases. This relationship is very high in cases such as reading frequency, a number of citations, and HTML index score, Mendeley with Scopus, Web of Science, and Google Scholar, and weak in cases such as Mendeley reader index with Scopus co-authorship index. The results show that the degree of correlation between the citations received in Mendeley and other databases is very high. Also, the relationship between the authors' index in Mendeley and other databases is positive and significant. This relationship is stronger between Scopus and Web of Science than the other databases.

Discussion: Due to the positive and significant relationship between Mendeley indicators and indicators of other databases, the use of this academic social network in publishing and sharing research results can attract more citations.

Introduction

Undoubtedly, one of the new technologies that have caused dramatic changes in communication is social networks. In fact, social media has made our lives a lot easier. Social networks have enabled people to connect with others regardless of their position, social status, or attitude. They have increased research opportunities. Various social networking platforms such as LinkedIn, ORCID, ResearchGate (RG), Twitter, Facebook, and YouTube are great tools for advancing research. In addition to these social networks, scientific-citation networks help a lot in sharing research results. Scientific-citation networks allow researchers to access up-to-date information about our field of work, communicate with colleagues, and exchange ideas on any topic. We can easily use in-text citations to validate texts.

The emergence of scientific-citation networks and their impact on scientific communication and publication of research results on the one hand and the shortcomings of traditional methods in measuring the impact of scientific publications, on the other hand, led to the introduction of new indicators to evaluate the impact of scientific products on social and scientific networks. As a new, web-based metric, Altmetric indicators complement citation metrics to evaluate scientific and research output (Shabani, 2009). In fact, an Altmetric indicator is a kind of webometer in which social networks are mostly used. Increasing the number of researchers in various fields and their apparent tendency to use new web technologies such as social networks, blogs, forums, and databases, on the one hand, and the limitations of methods based on citing the measurement of scientific effects in virtual environments, on the other hand, has led to the birth of Altmetric indicators (Priem, Taraborelli, Groth, & Neylon, 2010).

Information sharing is a vital factor for the identification of peers and researchers. Despite the obstacles in the use of measurement indicators, these indicators can be used as a complement to traditional indicators of scientific knowledge to evaluate the performance and effectiveness of scientific publications (Bernman, 2014; Costas et al., 2015; Wachi et al., 2019; Sugimoto et al., 2017). Therefore, they can play an important role in disseminating publications through the capabilities of social media. The use of citation indicators provides increased viewing, reading, feedback, and citation. Therefore, research on the use of academic, social networks by academic members of universities and the study of the impact of using these social networks on knowledge sharing among members is vital. Yet, the negative attitude of individuals towards knowledge sharing and their individualism in the use of knowledge is one of the main challenges of universities in the age of communication and an influential factor in knowledge management (Fullwood, Rollie, & Delbridge, 2013). Examining the relationship between the number of citations received by articles in scientific databases and the number of times the articles are viewed in socio-scientific networks provides a clear understanding of the role of researchers' activities in social networks. Scientific, social networks may be beneficial to researchers and scholars as they increase the rate of reading and receiving citations from others. Thus, this study examined the activities of Iranian researchers in the field of industrial management in Mendeley concerning scientific-citation databases of Scopus, WoS, and GS. Accordingly, and in line with the primary purpose of the research, the following questions were raised:

1- What is the status of the presence and the number of activities of Iranian researchers in the field of industrial management in Mendeley, Scopus, WoS, and GS?

2- Are there any correlations among Altmetric indicators, namely no. of documents, citations, H-index, inc-citation, and co-authorship, related to Iranian researchers in the field of industrial management in Mendeley and Scopus?

3- Are there any correlations among Altmetric indicators, namely no. of documents, citations, H-index, inc-citation, and co-authorship, related to Iranian authors and researchers in the industrial management field in Mendeley WoS?

4- Are there any correlations among Altmetric indicators, namely citations, H-index, I10th-index, related to Iranian researchers in the field of industrial management in Mendeley and GS?

5. Are there any correlations among the number of citations related to Iranian researchers in the field of industrial management in Mendeley, WoS, GS, and Scopus?

6- Are there any correlations among H-indices related to Iranian researchers in the field of industrial management in Mendeley, WoS, GS, and Scopus?

Theoretical framework of research

With the development of Web2 technology, social networks such as Facebook, Twitter, blogs, Wikipedia, Mendeley, SiteULike, and resource management tools are helping researchers to share information more securely and manage it. These methods are different and more precise than ever. Traditional methods and indicators are no longer helpful for measuring new social media behaviors (Ouchi et al., 2019).

Therefore, in recent research, Altmetrics indices have been used as an alternative measure of traditional methods to measure and evaluate research and calculate the extent of scientific impact. A review of the relevant literature shows that Altmetrics indices can be used to measure the impact of research and the performance of researchers (Table 1).

Despite all the research done, a study has not yet observed two decades of Iranian researchers' activities in industrial management in scientific, social networks based on Altmetrics indicators. So, the present study can be innovative, and the results can improve the indicators and be a beacon for the more effective activities of Iranian researchers in this field.

Table 1-Summary of research background

Source	Results	citation indexes/network studied
(Ansari, Fallah, Noruzi, & Rasolabadi, 2019)	There is a positive correlation between the Scopus base indicators and the RG network.	RG, Scopus
(Mohammadi & Thelwall, 2014)	Benefiting from Mendeley will help you get more citations for articles in WoS	Mendeley, WoS
(Thelwall & Kousha, 2015)	The use of RG broadly reflects the traditional distribution of academic capital	Research Gate
(Thelwall & Kousha, 2017)	RG received fewer citations than GS, but more than WoS and Scopus. RG also has more to do with GS in terms of citations received. However, sharing versions of articles on RG is even more important	Scopus, Research, GS, WoS
(Cho, 2017)	There is a positive correlation between scientometric and bibliographic indicators. There is a positive correlation between storing articles in Mendeley and citing articles. Medical science articles are often discussed on Twitter, social science, art, and humanities articles on reference tools such as Mendeley.	Mendeley social networks
(Pooladian & Borrego, 2017)	Altmetrics Indicators is the fastest indicator for evaluating the impact of scientific products available to a wide range of users. 61% of library and information publications are listed in Mendeley. In total, 75% of the articles published in the last five years have been tagged at least once in Mendeley, while only 55% of the articles have been cited in WoS.	Mendeley WoS
(Htoo & Na, 2017)	There is a significant, but weak correlation between tweets and sitellites in most of the disciplines studied. Altmetrics	Mendeley site You Like

Source	Results	citation indexes/network studied
	seems to predict the number of citations in most of the disciplines studied. However, there is a low presence and lack of correlation with the number of finance, economics, and law citations.	Twitter
(Riahinia, Rahimi, Jahangiri, Mirhaghjoo, & Alinezhad, 2018)	There is a positive and significant correlation between Mendeley reading and citation indicators in both Essential Science and WoS indicators.	Mendeley, WoS, Essential Science
(Ruan et al., 2018)	There is a positive correlation between the loading rate and the reading of articles in Mendeley with the citations received in Scopus.	Mendeley, Scopus
(Parabhoi & Verma, 2019)	There is a positive and weak correlation between the number of articles read in Mendeley and the citation in Scopus.	Mendeley Scopus
(Saberi & Ekhtiyari, 2019)	Between citations in GS and activity in Mendeley	Mendeley
(Saberi & Ekhtiyari, 2019)	There is a positive correlation.	GS
(Bardus et al., 2020)	Not using social media has a direct effect on not increasing the number of citations in health research.	social networks
(Mason, 2020)	social networks are a potential tool for creating international interactions.	Research, Academy
(Sathianathen et al., 2020)	Traditionally, the Scientific Impact of an article is measured by the number of citations. This period usually matures over two years at the journal level, and measuring impact over publication time is challenging. If the social media coverage is approximately 14 days after the publication of the document. Social media predicts citations and can be used as an early measure of scientific impact.	Scopus

Methodology

The present study is basic quantitative research that has investigated the effect of Altmetrics indices of Mendeley scientific-citation network on scientometric indices of Scopus, Wos and GS scientific-social citation indexes. Thematic and temporal scope of the research is related to the indexed works of 160 Iranian researchers in the field of industrial management. They had the most documents in the Scopus citation indexes in the period of 2000-2019 and were also the members of the Mendeley Scientific- citation indexes at the time of the research (2020.05.15). In this study, sampling was not performed due to the possibility of non-membership of all members of the community introduced from Scopus in Mendeley. In order to statistically analyze, in addition to descriptive statistics tests, in the inferential statistics section, Pearson correlation test was used to examine the effect of research variables. Applications include Excel and SPSS. The process of searching documents is done through the following search command. This search command leads to retrieving the indexed documents of researchers whose documents have been indexed in the Scopus database with the Iranian affiliation in the period 2000-2020:

(AFFILCOUNTRY(Iran) AND PUBYEAR > 1999 AND PUBYEAR < 2020 AND (LIMIT-TO (SUBJAREA,"BUSI")))

Findings

The findings are reported in two sections: descriptive findings and inferential findings. In the descriptive findings section, the average, minimum, maximum, and median indices of the variables are presented. In the inferential findings section, the Spearman correlation coefficient is used to

examine the correlation between Altmetrics on the one hand and Mendeley, Scopus, WoS, and GS on the other.

Descriptive Findings Related to the Indicators Studied in the citation indexes

In order to examine and compare the differences between the indicators of the number of documents, citations received, and the score H-index of each author, this information is presented in Table 2.

Table 2. Some descriptive findings related to the indicators studied in the citation indexes

Row	Authors	Scopus			WoS			GS			Mendeley		
		No. Documents	No. Citations	H-Index	No. Documents	No. Citations	H-Index	No. Citations	H-Index	I10-Index	H-Index	No. Citations	No. Documents
1	Salavati-Niasari, M.	879	25951	82	862	24148	79	29320	89	633	82	25943	840
2	Shahin, Arash	121	1189	19	51	391	10	3820	30	87	19	1189	95
3	Tavakkoli,M	522	8437	47	480	6300	42	13497	59	303	47	8445	419
4	Azadeh, A.	422	5814	38	342	4724	34	9726	50	244	38	5994	405
5	Tavana, M.	275	4563	35	140	2244	27	7055	44	152	35	4561	355
6	Saen, R.F.	172	3027	31	22	2	1	4499	35	106	31	3025	152
7	Taleizadeh, A.A.	150	2984	37	128	1840	28	4129	42	90	--	--	--
8	Rabbani, M.	197	2629	29	120	2135	26	4672	36	98	--	--	--
9	Mohammadi, M.	36	824	17	31	844	17	1199	20	27	117	1124	33
10	Salehi, M.	79	105	5	102	96	5	2879	26	87	5	105	62

According to Table 2, Masoud Salavati-Niasari's publications are by far the most indexed ones in all the databases. His publications were indexed 879 times by Scopus, 862 times by WoS, 840 times by Mendeley. Likewise, he is the most cited researcher in the said databases. He was cited 25,951 times by Scopus, 24148 times by WoS, 25943 times by Mendeley, and 29,320 times by GS. Finally, the highest score of H-index in WoS, Mendeley, and GS, namely 79, 117, and 89, belongs to the same researcher.

Descriptive Statistics Related to the Studied Indicators of Research Variables

Descriptive indicators of research variables are presented in Table 3. As shown in Table 3, the highest average number of indexed documents (91.96) is related to Mendeley. The highest average number of citations is related to GS with 2913.83 citations. Mendeley, Scopus, and WoS are next, respectively. The highest average H-index obtained is associated with GS (23.53). Mendeley, Scopus, and WoS are next in the rankings of the H-index score.

Table 3. Average, median, minimum, and maximum of research variables

Base	Indicator	Average	Median	Minimum	Maximum
Scopus	N. documents	90.99	52	12	879
	Citations	1566.9	681.5	7	25951
	H-Index	16.6	13	1	82
	Incoming citation	1036.93	532.5	7	11736
	Co-author	103.74	61	2	2510
WoS	N. citations received	1097.95	359	1	24148
	H-Index	13.21	10	0	79
	N. documents	67.84	52	1	852
Mendeley	H-Index	19.90	15	0	117
	Incoming Citation	1903.39	902	0	25943
	Singers	6169.57	1665	0	199877
	Publishers	91.96	50	0	840
	Viewers	66994.6	22729	0	606252
GS	Citations	2913.83	1415	13	29320
	H-Index	23.53	20	1	89
	I10-Inxex	59.69	32	0	633

Answering the first research question: *"What is the status of the presence and the number of activities of Iranian researchers in the field of industrial management in Mendeley, Scopus, WoS, and GS?"*

The number of Iranian researchers in industrial management in Scopus, WoS, Mendeley, and GS are 160, 159, 74, 131, respectively. The number of documents available in Scopus, WoS, and Mendeley is 14559, 10788, 5886, respectively.

Inferential findings of the research

Answering the second question of the research: *Are there any correlations among Altmetric indicators, namely no. of documents, citations, H-index, inc-citation, and co-authorship, related to Iranian researchers in the field of industrial management in Mendeley and Scopus?*

The correlations between various indices related to Iranian researchers in industrial management Mendeley and Scopus are presented in Table 4.

Table 4. Correlation coefficient between Altmetric indicators in Mendeley and Scopus.

			Scopus			
			No. Documents	Citations	H-index	Inc-Citation	Co-author
Mendeley	H-index	Correlation	0.793**	0.693**	0.709**	0.642**	0.589**
		Sig.	0.000	0.000	0.000	0.000	0.000
	Inc-Citation	Correlation	0.818**	0.719**	0.703**	0.675**	0.612**
		Sig.	0.000	0.000	0.000	0.000	0.000
	Readers	Correlation	0.718**	0.550**	0.547**	0.517**	0.525**
		Sig.	0.000	0.000	0.000	0.000	0.000
	Publishers	Correlation	0.775**	0.542**	0.555**	0.505**	0.576**
		Sig.	0.000	0.000	0.000	0.000	0.000
	Viewers	Correlation	0.645**	0.665**	0.658**	0.623**	0.580**
		Sig.	0.000	0.000	0.000	0.000	0.000

**. Significance at the level of 0.05.   (Ns.) Lack of significance at the level of 0.05.

Table 4 shows a significant relationship between other Altmetric indicators of researchers in Mendeley and Scopus citation indexes (because the level of significance related to the correlation coefficient between them is less than 0.05). The highest correlations are between the citation received and the number of documents, H-index and the number of documents, publications and the number of documents, respectively. The weakest correlation is related to the relationship between readers and co-authors.

Answering the third research question: *Are there any correlations among Altmetric indicators, namely the number of documents, citations, H-index, inc-citation, and co-authorship, related to Iranian researchers in the field of industrial management in Mendeley and WoS?*

The relationship between Altmetrics indicators of Iranian authors and researchers in industrial management Mendeley and WoS is presented in Table 5.

Table5. Correlation coefficient between Altmetric indicators in Mendeley and WoS

			WoS		
			Publication	No. Documents	Citations	H-index
Mendeley	H-index	Correlation	0.686**	0.710**	0.685**	0.709**
		Sig.	0.000	0.000	0.000	0.000
	Incoming citation	Correlation	0.707**	0.485**	0.710**	0.693**
		Sig.	0.000	0.000	0.000	0.000
	Readers	Correlation	0.598**	0.384**	0.485**	0.488**
		Sig.	0.000	0.002	0.000	0.000
	Publishers	Correlation	0.519**	0.457**	0.384**	0.403**
		Sig.	0.000	0.000	0.002	0.001
	Viewers	Correlation	0.685**	0.710**	0.475**	0.484**
		Sig.	0.000	0.000	0.000	0.000

**. Significance at the level of 0.05.   (Ns.) Lack of significance at the level of 0.05.

As shown in Table5, the significance level of the correlation coefficient between all the indicators studied by Mendeley and WoS has been less than 0.05. Therefore, there is a significant relationship between these indicators. The highest correlations were related to citations received in both citation indexes, H-Index of both citation indexes, and citations received in Mendeley with H-Index in WoS. The weakest correlation is between Mendeley Publications and the number of citations in WoS.

Answering the fourth research question: *Are there any correlations among various indices, namely citations, H-index, I10th-index, related to Iranian researchers in the field of industrial management in Mendeley and GS?*

The results of the correlation coefficient test between the Altmetric indicators of Iranian researchers in the field of industrial management in Mendeley and GS are presented in Table 6.

Table6. Correlation coefficient between Altmetrics indexes in Mendeley and GS

			GS		
			Citations	H-index	I10-index
Mendeley	H-index	The correlation coefficient	0.815**	0.850**	0.810**
		Significance level	0.000	0.000	0.000
	Incoming citation	The correlation coefficient	0.861**	0.870**	0.846**
		Significance level	0.000	0.000	0.000
	Readers	The correlation coefficient	0.729**	0.710**	0.734**
		Significance level	0.000	0.000	0.000
	Publishers	The correlation coefficient	0.674**	0.721**	0.783**
		Significance level	0.000	0.000	0.000
	Viewers	The correlation coefficient	0.641**	0.656**	0.682**
		Significance level	0.000	0.000	0.000

**. Significance at the level of 0.05.   (Ns.) Lack of significance at the level of 0.05.

According to Table 6, there is a significant relationship between some of the variables at $p<0.05$. There is a high correlation between the number of citations in Mendeley and the citation indexes, H-index, and I10-index in GS. In other cases, a relatively high correlation is seen between the indicators of both citation indexes.

Answering the fifth research question: *Are there any correlations among the number of citations related to Iranian researchers in the field of industrial management in Mendeley, WoS, Gs, and Scopus?*

Spearman correlation coefficient was used to examine the relationship between the number of citations in Scopus, WoS, GS, and Mendeley citation indexes. The results are reported in Table 7.

Table7. Correlation coefficient between the numbers of citations received in Mendeley, Scopus, WoS, and GS citation indexes

		Scopus	WoS	GS	Mendeley
Scopus	The correlation coefficient	1			
	Significance level				
WoS	The correlation coefficient	0.804**	1		
	Significance level	0.000			
GS	The correlation coefficient	0.877**	0.700**	1	
	Significance level	0.000	0.000		
Mendeley	The correlation coefficient	0.902**	0.710**	0.860**	1
	Significance level	0.000	0.000	0.000	

As shown in Table7, there is a significant relationship between the number of citations received in the studied citation indexes. Therefore, receiving citations from any of these citation indexes affects receiving citations in the other citation indexes. But the intensity of this relationship is very high at Mendeley base with other citation indexes. Also, the correlation between the number of citations in WoS and Scopus is very high.

Answering the sixth research question: *Are there any correlations among H-indices related to Iranian researchers in the field of industrial management in Mendeley, WoS, GS, and Scopus?*

The correlation between the H-index on the Scopus, WoS, GS, and Mendeley was tested using the Spearman correlation coefficient. The results are reported in Table 8.

Table 8. Correlation coefficient between H-index in Scopus, WoS, GS and Mendeley.

		Scopus	WoS	GS	Mendeley
Scopus	The correlation coefficient	1			
	Significance level				
WoS	The correlation coefficient	0.808**	1		
	Significance level	0.000			
GS	The correlation coefficient	0.898**	0.693**	1	
	Significance level	0.000	0.000		
Mendeley	The correlation coefficient	0.886**	0.709**	0.670**	1
	Significance level	0.000	0.000	0.000	

According to table 8, there is a positive and significant relationship between the H-index of the studied citation indexes. The correlation between the H-index of GS and Scopus is very high. It is high between WoS and Scopus.

Discussion and Conclusion

The descriptive part of the research indicates that researchers in the field of Industrial Management tend to publish their works in the journals indexed in Scopus, WoS, GS, and Mendeley, respectively. The findings are in line with those reported by Biranvand and Shanbedi (2020). The results show that researchers are reluctant to use Mendeley to manage resources as well as share their work through this website (less than 50% of researchers have an active personal page in Mendeley, though the impact of Mendeley is significantly greater (Biranvand & Shanbedi, 2020; Riahinia et al., 2018; Ruan et al., 2018). The researchers in this field seem not to pay enough attention to the effects of using these citation indexes in reading, attracting citations, and increasing their H-index score. The results of this section are in line with those already reported in the literature (Biranvand & Shanbedi, 2020; Htoo & Na, 2017; Pooladian & Borrego, 2017).

The failure to use Mendeley citation indexes and update the authors' personal pages in this reference manager seems to have had a negative impact on their status in Scopus, WoS and GS citation indexes. The findings show a significant relationship between the Altmetric indicators of researchers in Mendeley and Scopus citation indexes. The highest correlation between these indicators is related to the citation received and the number of documents, H-index and the number of documents, and the publications and the number of documents, respectively. Therefore, the results of this section support the effect of the publication of documents in Mendeley and its relationship with the number of citations received in Scopus. The results are in line with those reported earlier in the literature (Riahinia et al., 2018; Ruan et al., 2018). The positive and high relationship between Mendeley and WoS also indicates the influence of the researchers' activities in Mendeley on WoS. The highest correlations were related to the citations in Mendeley with H-index in WoS. The results of this section are in line with those reported in the literature (Mohammadi & Thelwall, 2014; Riahinia et al., 2018). There is also a high correlation between Mendeley and the citation indexes, H-index, and I10index in GS. The results are in line with those in the literature (Saberi & Ekhtiyari, 2019).

According to the results of this study, we can point to the effect of databases on the citation and visibility indicators of each other according to receiving citations from each; The correlation between indices of Mendeley resource management database and those of other databases is very high. This strong correlation can be seen between the number of citations received between WoS and Scopus. High correlations between the H-index score on the Scopus, WoS, GS, and Mendeley confirm the relationship of the databases with one another. Although the relationship between the H-index score between the GS and WoS or WoS and Scopus is stronger, the positive relationship between the Mendeley and H-index score is also considerable.

Considering the prominent role of the Mendeley resource management database in increasing the number of readings and receiving citations, which leads to an increase in the researchers' H-index score, they are recommended to use this site to index and share their works. By sharing resources in this database, it is possible to help improve the validity and consistency of in-text citations, and it is also considered a way to improve communication between researchers in scientific fields. Deficiencies in the management of scientific resources used in citations by researchers is a significant concern, as it results in the isolation of researchers. Mendeley is a great help for researchers to overcome this problem. Based on the results of the present study, it is advised to hold training courses to introduce social networks and their impact on the research activities of researchers and to promote culture of sharing knowledge and research results through social networks.

Some of the limitations that we faced in this research are restrictions on access to information in some databases, non-updating of the profiles of many researchers in this field, and inconsistent written form of some researchers' names. It can be said that many of these limitations will be removed if researchers use these scientific, social networks more. As mentioned, recent research can streamline the priorities of researchers' activities to continue their scientific path. A similar study can be conducted based on other indicators and in different scientific fields for future research work.

Conflict of interest

No conflict of interests has been reported by the authors.

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