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Researchers' Scientific performance in ResearchGate: The Case of a Technology University

Farahnaz Naderbeigi
Ph.D. Student. Department of Knowledge and Information Science, Islamic Azad University, Hamedan Branch, Iran.,
farahnaz.naderbaigy@gmail.com

Alireza Isfandyari-Moghaddam
Ph.D. Associate Professor. Department of Knowledge and Information Science, Islamic Azad University, Hamedan Branch, Iran.,
ali.isfandyari@gmail.com

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Abstract

With the advancement of technology and changes made in the scientific communication model, changes have been made in scientific evaluation methods. New technologies offer indicators that measure all the actions and interactions of scientists in the digital environment and create new aspects of scientific communication. This work has some purposes; first, mapping profile of scientific activities of faculty members of Sharif University of Technology (SUT) in “ResearchGate” (RG), second, intend to test the correlation h-index between the RG and Web of Science (WoS) and Scopus and Google Scholar (GS). Third, investigate SUT faculty members’ top h cited research RG in WoS, Scopus, and GS. Fourth, investigate Altmetric score of SUT faculty members’ top h cited research RG with Altmetric Explorer (AE). For this purpose, the SUT faculty members were searched in RG. Information was noted for those who were members in RG. Then, all their h index and the number of citations of top h cited research were extracted from WoS, Scopus and GS. Altmetric scores of Top h cited research of SUT faculty members was obtained by using AE. The degree of correlation between RG h index and WoS h index was higher than the h index of other citation databases. Also, the results indicate that there are errors in the calculation of the Almetric score by AE. Only 3% of the top h cited research of SUT faculty members had Altmetric score. While 95.72% of them had been read at least once in Mendeley and 78.7% of them had been cited in Mendeley.

Keywords: Altmetrics, Scientific social networks, ResearchGate, Sharif University of Technology, Scientific impact assessment.

Introduction & Statement of Problem

Information age with different technologies, communication tools has affected human interactions. One of the most influential tools is Web 2.0. In fact, Web 2.0 or the social web has introduced new concepts and tools that are able to operationalize a more social-centric vision. Online social networking systems allow people to manage their interaction with others on a massive scale (Isfandyari-Moghaddam and Hosseini-shoar, 2014) .The Web-based service facilitated communication, participation, collaboration in information space (Paroutis and Saleh, 2009) .Researchers and academics make connections by web logs, personal and organizational websites and social-scientific networks more comfortably. Besides, when Web 2.0 was introduced, it affected science. Rowlands et al. (2011) investigated the use of social media in the research workflow. Results show that social media have found serious application at all points of the research lifecycle, from identifying research opportunities to disseminate findings at the end. AS the volume of academic literature explodes, scholars rely on filters to select the most relevant and significant sources from the rest. Scholarship's three main filters are: Peer-review, Citation counting, and Journal Impact Factor (JIF) (Priem et al., 2010). Citation-based metrics and peer review have a long tradition and are widely applied in research evaluation. Citations are usually considered as a proxy for 'scientific impact' (Zahedi et al., 2014). Since the 1960s, citations have been widely used in research evaluation and monitoring (Mohammadi et al., 2015) .However, citations have limitations (MacRoberts and MacRoberts, 1989) such as slowness or different motivations and factors affecting citations, so that some unread papers are cited and some relevant or used articles are uncited (Mas-Bleda et al., 2014). The paper citations are classified into positive, negative and neutral that is all citations do not imply the value of the work, but the negation (Jamali and Sangari, 2015). Many important artifacts are commonly not cited, notably datasets, an increasingly important scientific product (MacRoberts and MacRoberts, 2010; Prime, 2014). Citations do not measure readership and do not account for the impact of scholarly papers on teaching, professional practice, technology development, and nonacademic audiences (Weller, 2015). Also, citation count does not recognize non-scholarly and other online uses of an article in today's digital environment (Htoo et al., 2016). But then, the impact factor of journals has some limitations. For example, impact factor has been created to compare the journals objectively through journal quality not paper quality; all papers in a journal do not have the same citation. Impact factor changes over time depending on field and scientific area and cannot evaluate the authors. Then again, rapid changes in how research is disseminated have not only challenged established models for publishing but also brought into question current methods for measuring scholarly impact (Hammarfelt, 2014). When Garfield introduced impact factor, there were not the-would-be technology. Nowadays, research-scientific evaluation is affected by Web 2.0. Since long, the researcher has tended to know the impact of his research, but it is worth mentioning that, the impact is a multi-faceted (Liu and Adie, 2013; Weller, 2015) and fuzzy (Crotty , 2014) concept impacts of research can go beyond knowledge advancement within science, and hence the influence of research publications in social, economic, cultural and environmental contexts needs to be identified in research evaluation (Bornmann, 2012; Thelwall, 2012; Mohammadi et al., 2015) .The traditional methods are not able to measure the impact of researchers` activities in scientific networks and web space. One factor is the limitation of existing measures of social, public, and/or "real-world" impact of research (Williams and Williams, 2017). Regarding the limitations of these methods, the scientists have sought to introduce new solutions. In July 2010, Priem and Hemminger published an article that

describes scientometrics 2.0 and called for new metrics based on Web 2.0 tools (Fenner, 2014). Afterward, the Altmetrics manifesto was published in 2010 by a group of enthusiasts and subsequently it becomes a baseline for a burgeoning Altmetrics movement that achieves a global appreciation (Das and Mishra, 2014). They proposed alternative methods and parameters. Altmetrics has been taken from Alternative +Metrics. Altmetrics is "the creation and study of new metrics based on the Social Web for analyzing, and informing scholarship" (Priem et al., 2010). Altmetrics are proposed to remove delay-associated drawbacks in making assessments based on reviews and citation analysis, as well as in response to the incorrect use of the impact factors of journals in assessing the activity of individual scientists (Mazov and Gureev, 2015). Academicians along with the rest of the online population increasingly use SNSs like, Academia.edu, RG, Mendeley, Researchr.org, Epernicus, SciSpace (Masud et al., 2012). Among those networks, the most popular are RG.net and Academia.edu: both allow uploading different type scholarly outputs (papers, scientific communications, lectures, etc.) (Melero, 2015). RG is launched in 2008 and bears the most resemblance to a "Facebook for scientists". By November 2016 claimed to have 11 million users and 100 million publications (Orduna-Malea et al., 2017). In 2015 the site claimed that on average 10,000 people joined it every day and two million publications were added per month (Jamali, 2017). It's free and among the research awareness sites (Bullinger et al., 2010), the research oriented SNS (Masud et al., 2012), collaborative social networking services (Moeslein et al., 2009) and Multidisciplinary academic social networking service (Nicholas et al., 2015). Table 1 shows some characteristics of a social scientific network of RG.

Table 1. Some of RG Services

Row	Property	Description
1	Professional profile	RG allows researchers to create a professional profile manually (Arda, 2012)
2	Share	RG network allows researchers to share Publications (journal articles, conference papers) Negative and raw data, figures, media files (RG, 2015) Field of interest (Giglia, 2011) Expertise Failed experiments (Lavin, 2015)
3	Email alerts	RG sends automatic email alerts to people about activities related to their profile and publications (Thelwall and Kousha, 2017a)
4	Semantic search engine	RG has developed a semantic search engine that works on internal resources and major external free research databases, including PubMed, CiteSeer, arXiv, and others to find research papers (Giglia, 2011)
5	Questions and answers	RG network allows researchers to ask their questions, they can also respond to other questions.
6	Projects	RG allows set up groups called "projects" (Adams and Bullard, 2014)
7	Social measurements	RG shows "Followers" and "Following" (Ortega, 2015).
8	Usage metrics	RG shows "Reads" of articles.
9	Bibliometric indicators	RG shows "papers", "citations" (Ortega, 2015)
10	RG Score	RG has its own measurement, called RG Score, that assigns members a score based upon content interactions and the score of the members interacting with the content (Ovadia, 2014). In fact, RG calculates RG Score based on the quality and quantity of publications, the number of questions and answers and followers.
11	h-index	The h-index is an author-level metric that measures a person's research output and its citation impact. It is based on a set of their most cited work and the number of citations it's received (ResearchGate, 2017).

The Iranian academics and researchers have used this web tool and have had interaction with other researchers. As the name of Iran is typed in RG, the list of Iranian institutions and universities will be

displayed. One of these universities is SUT, is a non-profit public research university in Tehran, Iran. SUT was established in 1966 with the aim of training and providing the necessary specialized personnel of the country at high scientific levels. SUT offers courses and programs leading to officially recognized higher education degrees such as bachelor degrees, master degrees, doctorate degrees in several areas of study especially as engineering, physical science disciplines. Fortunately, during the course of its activities, it has been able to present itself as a leading scientific institution in the industry, technologies of the day and applied sciences in the field of science, regional and global and finds a valuable place. In the 2016 Academic Ranking of World Universities Engineering/Technology and Computer Sciences rankings, SUT is ranked 1th in Iran. SUT has 484 faculty members. Of these, 181 (37.4%) were in full-time professors, 105 (21.7%) in assistant professors, 176 in assistant professors (36.4%) and 22 instructors (4.5%) Make up faculty members. The research problem is: What is the status of SUT faculty members in RG? This research aims to present a profile of research activities of SUT faculty members in this scientific social network with Altmetrics approach. It also determines how related their RG h-index are with Scopus and WoS and GS h-index. Also, reviewing the status of SUT faculty members' top h cited research RG in WoS, Scopus and GS. As well as reviewing Altmetric score of SUT faculty members' RG top h cited research with Altmetric Explorer.

Related works

1.1 Altmetrics

According to the influence of the Web 2.0 in science communication and dissemination of research outputs, due to the shortcomings of traditional methods in measuring the impact of scholarly publications and, bibliometrics, scientometrics and webometrics scientists decided to create new approaches and indicators for measuring scientific impact. They suggested Altmetrics for analyzing scholarship in social web and hoped that they can depict the impact of all kinds of information sources (not only those included in citation databases) on all kinds of users (not only authors) (Sotudeh et al., 2015). Indeed, "Altmetrics" refers to data sources, tools, and metrics (other than citations) that provide potentially relevant information on the impact of scientific outputs (Bornmann, 2015). During the recent years, many studies have been conducted on young discipline Altmetrics. Published research are various in the subject area. Some researchers introduced concept of Altmetrics, enumerated reasons have need of Altmetrics, benefits, disadvantages, challenges and history of Altmetrics as Wouters and Costas (2010); Priem et al . (2010); Piwowar and Priem (2013); Fenner (2014); Bornmann (2014);; Brown (2014); Hamferlt (2014); Galligan and Dyas-Correia (2013); Weller (2015); Williams and Williams(2017) and many more. Also, Bornmann and Haunschild(2016) introduced the principles of the Leiden manifesto and discuss them in connection with Altmetrics .The literature on "Altmetrics" outlines some basic arguments in favor of these new tracking tools speed, openness, informality (Wouters and Costas, 2012), richness, breadth of Altmetrics (Yeong and Abdullah, 2012), timelier (Wang et al., 2013), and diversity of sources and filtering (Wouters and Costas, 2012). Priem and Hemminger (2010) indicated an overview of various Altmetrics their paper titled Scientometrics 2.0: Toward new metrics of scholarly impact on the social Web. In contrast to these advantages, is considered weaknesses and challenges for Altmetrics. Bornmann (2014) noted this disadvantage for Altmetrics: commercialisation, data quality (Bias, target, multiple versions, different meanings, measurement standards, mention standards, normalization, and replication), missing evidence, manipulation. Haustein (2016) identified three major challenges of Altmetrics, contains, heterogeneity, data quality and dependencies. The heterogeneity of Altmetrics reflects the

diversity of the acts and online events, most of which take place on social media platforms. Data quality related to the lack of accuracy, consistency and replicability of various Altmetrics. Dependencies related with technical possibilities, APIs and DOIs, data providers and aggregators. In Altmetrics literature, there have been suggested many parameters regarding aim and methods. Buschman and Michalek (2013) expressed categorization of the impact of scholarly research: Usage (downloads, views, and document delivery), Captures (favorites, bookmarks, saves, readers, groups, and watchers), Mentions (blog posts, news stories, Wikipedia articles, comments, reviews), social Media (Tweets, +1s, Likes, Shares, and Ratings), Citations (Citation, Count). Due to the varied platforms, metrics and tools of Altmetrics is referred only some related research in this section. The correlation between Altmetrics and traditional scientometrics indicators is a part of the studies attempting to put to test their validity at least as regards the correspondence between the results obtained by the two kinds of indicators (Sotudeh et al. 2015) . Investigating these relationships has been carried in different platforms such as microblogging, online reference manager, blogging, social networks and scientific social networks.

Erdt et al. (2016) conducted meta-analysis across more than 40 cross-metric validation studies shows overall a weak correlation (ranging from 0.08 to 0.5) between Altmetrics and citation counts. Thelwall and Kousha (2014) made an observation the correlation traditional bibliometric and Academia.edu metrics; they found that there was no correlation between them for philosophers. According to Martín-martín et al. (2016) RG metrics, present a high correlation to all the indicators from GS Citations. Therefore, research to determine the relationship of alternative parameters and citation indexes presents a widespread scope of evaluating scientific publications. Moreover, Thelwall (2016) did a research to overcome the problem and found there are no guidelines about how to assess the strengths of the correlations found. The results show that the correlation strength reflects not only the underlying degree of association, but also the average magnitude of the numbers involved. Overall, the results suggest that due to the number of assumptions that must be made, in practice it will rarely be possible to make a realistic interpretation of the strength of a correlation coefficient

1.2 ResearchGate

Several works have been published on RG. When “ResearchGate” is searched, 167 items will be found in Scopus and 157 items will be found in WoS. Figure 1 illustrates the works related to RG in WoS and Scopus in year discrimination. These results are related to the search on WoS and Scopus that the word of RG was in topic, title, abstract and/or keywords. In this article, there is no way to review all of these works and only a few of them are mentioned

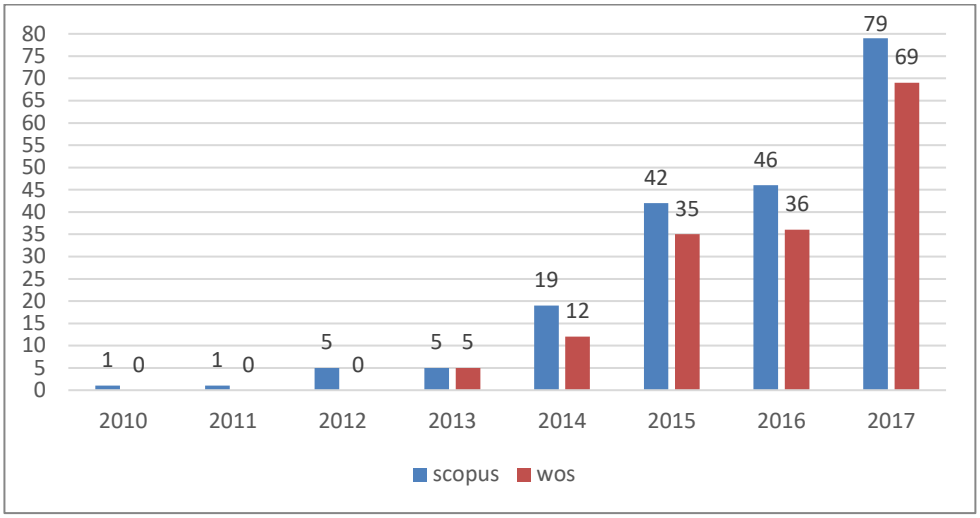

Figure 1. Published works on RG in Scopus and WoS in year discrimination.

Thelwall and Kousha (2015) assessed whether RG usage and publication data broadly reflect existing academic hierarchies and whether individual countries are set to benefit or lose out from the site. The findings showed that rankings based on RG statistics correlate moderately well with other rankings of academic institutions. One study explored the connections between social and usage metrics (Altmetrics) and bibliometric indicators at the author level of 300 users of RG. It was calculated correlation between RG metrics and other performance metrics, based on both the institutional and researcher levels, the results showed that the RG score can be an effective indicator for measuring individual researcher performance and potential as an alternative performance indicator for academic institutions (Yu et al., 2016). Batooli et al. (2016) investigated another study on the articles published in Scopus journals by scholars at Kashan University of Medical Sciences by the end of March 2014. The required data were collected from Scopus, RG, and Mendeley. The results showed that there was a positive correlation between the number of views of the articles in RG and Mendeley and the number of citations of the articles in Scopus. One study was aimed at to evaluate the extent of association between the traditional bibliometric indicators and RG indicators. The results showed that most of the RG metrics showed strong positive correlation with the Scopus metrics, except for RG Score and Scopus Citations, which showed a moderate positive correlation. It was also found that the RG metrics showed moderate to strong positive correlation amongst each other (Shrivastava and Mahajan, 2015). Martín-martín et al. (2016) conducted a study on 814 authors who had a profile on GS Citation. It was found that 543 authors had profile in RG. Also, was specified that RG indicators, present a high correlation to all the indicators from GS Citation. Thelwall and Kousha (2017b) assessed the whether the number of citations found for recent articles is comparable to other citation indexes using 2675 recently-published library and information science articles. The results showed that in ResearchGate found fewer citations than did GS but more than both WoS and Scopus. RG correlated most strongly with GS citations. Jamali (2017) investigated 500 articles available as full-text on RG. He found that authors infringe copyright most of the time not because they are not allowed to self-archive, but because they use the wrong version, which might imply their lack of understanding of copyright policies and/or complexity and diversity of policies. In another study, Boudry and Bouchard (2017) evaluated the proportion, the typology and the legality of the full-text publications deposited by researchers on RG which is widely used by the medical and biological community, evidence showed the important role RG plays for providing full-texts of articles in biology/medicine. A study

explored how research scholars of the University of Delhi integrated Social Networking Sites (SNSs) into their daily communication for research work. Most used SNSs for "lurking" while few used such sites for promoting one's research. 54% of respondents had profile in RG. Most respondents preferred the SNS Facebook and RG for academic purposes (Madhusudhan, 2012). Lui et al. (2017) studied to identify levels of adoption and engagement of several social media platforms by a large international cohort of hernia surgery specialists. They found that 759 surgeons from 57 countries, 189 (24.9%) had RG accounts Engagement in one social media platform was associated with increased engagement and utilization on other platforms. Chakraborty (2012) investigated activities and reasons for Using RG by Research Scholars in North Eastern Hill University. He found RG users, 24% use it "to know the other's field of research", 31% use it "to be up to date" and 37% use it "to form study groups", 6% use it "to share research activity", 2% use it "Friends use the same site". Another study was conducted to investigate using of SNSs in two Indian universities. Its findings showed that RG was used by 31.13% of respondents (Mahajan et al., 2013). Another study was conducted an international survey of 3500 researchers from 95 different countries, results showed that RG has 1,589 regular visitors and more than 88% of scientists and engineers, 35% of the social sciences and arts and humanities said that they were aware of it and visit regularly. The results confirm that RG is certainly well-known and most popular academic social web site (Van Noorden, 2014). Hoffmann and Lutz (2016) conducted a case study among a sample of Swiss management scholars found that platform engagement, seniority, and the publication impact contributes to members' indegree and eigenvector centrality on the platform, but less so to closeness or betweenness centrality. It was concluded that a relational approach based on social network analyses of academic SNS, while subject to platform-specific dynamics, may add richness and differentiation to scientific impact assessment. Also, studies have been conducted on the questions and answers in Research Gate. As one study investigated answer quality of scholars answers in a Q&A setting based on the web-captured features (e.g., RG Score or the length of answers) and human-coded features (e.g., if the answer provided factual information) on the academic Q&A site RG. It was found that the differing degrees of answer quality on RG are characterized differently from general Q&A sites (Li et al., 2015) .Orduna-Malea et al. (2017) investigated that whether it is reasonable to employ the RG Score as evidence of scholarly reputation. Their research results showed that high RG Scores are built primarily from activity related to asking and answering questions in the site. In particular, it seems impossible to get a high RG Score solely through publications. Alheyasat (2015) investigated the question/answer platform of RG. The collected data have been utilized to generate a directed graph that connects users according to their questions and answers. The result's analysis shows that, users in RG do not care about sharing their expertise. In addition, it is observed that most of the nodes in the graph are disconnected, which means that, most of the questions have no answers. It was described the effects of three different interfaces on RG by another study. It was collected and grouped 413 posts across three distinct interfaces of RG's communication platform. The results showed that scholars were more polite in the initial group discussion interface, but that user interface design did not change the core communication patterns of sharing information and opinions among scholars. RG transitioned from one-to-many discussions to one-to-one posts, but new users were generally welcomed to the scholarly communications (Goodwin et al., 2014). Some also looked at RG critically and compiled some articles. As Kraker and lex (2015) look are critical of RG Score as a measure of scientific reputation. They hold that the RG Score has three serious shortcomings: (1) the score is intransparent and irreproducible, (2) the score incorporates the journal impact factor to evaluate individual researchers, and (3) changes in the score cannot be reconstructed. Most of carried out studies are based on sampling and there is not a research which focuses the

researchers of Iranian universities in RG. And in none of the researches, RG top h cited of the researchers has not been studied.

Objectives

The purpose of this paper is multifold. The study aims to investigate:

1. The status of SUT faculty members in RG.

2. The correlation between RG and WoS and Scopus researcher's h-index and citations.

3. The status of researcher's top h cited research in RG ,WoS and Scopus.

4. Researcher's top h research score with Altmetric Explorer.

Research methodology

The data were collected manually by visiting the profile pages of faculty members who had a profile in under SUT. The number of them was 304 until December 21, 2017. Researchers' profiles were viewed and then, we noted these data: gender, RG metrics (RG Score, citations, reads, answers, questions, following, followers, uploaded full text, top h cited research, h-index, research item consist of article, conference paper, data). Then, in the next step, the SUT faculty members who joined in the RG were searched in Scopus and WoS and their h- index and citations extracted. Their names were also searched in GS. The number of h index and citations of those who had profiles were noted. 174 of them did not have profiles so publish or perish software was used to extract their h index and the number of citation. Then the name of the top h cited research was searched in Scopus and WoS and GS. The citations number of that work (If there was) was obtained. In the next section of this study, among the Altmetrics service providers, data from the Altmetric LLP was used. To do this, First top h cited research that have doi, searched on Google, then, Bookmarklet tool was used to calculate Altmetric score. When it was found that the score of many articles is zero, then the articles in Mendeley were searched. All collected data was analyzed by SPSS 22 software.

Findings

RQ1. How is the status of SUT faculty members in RG?

In total, SUT has 5159 members in the RG until December 21, 2017. There are 304 of SUT faculty members in RG. They are working in RG with different scientific degrees and grades. The majority of them are professors and experienced academic. As seen in Finger 3, in terms of number the professors are in the first place. After them, the second-level assistants' professors, then associate professors and instructors are in the third and fourth places in terms of the number of members in the RG.

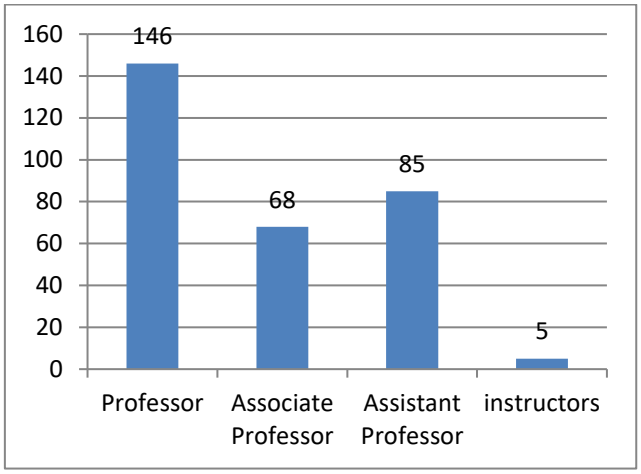

Figure 2. SUT Faculty members' frequency based on their degrees in RG

As we see in figure 3.The number of male faculty members is more than female faculty members.

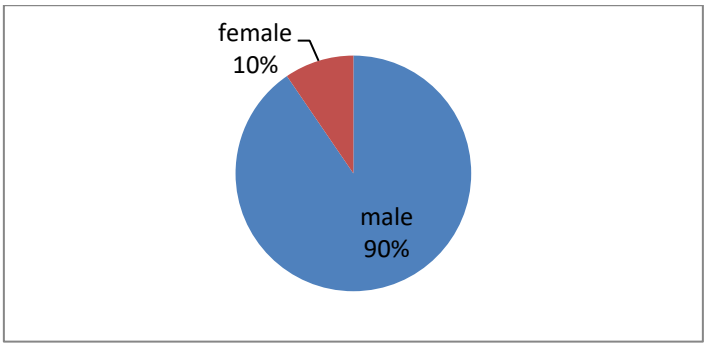

Figure 3. SUT faculty members' gender in RG

The total sum RG Score from of 5628 SUT members is 15,889.29. Average total RG Score for all SUT members is 2.82, While faculty members make up only 5% of SUT‘s population in RG, their average is 21.81. This shows the activity and interaction of the faculty members more than other scholars. Figure 4 shows SUT faculty members' RG Score.

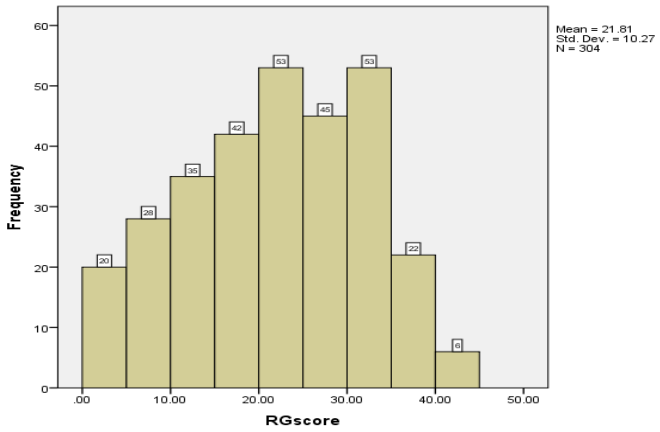

Figure 4. SUT faculty members' RG Score

RG Score and contribution has been shown SUT faculty members based on degrees in Table 1. It is worth noting as their degree increases, their RG Score and their contributions also increases (excluding the number of questions asked).

Table 2. SUT faculty members' RG Score and contribution based on their degrees in RG

Degree	RG Score	Research Items	Article	Conference paper	Data	Other publication (book, thesis…)	Full text	Answer	Question	Following	Follower
Professor	3927.22	18462	10685	3116	320	4341	2666	54	1	5725	26112
Associate Professor	1388.67	3858	2647	1114	85	12	685	29	2	1794	7089
Assistant Professor	1285.56	2595	1804	615	129	47	557	17	3	2082	6840
Instructor	29.13	84	45	35	4	0	17	0	0	60	322
Grand Total	6630.58	24999	15181	4880	538	4400	3925	100	6	9661	40363
Grand Average	21.81	82.23	49.93	16.05	1.76	14.47	12.91	0.32	0.01	31.99	132.77

The results suggest that the researchers are interested in uploading their works on RG and providing full text of 15% of their works to others. The higher the rank, the number of faculty members are more works available to others. The higher the rank of the members of faculty, the more number of works they share with others. 60.72% of the uploaded works are published articles in journals, 19.52% are the conference papers and 2.15% are data, and 17.06 of them are books, thesis and so on. They interact with other researchers to answer other questions. They interact with other researchers and answer the questions of others too. Other scholars also consider them as scientific references and follow their work that the number of their followers confirms this. On the other hand, reviewing the results showed that only 10% of the faculty members of SUT answered the questions of others. For these researchers, the average number of responses given is only 0.32 and the average researches items are 82.23.

Table 3. Spearman's correlations between SUT faculty members' RG metrics

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1. RG Score	1	0.870**	0.811**	0.899**	0.301**	0.362**	0.067	0.048	0.696**	0.913**
2.Research Items		1	0.839**	0.852**	0.336**	0.476**	0.107	-0.30	0.752**	0.867**
3. Reads			1	0.837**	0.368**	0.479**	0.172**	-0.22	0.781**	0.828**
4. Citations				1	0.246**	0.377**	0.47	-0.28	0.696**	0.968**
5. Following					1	0.380**	0.267**	0.105	0.464**	0.283**
6. Full text						1	0.215**	0.053	0.530**	0.373**
7. Answer							1	0.219**	0.130	0.060
8. Question								1	0.019	-0.028
9. Follower									1	0.702**
10. h-index										1

Note: **indicates significance level with a p value of <0.01.

Table 3 illustrates the correlation between the RG metrics of the SUT faculty members. As stated on RG site, RG Score is calculated based on publications, questions, answers and followers. But RG Score of the SUT faculty members does not have correlation with the question and answer (Table 2 also showed that only 100 questions have been answered and only 6 questions have been asked). Their RG scores with($r = 0.870$, $p < 0.01$), have a positive and strong correlation with research items. Also, their RG score has a positive and moderate correlation ($r = 0.696$, $p < 0.01$) with Follower. As shown in Table 3, the highest correlation of RG score is with h-index and citations. In other words, if we consider RG Score as a new measure for researchers, then there is still a large degree of dependence on the traditional measure.

RQ2: Are there correlations between RG and WoS and Scopus and GS researchers' h-index?

Table 4 lists Spearman correlations among the z values of the five indicators. RG score, RG h-index, Scopus h-index, WoS h-index, and GS h-index are strongly correlated with each other, with a Spearman correlation >0.7.

Table 4. Spearman's correlations between RG and WoS and Scopus and GS researchers' h-index

	1	2	3	4	5
1. RG Score	1	0.913**	0.803**	0.846**	0.703**
2. RG h-index		1	0.825**	0.827**	0.787**
3. Scopus h-index			1	0.894**	0.856**
4. WoS h-index				1	0.804**
5. GS h-index					1

Note: **indicates significance level with a p value of <0.01.

The strongest correlation is between RG score and RG h-index. Then between Scopus h-index and WoS h-index. Also, the correlation between RG h-index and WoS h-index is stronger than the other citation databases.

RQ3: Are there correlations between RG and WoS and Scopus and GS SUT faculty members' citations?

Table 5. Spearman's correlations between SUT faculty members' RG and WoS and Scopus and GS citations

	1	2	3	4	5
1. RG Score	1	0.899**	0797**	0.843**	0.725**
2. RG citations		1	0.826**	0.835**	0.780**
3. Scopus citation			1	0.886**	0.840**
4. WoS citations				1	0.794**
5. GS citations					1

Note: **indicates significance level with a p value of <0.01.

As it can be seen in Table 5, there is a positive and strong correlation between citations of RG score and citation databases. The correlation between RG citations and WoS citations is greater than Scopus citations and GS citations. Also, RG Score of researchers strongly correlate with citations in RG and citation databases, which are more correlated with WoS, Scopus, and GS respectively.

RQ4: How is the status of researcher's top h cited research RG in WoS and Scopus and GS?

Top h cited research RG of Researchers were searched in Scopus and WoS and GS. 93.43% in Scopus, 88.15% in WoS and 100% of them were indexed in GS. The maximum number of citations of the Top h cited research respectively in RG, Scopus, WoS and GS are 570,570,557, 762.While the maximum reads is 12567. Only 3% of these works were single-authored, and the rest were written in collaboration with other authors. It is noteworthy that in 37% of these works, the numbers of RG citations were more than the numbers of reads. Namely, they were cited before they were read by RG scholars. Table 6 shows the Spearman's correlation between the reads and the citations top h cited research RG and WoS and Scopus and GS citation.

Table 6. The Spearman's correlation between the reads and the Top h cited research RG and WoS and Scopus and GS

	1	2	3	4	5
1. Reads	1	0.338**	0.299**	0.286**	0.337**
2. RG citation		1	0.873**	0.848**	0.971**
3. Scopus citation			1	0.878**	0.881**
4. WoS citation				1	0.827**
5. GS citations					1

Note: **indicates significance level with a p value of <0.01.

The data in Table 6 indicates that the number of citations is positively correlated with reads. This correlation with the RG and GS citations is moderate and it is weak with WoS and Scopus. Other results show that RG citations have a strong and positive correlation with the number of citations in Scopus, WoS and GS, which is more correlated with citations in GS.

RQ5: How is the status of researcher's Altmetric Score of top h cited research RG?

In this research, the AE database was used to extract and analyze the top h-cited research of SUT faculty members. The AE database tracks the amount of presence and sharing of scientific evidence on social media, including News Websites, Policy Documents, Blogs, Facebook ,LinkedIn, Reddit, Pinterest, Food & Agriculture Organization of the United Nations ,Google + ,Wikipedia Websites, Faculty 1000, World Health Organization, Video, International Monetary Fund, Post-publication Peer-review, World Bank , Question & Answer , Mendeley , CiteULike. All top h-cited researches that had doi were searched on Google, but only 3% had an Altmetric score. For the rest of the articles, Figure 5 is shown.

Figure 5. Altmetric score

As shown in Figure 5, the number of readers in Mendeley is reported to be zero. The number of readers in Mendeley is reported to be zero. For this reason, all of the top h-cited researches were searched again in Mendeley. 96.05% of them were found in Mendeley and 95.72% had been read at least once, and 78.94% of them had been cited. . The result is invaluable. Given that AE used doi in articles, 97.36% of the articles had doi. For example, Protein-nanoparticle interactions: Opportunities and challenges has been read 410 times and cited 557 times in Mendeley as Figure 6. But in the calculation of its score, 0 readers on Mendeley are shown as Figure 5.

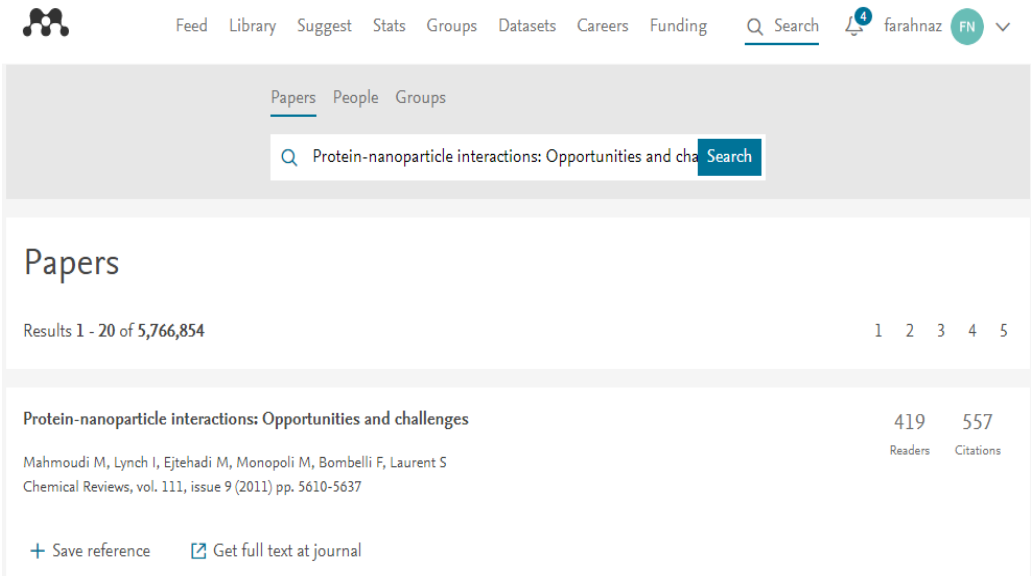

Figure 6. Protein-nanoparticle interactions: Opportunities and challenges in Mendeley**.**

The number of RG reads of the top h-cited research of SUT faculty members in Mendeley can be seen in Figure 7.

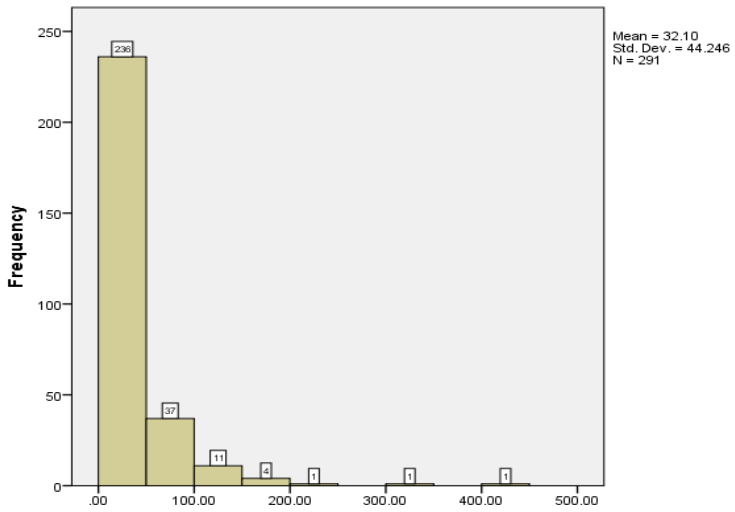

Figure 7. the number of reads of the RG top h-cited research of SUT faulty members in Mendeley

Discussion and Conclusions

With the development of Web and interaction methods, sharing and publication of scientific outputs changed. Researchers publish their works through the web-based tool. Methods of evaluation is changed scientific publications. One of these methods is Altmetrics and research to determine the relationship of alternative parameters and citation indexes presents a widespread scope of evaluating scientific publications. RG' Growth is very high and RG today has more than 14+ million members. The results of this study indicate that the faculty members of the universities, along with other scholars and students, are active in the scientific network RG. 75% of SUT faculty members had membership on RG. This research calculated Spearman correlation coefficients to study the relationships among RG indicators and h-index

and citations of WoS, Scopus and GS. The results of this study show that the highest correlation of RG score is with h-index and citations. In other words, if we consider RG Score as a new measure for researchers, then there is still a large degree of dependence on the traditional measure. In other hand, SUT faculty members' participation in Q & A was low and there was no correlation between their RG Score and Q&A. This is in contradiction with the research results of Orduna-Malea et al (2017). This discrepancy may be due to the difference in the statistical society studied by these two researches. In addition, the quality of the responses provided in these networks is also debatable. As the results of the research of Li et al (2015) state that the differing degrees of answer quality on RG are characterized differently from general Q&A sites. Also most of researchers do not use all the capabilities of social science networks. They have different goals in using these networks. Some researchers' goal is to use RG to promote and display more and more of their scientific activities. To accomplish this goal, the researchers upload their works to the RG. They mostly use these networks as an area for delivering the results of their research. As Thelwall and Kousha (2017) say "RG has become a major source of academic papers". 15 percent of full text research items of these researchers were uploaded to RG. As Harnad (2006) concluded in his research that the availability of research findings through self-archiving increases the citation rate by more than 50%. In full text posting, copyrights may also be distorted, as Jamali (2017) has addressed this issue in his research.

The RG Score correlates with the number of citations in the citation database and RG strongly and positively. In fact, it can be concluded that the RG score of researchers depends heavily on the number of citations databases and less attention is paid to researchers' other activities. While policy-making of RG should be importance to interactions of researchers. The result of this study showed that there is a strong positive correlation between the numbers of RG top h-cite citations of SUT faculty members and citations of GS, Scopus, and Wos. This correlation is greater with GS citations that match the research results (Martín-martín et al. 2016; Thelwall and Kousha, 2017b).

RG has limitations are caused by the unclearness of the indicators and unexpected changes in the policies of the company. What is certain is that RG' indicators are largely unstable. For example, if we take look at RG, we will see that there were already measures, but now they have been removed from RG such as impact point, RG reach, views, profile view and other metrics were later added to this social science network, such as reads and h-index. It seems that it is biggest problem. Since it is not possible to study and compare with previous results for researchers.

According to the results of question 5, it can be concluded that one cannot always see the score of the Altmetric articles through AE. There are errors in the calculation of the Almetric score by AE. The data coverage of Altmetric Institute is limited. However, the statistical community of this study was dedicated only to the top h-cited research RG of the researchers of SUT. But it can be a good sample, those works were indexed 88.15% in WoS, 93.43% in Scopus, and 100% in GS.

On the other hand, the inability of scholars from some countries to access some social media such as Twitter because of filtering has had the effect on results. In other words, the digital divide is also effective in computing the score of the publications and it would be fair to consider the conditions for access to all publications in all countries to be the same.

However, new indicators are at the beginning of the way and after fixing problems, those can be considered as a complementary measure along with other traditional ones to measure the scientific impact of researchers.

Limitations

This study is limited by the focus on SUT faculty members and the results may not apply to other universities. Another important limitation of this study is that the results reflect use of RG at a specific point in time.

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