2-1-2019

ResearchGate Profiles of Naval Architecture Scientists in India: An Altmetric Analysis

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Abstract

This study aims to conduct analtmetrics analysis of researchers on Indian Naval Architecture. The study covered sixty-four faculty members on Naval Architecture discipline from six higher education institutions in India. The profile page of ResearchGate (RG) was visited to collect altmetrics indicators. The study also tried to perform scientometric analysis of publication outputs, citations and H-index of the researchers using the Scopus database. The study further investigated the correlation of altmetrics and scientometric indicators with Pearson correlation test. The study found that the 65 percent of the researchers has an account in RG with their publications being uploaded in RG. Most of them received citations in a range of 1-50 and H-index of 1-5. Their publications have received reads in a range of 1000 to 5000 and obtained RG score of10-15. Naval architecture scientists have relatively low followers, and they are following a limited number of their peers. There is a significant correlation between the range of citations and H-index received by the naval architecture scientists in Scopus and RG. The study also shows the correlation among the range of publications indexed in Scopus and added in RG.

Keywords: Altmetrics, Scientometrics, Scopus, ResearchGate, Academic, Social networking, Naval Architecture, and India

Introduction

The maritime history of Indian shipbuilding begins right from the time of civilization in Harappa and Mohenjo-Daro (Thangam & Kumar, 2017). The Rigveda, Ramayana, and Mahabharata, ancient philosophical and literary works in India mention ships and maritime activities. Information on ships can be found in Brihat Samhita, written by Varahmihir in the 5th century and in the Yukti Kalpataru written by Raja Bhoj in the 11th century (Soni, 2009). The boat building technology is considered as an important industry in the Dravidian culture (Rajamanickam, 2004). In those days Indian shipbuilding was mainly confined to timber. The Venetian traveler Marco Polo describes varieties of timber used for Indian vessel making (Polo, 1958).

India is surrounded by season three sides. India's coastline extends about 7517 km,and it enjoys excellent natural conditions to develop the shipbuilding industry (Lin, 2017). At present India has 12 major ports, 205 notified nonmajor ports and 31 shipyards. The country has nine states out of a total of 29 on the coastal belts. The country also has an extensive network of Inland waterways in the form of rivers, canals, backwaters, and creeks which create the demand for small ships/crafts. As per the Ministry of Shipping, Government of India (2016), 95 % of the country's trade by volume (68% in terms of value) is moved by the seas. Though India has one of the largest merchant shipping fleet among the developing countries (Panda, 2009), India's shipbuilding industry experienced a decline due to lack of relevant policies and short of skilled workers (Lin, 2017).

Naval architecture, also known as naval engineering, is an engineering discipline dealing with the engineering design process, shipbuilding, maintenance, and operation of marine vessels and structures.(Wikipedia, 2018).A Naval Architect is a professional engineer who is responsible for the design, construction and repair of ships, boats, other marine vessels and offshore structures, both civil and military, including Merchant ships, Passenger/Vehicle Ferries, Warships, Submarines, and underwater vehicles, Offshore drilling platforms, High speed craft, Workboats, Yachts etc.(RINA, 2018). As per RINA only24 countries in the world areofferingNaval Architecture and related courses. There are eight institutions that offer four-year engineering undergraduate

courses in Naval Architecture and Shipbuilding in India. This study attempts an altmetrics analysis of the research performance of Indian Naval Architecture scientists working as faculty members of six education institutions in India. The study also intends to find out the association between altmetrics indicators and scientometric indicators.

Social Networking and Altmetrics

Altmetrics was first narrowly defined as indicators for academic activities or outputs derived from the social web (Thelwall, 2018). Priem (2014) defined altmetrics as "the study and use of scholarly impact measures based on activity in online tools and environments."This study is following the concept of Altmetrics analysis for finding Indian research on Naval Architecture. The study is based on data from ResearchGate (RG), which is the most well-known social network among researchers (Van Noorden, 2014). RG was started in 2008 by physicians Dr. IjadMadisch, Dr. SörenHofmayer, and Horst Fickenscher. It is an academic, social networking site for scientists and researchers. RG claims that over 15 million members from different parts of the world use it to share and discuss research. The user accounts are restricted to researchers at recognized institutions. By becoming a member, a researcher can share publications, collaborate with co-authors and peers in the field of research. Every member has a profile page with short biographical information and a list of publications. The publication page shows the number of times an article has been downloaded. All the research are listed separately under articles, book, chapter, conference paper, with the option to include data. The statistics view shows the number of reads and citations. The RG score is calculated based on any contribution of the researcher added to the profile, such as published articles, unpublished research, etc. (ResearchGate, 2018). But the method and the algorithm used for calculating the score are not known. RG introduced h-index both including and excluding self-citations. The site also provides an overview of the researcher's top h cited publication (ResearchGate, 2018).

Since, the age of the internet, social media tools offered a powerful way for scientists to boost their professional profile and act as a public voice for science (Bik and Goldstein, 2013). Hence, it is important to study the social networking activities of Naval Architect academiainIndiasince they remained unattended by scholars so far.

Methods

There are eight institutions in India offering Naval Architecture course. However, this study is limited to six institutions due to the non-availability of data for the two institutions. The six institutions include the Indian Institute of Technology (IIT), Madras, IIT Kharagpur, Cochin University of Science and Technology, Andhra University, Indian Maritime University, Visakhapatnam Campus and Sree Narayana Gurukulam College of Engineering, Ernakulam that offer either Bachelor Degree (B.Tech) or Master Degree (M.Tech)in Naval Architecture. A total number of sixty-four faculty members were identified from the website of respective institutions. Among them, only forty-two faculty members were having an account in RG. This community becomes the sample of this study. The number of publications, type of publications, reads, followers, following researchers, citations, H-index, and RG Score of the sample population was collected and analysed using Microsoft spreadsheet.

The scientometric analysis of the sample population was conducted based on data from the Scopus database of Elsevier. Affiliation search was used to identify the six institutions and further search was performed to identify the individual authors. Documents were analysed according to publications, citations and H-index. Correlation test was performed on a total number of publications, H index, and total citations of Scopus and RG. The data was collected during March 2018. The result of the study can vary according to the documents uploaded by the scientists in RG.

Data analysis and results

The altmetrics and scientometric indicators of faculty members of Naval Architecture working in six institutions in India were identified. The study found 64 faculty members across these institutions with 42(65.6%) of them having accounts in RG and 41(64%) researcher's publications being indexed in the Scopus database.

Publication output

The availability of publications in RG and Scopus come in different ways. In RG a researcher himself adds his publications whereas Scopus database adds the publications as part of its indexing policy. The study found that literature on Naval Architecture by Indian scientists is unevenly distributed across RG and Scopus platforms. The RG displays more documents compared to Scopus. There are 2038 documents available RG while in the Scopus only 1466 documents found (Fig.1). This data demonstrates the scientists are considering RG as an alternative platform to publish and communicate with their peers.

Publication Range

Only one researcher has more than 200 publications in RG; however none of them have 200 publications in Scopus. Four researchers (9.5%) have not uploaded any publications in their RG profile, and Scopus has not indexed any type of publications of 23 (35.94%) researchers. In RG majority (59.2%) of the researchers have publications in the range of 1-50. Scopus data also shows majority scientists (46.88%) have documents in the range of 1-50. Figure 2 shows the range of publications in RG and Scopus.
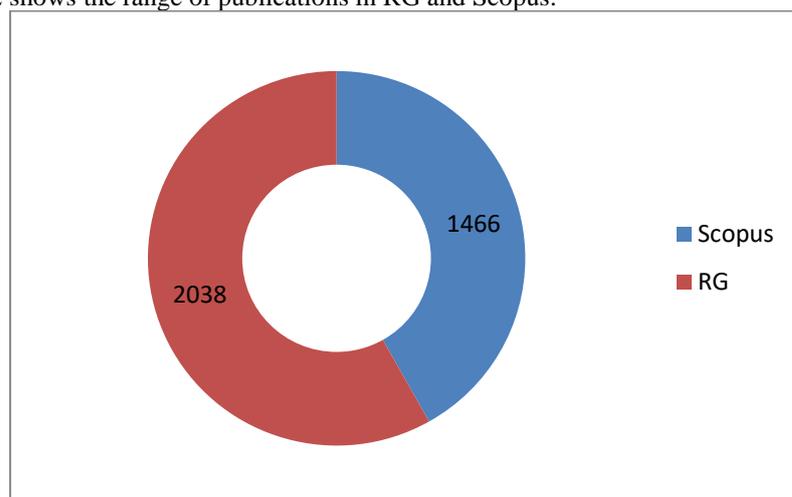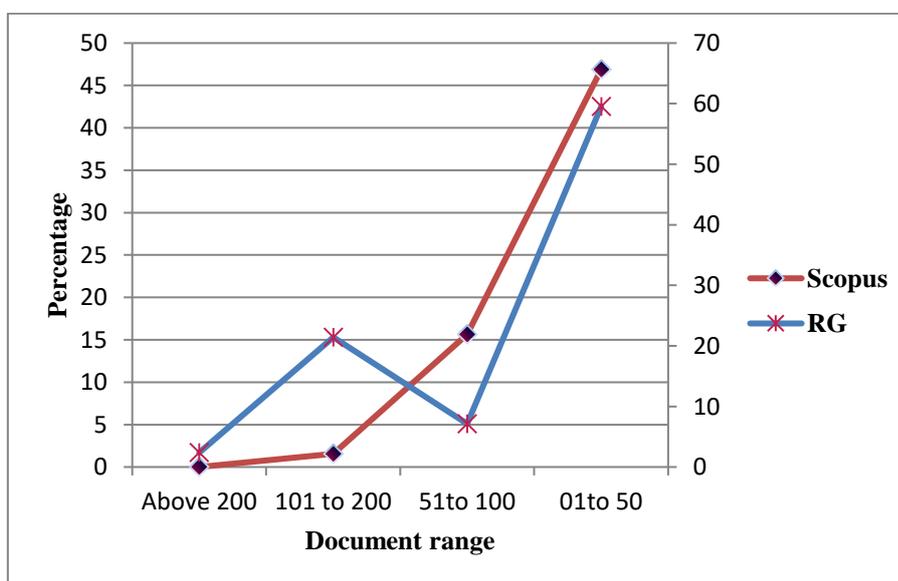

Figure 1 Document Status in RG and Scopus

Figure 2 Publication Range in RG and Scopus

Type of publications

The publication in RG added by the researchers include, journal articles, conference papers, data, book chapters, and books. The study found that 67% of the total publications comprise journal papers and 25% consists of conference proceedings. Around 88% scientists'uploaded journal articles to RG profile with varying quantities. Two researcher's added more than 100 articles, and one researcher uploaded two books. Book chapters

(48)and34 data sets are also available in RG platform in Naval Architecture field. Altogether 298 full text documents were uploaded by Naval Architecture researchers. RG platform allows arising questions and16 questions were asked by the scientists and they have given 10answers to their peer's questions.

Number of Citations

Citation counts are used to measure the impact of articles, journals, and researchers and are frequently incorporated in decisions of academic advancement (Kulkarni, *et al* 2009). RG extract citations from papers uploaded to the service (Ortega, 2016). Scopus extracts citation data from all scholarly journals indexed by it. Scientists received 9555 citations in RG for their 2038 documents. The study also found that 6 (14.28%) researchers did not receive any citations in RG. In Scopus, they received 8058 citations for their 1466 documents. The study also shows 11.9% researchers did not receive any citations in Scopus. The average number of citations per paper received from Scopus is higher than that of RG. This confirms that even though, academic, social networking sites influence researchers to upload their works for more visibility, the citations received from these sites are lower than those of from paid indexing databases. Majority of the ranking agencies collect data on research productivity and citations from paid indexing databases.

The distribution of the range of citations received for scientists in Naval Architecture in RG and Scopus is illustrated in Figure 3. In RG majority (23.81%) have received citations in a range of 1-50. Only 8(19%) members have received more than 500 citations. Same as RG, in Scopus also majority scientists (35.71%) have received citations in a range of 1-50.
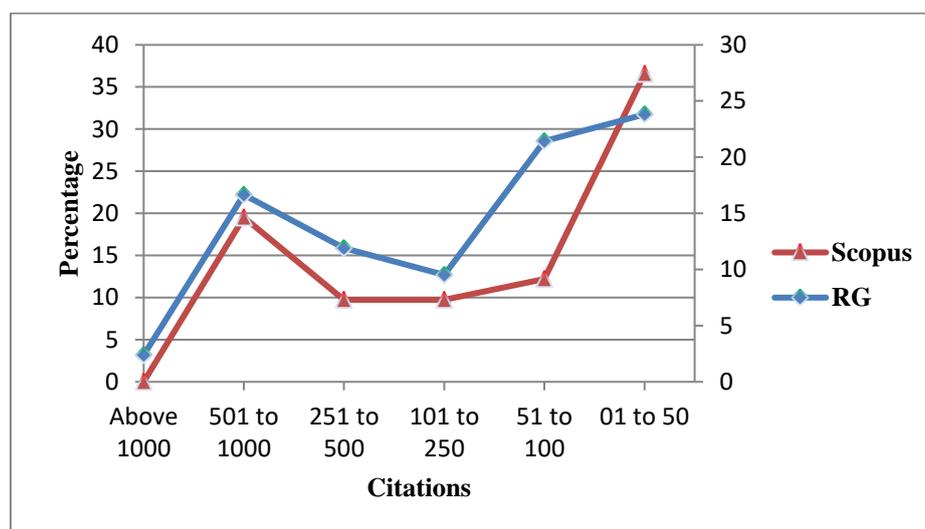

Figure 3.Number of Citations Received in RG and Scopus

H-index

The h-index is the highest number of papers a scientist has that have each received at least that number of citations(Ball, 2005). RG calculated *h*-index based on two bits of information: the total number of papers published (Np) and the number of citations (Nc) for each paper. It is defined by how many *h* of a researcher's publications (Np) have at least *h* citations each (Research Gate, 2018). Majority of researchers in RG and Scopus received (RG-38.09; Scopus-29.69%) H-index in a range 1-5, followed by 5-10 range (RG-29.42%; Scopus-15.63%). Six researchers had no H-index in RG and 2 in Scopus. Figure4illustrates the range of H-index received by naval architecture scientists in India in RG and Scopus.

The study found that in RG highest range of H-index(15-20) is received by 7.14 percent researchers. The majority (38.09%) obtained 1to 5 range followed by 5 to 10 and 10 to 15 range of H-index. The analysis found that 14.2 percent researchers do not have H-index in RG. Compared to RG only 3.3 percent of researchers had nil H-index in Scopus. Similar to RG, the majority (29.69%) have obtained H-index in a range of 1to 5 followed by 5 to 10 (15.63%).
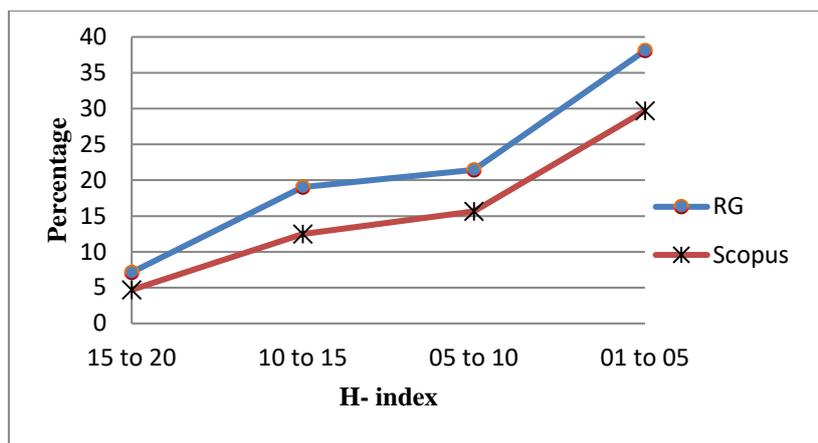
Figure 4H-index in RG and Scopus

Reads

Reads is a simple metric designed to show the researcher how often research is being accessed on RG, in real time. This indicator offers how many reads your research items are getting, which are getting the most reads, and which institutions and countries your reads are coming from. The analysis shows the majority (3571%) of the scientists gained reads in the range of 1001-5000 reads followed by 101-1000 reads by 11 (26%) researchers and 5001-10000 reads by 8 (19%) scientists. Figure 5 depicts the number of reads obtained by naval architecture scientists.
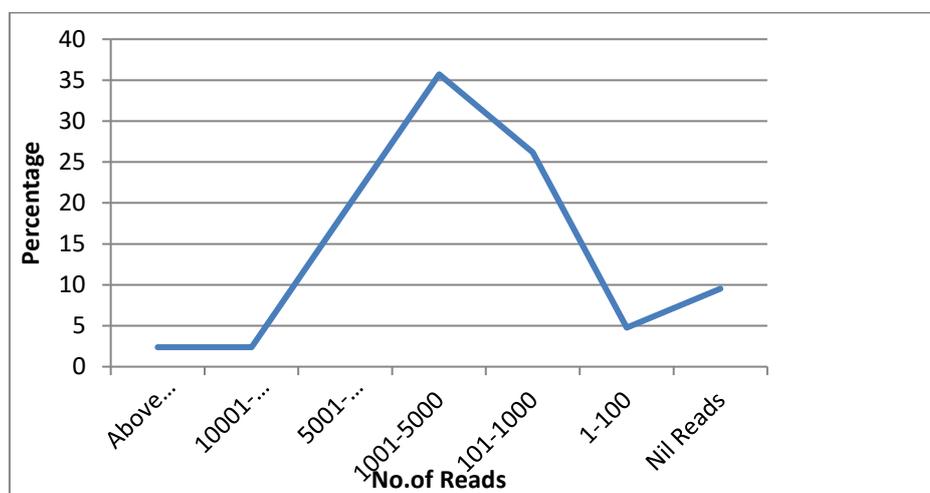

Figure 5No. of Reads in RG

RG Score

RG score is a metric that measures scientific reputation based on how an author's research is received by his/her peers. The exact method to calculate this metric has not been made public, but it takes into account how many times the contributions (papers, data, etc.) an author uploads to RGare visited and downloaded, and also by whom (reputation)(Martín-Martín, 2016). The study found that the highest RG score range 30-35 obtained by 7 (16.66%) researchers. The majority (23.8%) obtained RG score in a range of 10-15. There are 6 (14.28%) researchers who have no RG Score.

Table 1Status of RG Score

RG Score	Frequency	Percent
30-35	7	16.66
25-30	2	4.76
20-25	6	14.28
15-20	3	7.14
10 - 15	10	23.80
5 - 10	4	9.52
1 - 5	4	9.52
0	6	14.28

Followers and Following

Followers in RG mean a number of researchers who follow an author. Followers will receive notifications when the author uploads new materials toRG. A number of followers indicates the popularity of a researcher, and it is a method of keeping up-to-date with a specific area of interest. Following a researcher in RG means we can view the updates about their publications and other contributions on RG. When a researcher joins RG from a colleague's invitation, he will automatically be following each other similarly; if you were browsing another researcher's profile when you signed up, you would automatically be following them as well. Figure 6 shows the distribution of followers and following researchers of Indian Naval architecture scientists. Half of the researchers had less than 50 followers, and one researcher had no follower; whereas 3 (7%) researchers had more than 300 followers. The analysis of "Following" metric shows that majority (76%) are following less than 50 of their peers. Only 2(4.76%) following more than 300 researchers around the world. Another two researchers (4.76%) didn't follow any of their peers.
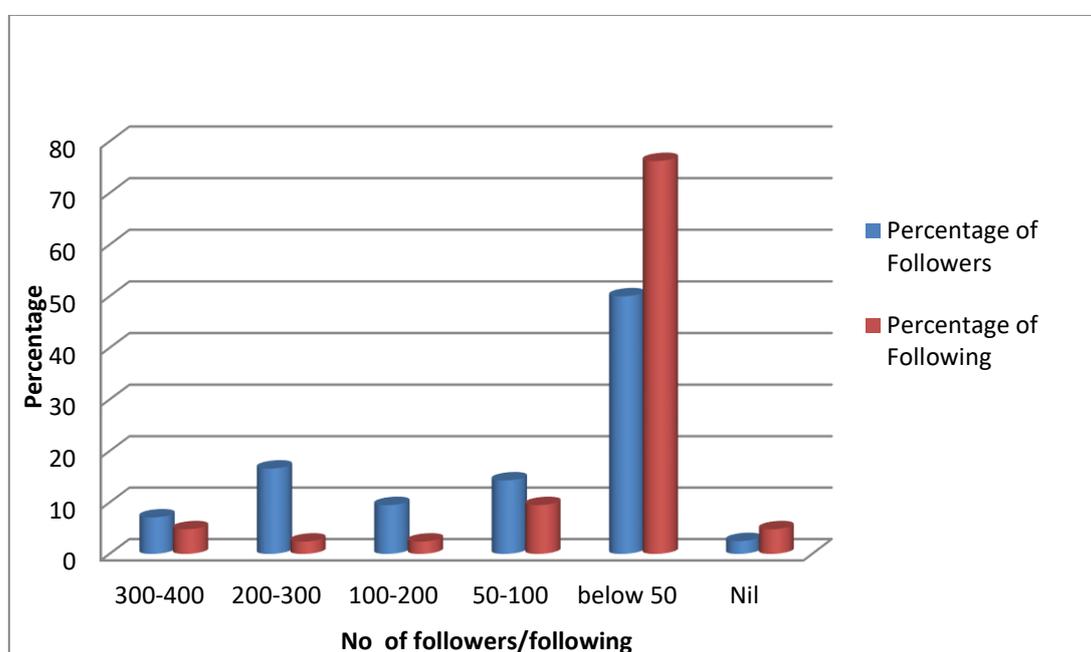

Figure 6 Numbers of Followers and Following in RG

Number of publications in RG Vs. Scopus

To find if there is any association between the number of publications in RG and Scopus, correlation tests were applied. The correlation coefficient for a data set is denoted by 'r.'In this study, Pearson correlation coefficient was calculated to find the relation between the two data sets. The correlation 'r' is always between +1 and –1. A

correlation value close to +1 indicates a strong linear relationship.(Rumsey, 2015)In this case correlation co-efficient of 0.8797 showed that there is a positive correlation between the range of publications uploaded in RG and indexed by Scopus.

Number of Citations RG Vs. Scopus

The study conducted a correlation test to identify if there is any relation between the range of citations received in Scopus and RG. Pearson correlation coefficient is used to calculate the relationship between the variables. A significant value 0.8294 with linear correlation proved that there is a strong association between the ranges of citations received in both platforms. (Fig.7)
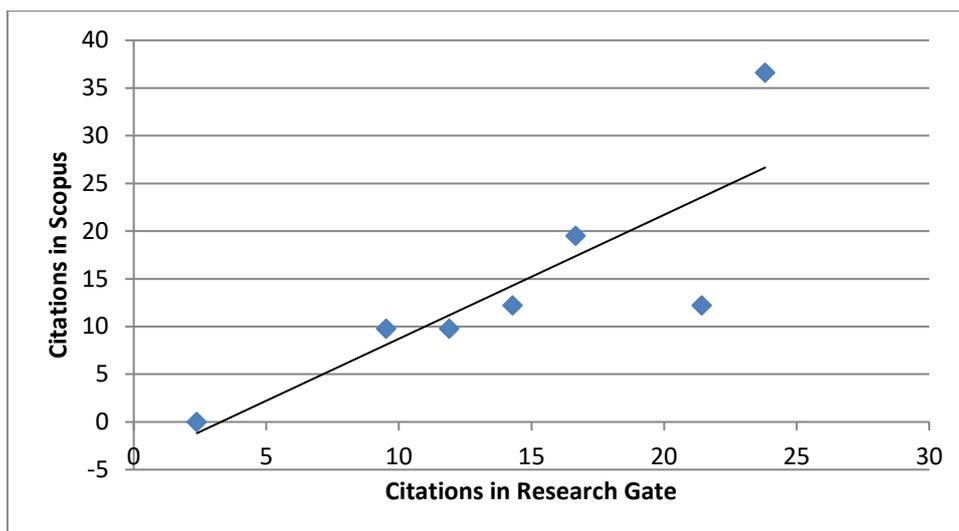

Figure7ScatterPlot of Citations in RG and Scopus

H-index in RGVs. Scopus

Similarly, the correlation between the range of H-index received in RG and Scopus was also calculated (Fig.8) A linear correlation with high correlation coefficient 0.961 showed that there is a significant relation between the range of H-index obtained in RG and Scopus.
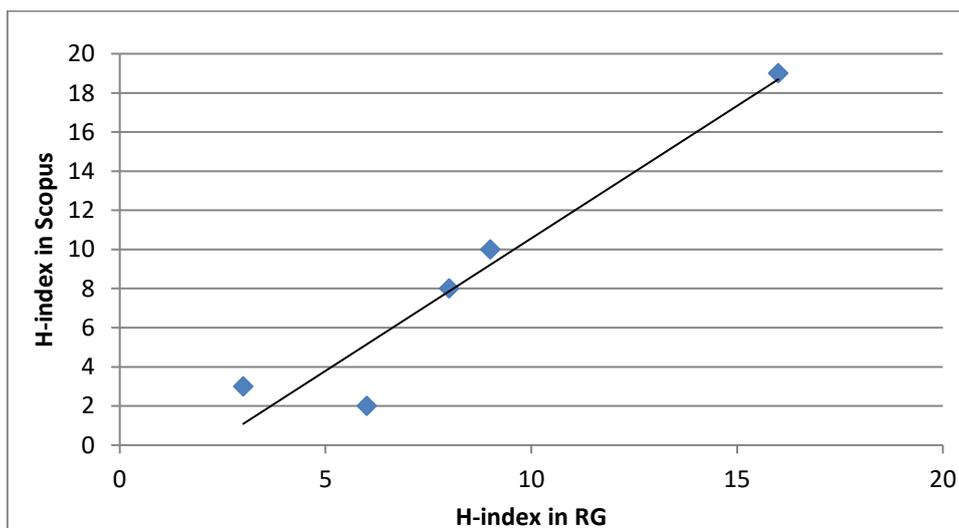

Figure 8Scatter Plot of H-index in RG and Scopus

Conclusion

This study has carried out an altmetric analysis of RG members of 42 Indian Naval architecture scientists working in six educational institutions in India. The study revealed that NavalArchitecture scientists were active in RG network and 90 percent of them uploaded publications in their profile. The publications uploaded by the scientists in RG are higher than publications indexed by Scopus. This proves the researchers and scientists preferred RG as an open publication channel to communicate with their peers. This result testifies the observations of Ortega (2016) that RG act as a personal repository where each researcher can promote and share their scientific results with another researcher. Journal articles and conference papers are the most common type of publications uploaded by the researchers. Even though they added more than two thousand publications the availability of full-text documents were relatively low. It may be due to copyright issues. Majority of them had obtained 1001-5000 reads for their publications. Naval architecture researchers had quite a few followers,and they were following a low number of their peers around the world. It may be due to the less number of researchers working in this field. Around 70 percent of them received the RG Score in between 10 to 35. The study also shows the scientists received a similar range of citations and H-index in both platforms. The Pearson correlation confirmed that RG altmetric indicators – publications, citations, and H-index are strongly correlated with respective scientometric indicators of Scopus. Shrivastava & Mahajan (2015) found similar results that RG metrics showed a strong positive correlation with the Scopus metrics, except for RGScore (RG) and Citations (Scopus), which showed only a moderate correlation.

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