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Research Article

An Analogy in Scientometric Journal Factors of Importance of Remote Sensing Journals

Shakil Ahmad[1,*], Hisham I. M. Abdel-Magid[2], Isam Mohammed Abdel-Magid[3], Enayat Bano[4], Abu Waris[5]

[1]New Central Library, Imam Abdulrehman Bin Faisal University, Dammam, KINGDOM OF SAUDI ARABIA.
[2]Department of Environmental Engineering, College of Engineering, Imam Abdulrahman Bin Faisal University, Dammam, KINGDOM OF SAUDI ARABIA.
[3]Water Resources and Environmental Engineering at Environmental Engineering, Department of College of Engineering, Imam Abdulrahman Bin Faisal University, Dammam, KINGDOM OF SAUDI ARABIA.
[4]Department of Geography, Aligarh Muslim University, Aligarh, Uttar Pradesh, INDIA.
[5]Imam Abdulrahman Bin Faisal University Library, Dammam, KINGDOM OF SAUDI ARABIA.

ABSTRACT
This paper aims at presenting the reputation and practice of SCImago Journal Rank (SJR), Eigen Factor Score (ES) and Cite Score (CS) indicators in comparison with Journal Impact Factor. These scientometric instruments were summarized as an unconventional to the Journal Impact Factor (JIF) for quality judgment in the field of remote sensing. Governing factors were investigated across alternatives that included academia, researchers and scientist's apprehensions of procedures of scientific journal ranking, publication language, assessment, analysis time and self-citation impact. The SJR, ES, CS index and JIF scores and ranking order of selected remote sensing journals were downloaded from their appropriate websites and domains. Pearson's and Spearman's correlation coefficients were measured to evaluate the correlation between these journal quality metrics. Selected coefficients were incorporated for rating relationships of elected variables and ranking methods. A beneficial correlation was noticed among the scores and ranking pattern based on SJR, ES, CS and JIF of the chosen remote sensing journals. Accordingly, specialist's, scholar's and a researcher's in remote sensing may benefit from SJR, ES and CS indicators as substitutes to JIF for assessment of scientific journals in the concerned discipline.

Keywords: Journal Ranking, Bibliometrics Indicators, Impact Factor, SCImago Indicator, Eigenfactor Score, Cite Score, Remote Sensing Journals.

Correspondence
Shakil Ahmad
New Central Library, Imam Abdulrehman Bin Faisal University, Dammam, KINGDOM OF SAUDI ARABIA.
E-mail: shahmad@iau.edu.sa

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INTRODUCTION

Nowadays, scientometric assessments of journals are widely accepted topics among researchers and academician throughout the world. Ranked journal lists are to allow the reduction of uncertainty in the process of choosing publication targets and assessing research output.[1] The mainstream scientific journals that ought to meet quality criteria are measured through scientometric tools.[2] The Web of Science (WoS) and Scopus are the two foremost and accepted citation databases that are regularly employed to rank journals in a discipline in terms of their productivity as well as the total citations received to indicate the journal's impact or influence.[3] Generally, journal popularity status depends on the citations, while the journal reputation recursively weights them with the prestige of the citing journals.[4] Tian *et al*.[5] studies showed that focusing on the changes in the quantities of citations or publications alone may not be adequate to provide a clear indication of the developing trends or future orientation of a research field. Stojanovski *et al*.[6] Stressed the visibility and availability of scientific publications as basic prerequisites for future reading, citation and influence, yet to be improved by providing open access and availability through popular online databases. Glanzel and Moed[7] denoted that scientific journals may differ concerning the importance of their position in the journal communication system and their status or prestige.

Cite Score metrics from Scopus[1] are comprehensive, transparent, current and free metrics for serial titles in Scopus. Cite Score™ metrics are a new standard to measure serial citation impact and help to analyze the impact of all serial titles – including journals – in Scopus. Cite Score gives the annual calculation for previous complete years. Campanario[8] indicated that a journal's position as a leader in its field does not necessarily say anything about types of articles (e.g., original research versus review articles) that the journal publishes. Mingers and Yang[9] showed that even though the indicators

1 https://journalmetrics.scopus.com/

appear highly correlated in fact, they lead to large differences in journal rankings. Bollen *et al*.[10] suggested introducing the possibility of devising impact metrics based on usage information in general.

The use of Cite Score metric for objective evaluation of remote sensing journals and its impact is lacking within literature reviewed. Such work would initiate a vital scope of further improvement within any cross-reference studies that are to be cited and explored.[11]

The main objectives of this research work are to compare quality metrics and factors, to study the reputation of remote sensing journals, to identify the Web of science and Scopus journals, to identify the preferred journals were carried out research work is to be published and to evaluate the ranking of journals. The attempt has been made to identify database coverage of remote sensing journals in Scopus, Web of Science and Cite Score to determine correlation strength of Bibliometric factors and its subsequent weight in manipulating the status of remote sensing journals as per JIF, ES, SJR and CS indicators.

Literature Review

Journal analysis denotes evaluation, assessment, ranking and scoring of a journal, nonetheless, ranking system should not become an obstacle.[12] It is well established that any journal ranking depends on different indices such as journal scientific impact: (IF), Eigenfactor Score (ES) and SCImago Journal Rank indicator (SJR).[13] Different studies dealt with each item individually in preference to others is an attempt to quantify quality and assess the ranking of a journal. For instance, Cantin *et al*.[2] When studied anatomy and morphology journals they found that the lowest IF was 0.318 and the highest reached 17; the lowest Eigenfactor score reached 0.00044 and the highest 0.01843 and in case of SJR, lowest was 0.228 and highest 1.795. The entire evaluated journals were reputed and of high standard quality and indexed in Web of Science and Scopus. Ramin and Shirazi[14] selected nuclear medicine journals for comparison of various indices. In their paper, seven nuclear medicine journals are indexed in Scopus while thirteen are indexed in Web of Science journals. From their findings, it was concluded that the three indices would be a better parameter to evaluate the ranking of the journal and eliminate the shortcomings existed.

In this field, the Journal of Nuclear Medicine got the highest impact factor 7.022 in the year 2010, while ANZ Nuclear Medicine had the lowest impact factor 0.34. As it is well known that impact factors of a journal depend on the number of citations during the two previous years. A study was conducted on Paediatric Neurology Journals by Kianifar *et al.* in 2014[15] and compared the journal quality by taking various indices such as Journal impact factor, Article Influence Score, Eigenfactor Metrics and SCImago journal rank. During that year, fourteen Paediatric Neurology Journals were found, in which three were Scopus indexed while other journals were ISI indexed. Due to shortcomings (such as self-citation, review articles, a total number of articles, etc.) of the impact factor of journals, researchers and editors of the journal should know about the other new journal quality metrics. Journal of Neurodevelopmental Disorders got highest impact factor during 2011 while Iranian Journal of Child Neurology had the lowest impact factor 0.102.[15] Similar studies have been conducted by many researchers around the world and discussed the importance of these metrics.[16,17] Journal impact factor is one of the major and widely accepted key parameter to reflect upon the scientific importance of the journals. JIF is calculated annually by the Institute for Scientific Information.[18] In any given year it is defined as the ratio of the number of articles cited all citable documents published in the two previous years to all citable documents in the same period of time (JIF) achieved widespread acceptance in the scientific world. Garfield[19] pointed out that all citation studies should be normalized to consider variables such as field, or discipline, citation practices, citation density and half-life. Nevertheless, certain reservations prevail such as deficiency of citations quality assessment, the impact of self-citation, English language favoritism and effect of self-citation, review articles, the total number of articles, etc.[14,15,20] Eigenfactor score (ES) journal scientific impact index uses an algorithm like Google's Page Rank. For calculating ES, an iterative method is used and journals are influential if they are cited more often by other prominent journals.[21] SCImago Journal Rank Indicator (SJR) is a quality indicator that employs Scopus indexed journals for quality valuation while considering citations in SCOPUS database for three years.[22] SJR weaknesses involve: workable definition, data ill coherence, journals coverage continuity, reasonable purposes, citation networks comparability concerns, ranking journals arrangements, data backups and stability, quartile construction methods, indicator capacity, fixing procedures, degree of transparency, results reproducibility, errors in Scopus assignment of documents to countries and omission of significant information.[23]

Yuen, J.[11] studied the correlations among six of commonly used bibliometric indices (Impact Factor, SCImago Journal indicator, SCOPUS h-index, Google h-index, Eigenfactor, Article Influence Score) in neurosurgical and spinal surgical journals. This study showed high positive correlations among the bibliometric indices ($P < 0.05$ in all pairs), with median values of 1.54, 0.66, 53, 25, 0.0035 and 0.46, respectively.

Roldan-Valadez[24] concluded within their study on current bibliometric that an integrative use of the metrics might represent the fairest and most legitimate approach to assess the in-

fluence, growth and publishing trends of acceptable research issues in their respective disciplines.

Villaseñor-Almaraz[25] evaluated the associations between bibliometrics in the Radiology, Nuclear Medicine and Medical Imaging category of the Web of Knowledge. They addressed indices of impact factor (IF): SCImago Journal Rank (SJR), Source Normalized Impact per Paper (SNIP), Eigenfactor Score (ES) and Cite Score™ (Cite Score). They concluded that the IF does not show the best correlation between other metrics.

Such a diversity in concepts and findings lead towards conducting this research work with the objective of filling missing gap and comparing quality metrics of remote sensing journals.

MATERIALS AND METHODS

In this study, remote sensing journals were selected and used for the evaluation of their rankings, which depend on the various chosen matrices. All the relevant information was collected from their source databases as derived from the journal ranking section of SCImago journal and country ranking website[2] and Web of Science[3] (WoS) Core Collection official website and citations. Influence of all the shortcomings such as self-citation, original and review article, citable documents was assessed from the various sources. ISI indexed journals were employed for the reckoning of potential impact factor. The 2016 JIFs and ESs were obtained from Journal Citation Report® (JCR) through WoS. The 2016 SJR indicator is utilized as offered by the SCImago Journal and country rank provided by Scopus and Cite Score (CS) indicators under the category of "Remote Sensing." Journals with JIFs and ESs were arranged and ranked in accord with the SJR indicator list and matched with their International Standard Serial Number (ISSN). Likewise, journals with the SJR indicators also were listed and their ranking was detected in the inventory of journal JIFs.

Each journal is ranked per each metric, presented and matched statistically. The correlations between the impact factor and other journal citation parameters were evaluated using both Pearson's and Spearsman's statistical correlation coefficients. All analyses were conducted using the Statistical Package for the Social Sciences (SPSS) 21.0, version 2012.

RESULTS AND DISCUSSION

Ranking and quality of the journals according to all four indices (IF, ES, SJR and CS) were harmonized and compared. Correlations between indices were evaluated using Pearson and Spearman correlation. In the present study, twenty-nine journals were selected and renowned with remote sensing as the definite survey domain and specialty. All chosen remote sensing journals were indexed in ISI and Scopus together with rankings according to SCImago, JIF, ES and CS in 2016.

Detailed information for each journal is illustrated in Table 1. This is together with comparative rankings of remote sensing journals by 2016 JIF, ES, SJR and CS Index. Table 1 shows the ISI and Scopus indexed information in the twenty-nine selected remote sensing journals. Table 1 displays that none of the selected remote sensing journals had the same ranking to match various indicators in all four taxonomies and metric indices within the analysis framework. All inspected journals have the leading standard of quality since they are indexed in such databases (WoS and Scopus) of high prestige and trustworthiness.

The twenty-nine selected journals were categorized with Remote sensing field. All journals were indexed in the ISI web of science and Scopus databases. In the form of JIF, the most cited top three journals were ISPRS Journal of Photogrammetry and Remote Sensing (JIF 6.387), Remote Sensing of Environment (JIF 6.265) and IEEE Transactions on Geoscience and Remote Sensing (JIF 4.942). On the other hand, the lowest citations were observed for Journal of Spatial Science (JIF 0.735) and Journal of The Indian Society of Remote Sensing (JIF 0.725). This result contradicts with the[26] finding that International Journal of Remote Sensing was the top active journal.

According to Eigenfactor Score, the journals that ranked top three ones were Remote Sensing of Environment (ES 0.04684), IEEE Transactions on Geoscience and Remote Sensing (ES 0.04295) and Remote Sensing (ES0.02273) while Journal of Spatial Science scored the lowest value (ES 0.00036).

Another factor studied in this work was the SJR indicator. According to this, top three ranking journals were Remote Sensing of Environment (SJR 6.92), ISPRS Journal of Photogrammetry and Remote Sensing (SJR 6.46) and IEEE Transactions on Geoscience and Remote Sensing (SJR 5.45) while Journal of Spatial Science satisfied its rank as the lowest one (SJR 0.79).

In another metrics, top three ranking journals for Cite Score index labelled Remote Sensing of Environment to lead with a CS of 3.073, yet to be trailed by ISPRS Journal of Photogrammetry and Remote Sensing with a CS of 2.815 and IEEE Transactions on Geoscience and Remote Sensing with a CS of 2.461. Journal of Spatial Science tailed the list of assessed journals registering a CS index of 0.295.

Table 2 demonstrates a bivariate correlation between the four indicators (JIF, ES, SJR and CS) for ranking of Remote sensing journals. As presented in Table 2, there is a high Pearson's (r) statistical correlation between JIF and CS indicators

2 At http://www.scimagojr.com/
3 At http://www.accesowok.fecyt.es/

Table 1: Comparative rankings of remote sensing journals by 2016 JIF, ES, SJ and Cite Score.

	Journal Impact Factor		Eigenfactor score		SCImago Journal Rank		Cite Score	
Full Journal Title	Value	Rank	Value	Rank	Value	Rank	Value	Rank
ISPRS Journal of Photogrammetry and Remote Sensing	6.387	1	0.0135	7	6.46	2	2.815	2
Remote Sensing of Environment	6.265	2	0.04684	1	6.92	1	3.073	1
IEEE Transactions on Geoscience and Remote Sensing	4.942	3	0.04295	2	5.45	3	2.461	3
GPS Solutions	4.061	4	0.00438	11	3.94	5	2.166	4
International Journal of Applied Earth Observation and Geo-information	3.93	5	0.01063	8	4.14	4	1.473	6
Photogrammetric Record	3.256	6	0.00073	26	2.15	13	1.043	12
Remote Sensing	3.244	7	0.02273	3	3.56	6	1.31	9
GIScience and Remote Sensing	3.049	8	0.00133	19	2.76	10	1.246	10
Journal of Geodesy	2.949	9	0.00701	9	3.44	7	1.906	5
IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing	2.913	10	0.01703	5	3.44	7	1.427	8
IEEE Geoscience and Remote Sensing Letters	2.761	11	0.01984	4	3.13	9	1.434	7
IEEE Geoscience and Remote Sensing Magazine	2.676	12	0.00078	24	2.52	11	1.19	11
Photogrammetric Engineering and Remote Sensing	2.493	13	0.00351	12	1.74	17	0.969	14
International Journal of Digital Earth	2.292	14	0.00218	15	2.46	12	0.927	15
Canadian Journal of Remote Sensing	1.838	15	0.00158	16	1.67	18	0.712	18
International Journal of Remote Sensing	1.724	16	0.01484	6	2	15	0.797	16
Geocarto International	1.646	17	0.00137	18	1.26	23	0.474	25
Navigation-Journal of The Institute of Navigation	1.604	18	0.00088	23	2.14	14	0.981	13
Radio Science	1.581	19	0.00498	10	1.65	19	0.545	20
European Journal of Remote Sensing	1.533	20	0.00074	25	1.6	21	0.555	19
Remote Sensing Letters	1.532	21	0.00291	14	1.76	16	0.794	17
ISPRS International Journal of Geo-Information	1.502	22	0.00125	21	1.62	20	0.455	26
Spatial Statistics	1.176	23	0.00139	17	1.15	26	0.523	22
Journal of Applied Remote Sensing	1.107	24	0.00341	13	1.26	23	0.447	27
Marine Geodesy	1	25	0.00129	20	1.35	22	0.542	21
Survey Review	0.929	26	0.00071	27	0.88	28	0.483	24
Photogrammetric Fernerkundung Geoinformation	0.852	27	0.00041	28	1.2	25	0.504	23
Journal of Spatial Science	0.735	28	0.00036	29	0.79	29	0.295	29
Journal of The Indian Society of Remote Sensing	0.725	29	0.00101	22	0.92	27	0.327	28

Table 2: Bivariate correlation between three indicators for ranking of Remote sensing journals.

Correlation statistic	Coefficient value	Sig.
Pearson's r between JIF and ES values	0.712	.000
Pearson's r between JIF and SJR values	0.961	.000
Pearson's r between JIF and CS values	0.972	.000
Spearman's rho between JIF and ES rankings	0.663	.000
Spearman's rho between JIF and SJR rankings	0.934	.000
Spearman's rho between JIF and CS rankings	0.946	.000

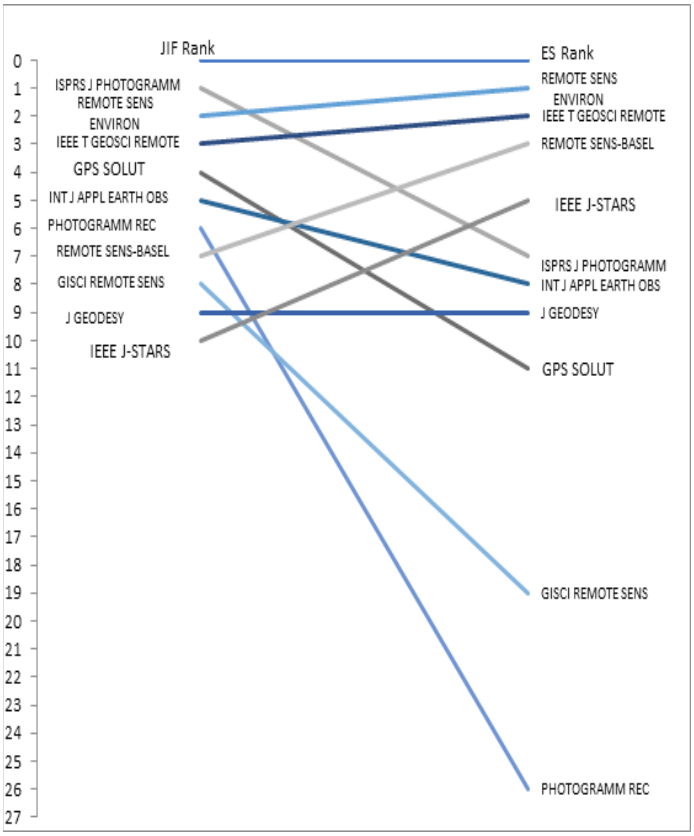

Figure 1: Bump chart for the top 10 JIF ranked remote sensing journals in comparison with ES ranking.

for journals in this category (r = 0.972) and between JIF and SJR indices (r = 0.961), while it is rather moderate between JIF and ES values (r = 0.712). Concerning Spearsman's rho statistical correlation acceptable high correlation existed between JIF and CS indicators (coefficient value =0.946), JIF and SJR (coefficient value =0.934) for journals in Remote sensing. This value is rather low between JIF and ES rankings (coefficient value = 0.663).

All the collected research statistics and information revealed that employment of the SJR index does not suggestively adjust the technique of sorting of Remote sensing journals as compared to JIF or its method of calculation. Since SCImago Journal and Country Rank is a free access one, this promotes that SJR may be deemed as an alternative to the JIF for Remote sensing journals. This finding agrees with.[27]

Figure 1 indicates a bump chart for top ten JIF ranked remote sensing journals in comparison and as compared with ES ranking.

Figure 2 demonstrates a bump chart for top ten JIF ranked remote sensing journals as interrelated to SJR ranking.

Figure 3 displays a bump chart for top ten JIF ranked remote sensing journals in comparison with CS ranking.

Figures 1-3 elucidate the changing array of the ranking of nominated indicators for the designated remote sensing journals.

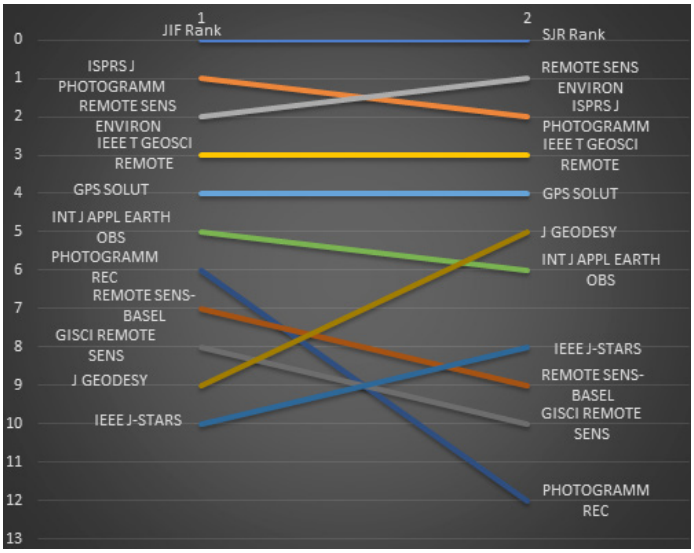

Figure 2: Bump chart for the top 10 JIF ranked remote sensing journals in comparison with SJR ranking.

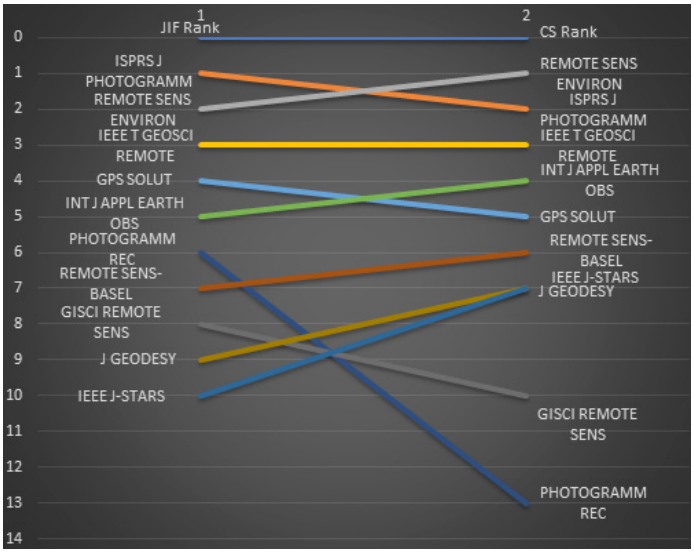

Figure 3: Bump chart for the top 10 JIF ranked Remote sensing journals in comparison with CS ranking.

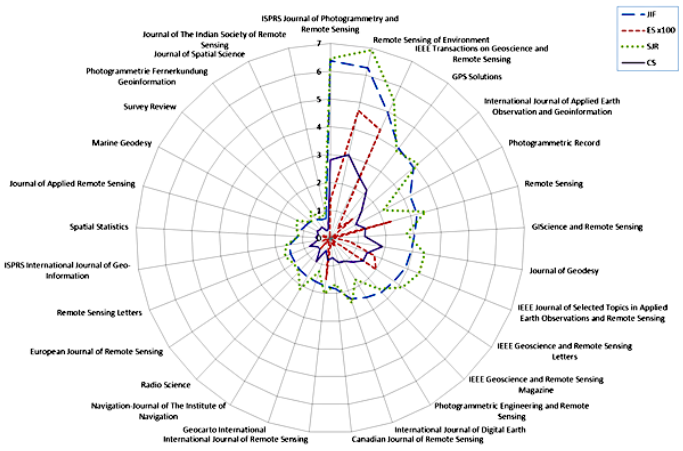

Figure 4: A spider chart for the variability of the four indices of subject journals.

Figure 4 illustrates a spider chart for the variability of the four indices of subject journals. The values of ES were amplified by multiplication of 100 for visualization purposes only.

Figure 5 presents a scatter plots giving a correlation of ranking rates between JIF, ES, SJR and CS as well as their fit lines for twenty-nine remote sensing journals mutually used in this research work. Figures 5a and 5b show a linear correlation between the values and ranks of ES and JIF indices. Figures 5c and 5d show a stronger relationship between the values and ranks of SJR and JIF indices. Figures 5e and 5f show the same for the correlation between the values and ranks of CS and JIF. A linear correlation between various values of indices (ES versus JIF and SJR set against JIF) is revealed in the Figure. Similarly, the linearity of relationship is apparent between both ranks of ES versus JIF and of SJR against JIF.

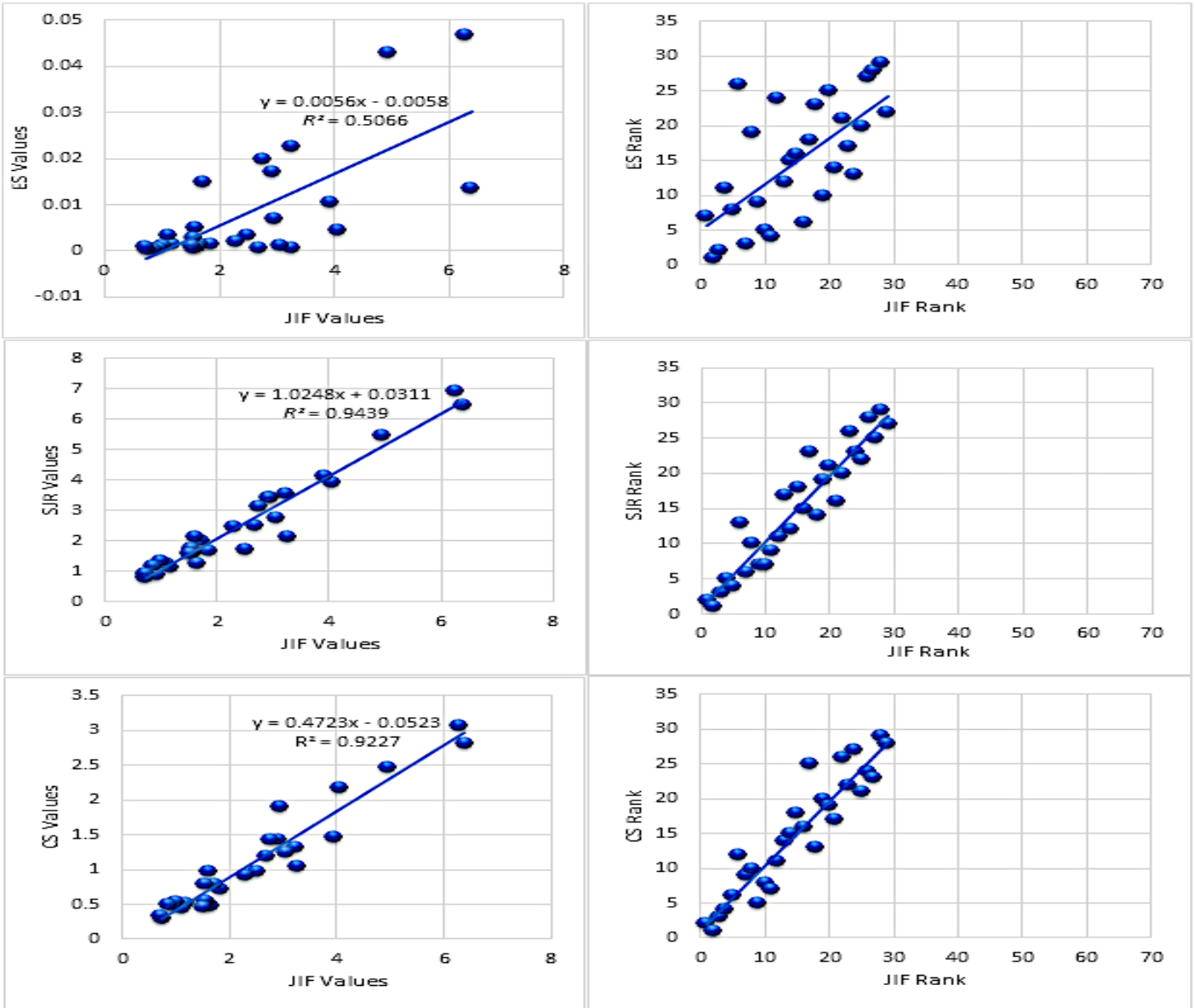

Figure 5: Scatter plots showing a correlation between JIF, ES, SJR and Cite Score (values and rankings) as well as their fit lines for twenty-nine remote sensing journals.

CONCLUSION

This research study evaluated four bibliometric research Journal quality indices (JIF, SJR, ES and CS) for remote sensing journals. Work conducted showed that the Journal Impact Factor (JIF) is the main index used by researchers and academicians for ranking remote sensing journals, chronicles and periodicals. While several limitations materialized in only using JIF indicator. SJR, ES and CS indicators could be more precise quality indices for remote sensing journals.

Consequently, it would be beneficial to comment on remote sensing journals quality when using all the four indices. This would enable indicators to supplement and stabilize each other. This work disclosed that all the metrics above are greatly correlated and associated with one another (Spearman's rho > 0.8 and Pearson's r > 0.6).

JIF, ES, SJR and CS indicators of remote sensing journals would be of overriding importance for librarians, researchers, academicians, authors, writers, inventors and concerned personnel alike when distinguished rating journals for publishing their work and scientific findings. All examined remote sensing journals have the leading standard of quality as being indexed in valued and well-regarded databases such as World of Science (WoS) and Scopus. JIF varied between 6.387 and0.725; ES oscillated between 0.0135 to as low as 0.00101, JSR fluctuated over 6.9 and 0.79 and CS alternated between 3.073 and 0.295. A high Pearson's (r) statistical correlation followed between JIF and CS indicators for journals in this class (r = 0.972) and between JIF and SJR indices (r = 0.961), while it is rather reasonable between JIF and ES values (r = 0.712). Spearman's rho statistical correlation showed a high correlation between JIF and CS indicators (coefficient value = 0.946) and JIF and SJR rankings (coefficient value = 0.663). From an institutional point of view, considering Imam Abdulrahman Bin Faisal University case; the exhibited top twenty-nine journals rest within the university's incentive scheme for being a respectable publication. Inspected bibliometric may confidently be recognized to complement each other when used as supportive indicators to evaluate the impact on remote sensing journals.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

WOS: Web of Science.

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