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SCImago, Eigenfactor Score, and H5 Index Journal Rank Indicator: A Study of Journals in the area of Construction and Building Technologies

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ABSTRACT

Present work studies the role of bibliometric indicators and scientometric instruments for checking the qualities of journals published in the area of construction and building technology. Journal quality review targeted comparisons between indicators of significance and merit from reputable databases. Likewise, present work stressed on performance of well cited journals and their informational correlations as predicted by selected indicators complex algorithms. Main research objective focused on review of scientific journal quality indices that included: Journal Impact Factor (JIF), Eigenfactor Score (ES), SCImago Journal Rank indicator (SJR) and H5 index. Dependable construction and building technology journals were chosen from their category within Web of Science. JIFs and ESs are obtained from Journal Citation Report and the SJR from the SCImago Journal and country rank website. Sixty one construction and building technology journals were selected for this work and their related data records and information documents retrieved from their primary sites in relating designated quality indicators (JIF, SJR, ES and H5). Correlations between indicators were elucidated by means of Pearson's and Spearman's statistical correlations produced by SPSS software. All reclaimed journals are indexed in Web of Science and Scopus citation database.

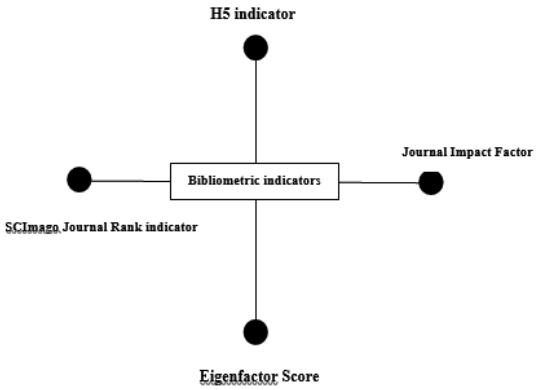
Keywords: Journal rank; Bibliometric indicators; Impact factor; SCImago indicator; Eigenfactor score; H5-Index construction; Building technology journals

1. INTRODUCTION

Now-a-days most of the authors, writers and researchers are targeting to publish their research findings and results in reputable journals or respectable academic gatherings for accredited outcomes, citation aspects and recognition of research conducted. This will enhance wider spread of findings, attraction of joint team research, tapping for potentiality of patenting and competing for awards among peer experts, professional societies and discrete authors. Ibanez[1], *et al.* and Pajic[2] depicted that bibliometric indices are used to evaluate the importance of research at different levels by funding agencies and promotion committees. Later, Miller[3] illustrated that the journal should be measured by how well it serves the scientific community, the integrity of its review and publication process, and how it adds to the base of knowledge through high-quality publications.

Quality standards of research and scientific journals usually are gauged through firm scientometric tools and instruments. Such bibliometric indicators and means have their advantages and drawbacks. Most widely used bibliometric and scientometric indicators include: Journal Impact Factor or Eugene Garfield factor (JIF), Eigenfactor Score (ES), SCImago Journal Rank indicator, and H5 indicator (see Fig. 1). Jamali *et al.*[4], Ahmad[5] and Hussain & Swain[6] suggested that the number of citations is influenced by interacting factors such as: journal history and its indexing in an accredited database, rate of international cooperation, and country of publication.

Ramin & Sarraf[7] stated that JIF is one of the most used quality indicators. This indicator is calculated annually by dividing the number of citations to articles published in the journal in the past two years, by the number of articles published in the journal in the same time frame. However, the indicator has been criticised for its English-language bias and influence



Bibliometric indicators radar chart

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of self-citation, Garfield[8] revealed that SCImago Journal Rank indicator (SJR) indicator is initiated on an algorithm analogous to Google's PageRank. Citations are based on Scopus database, over a window of three years. The indicator considers journal prestige and status, which offers weight to citations for highly ranked journals Walters[9] confessed that ES, provides weight to citations from highly ranked journals using an algorithm similar to Google's PageRank in its computation. Citations are based on the WoS database, covering a span of three years. For each journal articles, the Eigenfactor site reports influence score.

Zarifmahmoudi[10], *et al.* and Jacso[11] explained the similar opinion for Google Scholar and developed the H5 index for ranking publications. A journal with an index of H has published at least H articles, each of which has been cited H times in other articles, for the period of the last five years. The launch of Google Scholar Metrics has attracted interest in the scientific community.

Shakil, Islam & Akhtar[12] studied a similar study of bibliometric indicators that are used to appraise quality ranking for journals using algorithms that are complex and databases. The major objective of this research work is to determine quality indices of journal scientific impact with emphasis on JIF, ES, and SJR.

2. RESEARCH OBJECTIVE

In this research study quality metrics indicators of selected construction and building technology journals were studied for any links or discrepancies between their bibliometric factors as guided by their respective JIF, ES, SJR and H5 index indicators.

3. MATERIALS AND METHODS

Sixty one construction and building technology journals were tested in this research work. Applicable data and relevant information were collected from their site sources within journal ranking section of 2015 SCImago and country ranking website and Web of Science (WoS) Core Collection official website and citations, ISI and Scopus-indexed journals provided by Scopus and Google Scholar Citations (GS) metrics under the category of "Construction and building technology journals". Assembled data were used to calculate the journal indicators. The correlations between obtained indicators were evaluated using Pearson's and Pearson's' correlation coefficients using Statistical Package for the Social Sciences (SPSS) version 21.0 release 2012.

4. RESULTS AND DISCUSSION

Sixty one esteemed journals of construction and building technology were searched from the prominent ranking websites and arranged and indexed in both ISI and Scopus, covering fields of civil and infrastructure engineering, cement and concrete, air pollution, building and environment, energy and buildings, steel, materials and structures, construction automation, structural control and health monitoring, performance simulation, steel and composite structures, tunnelling, space technology, road materials and pavement design, lightening, sustainable cities and society, architectural heritage, tall and special buildings, HVAC & R research computers and buildings, wind and structures, science and technology and ventilation. Ranking of the construction and building technology journals followed all four indices (IF, ES, SJR, and H5). Correlations between indices were evaluated using SPSS Pearson and Spearman correlations.

Appendix 'A' shows detailed ISI and Scopus indexed information for the chosen construction and building technology journals. The table clearly illustrates that very few of the selected construction and building technology journals had the same ranking across the selected four indices. As such, it is difficult to relate metrics information and measure across the distinctive indicators.

As related to JIF, the most cited top three of construction and building technology journals were (JIF score in parenthesis): *Computer-Aided Civil and Infrastructure Engineering* (5.288), *Indoor Air* (4.33) and *Cement and Concrete Research* (3.48). These journals were closely followed by *Cement and Concrete Composites* (3.399). In contrast, the lowest citations were scored by *Engineering Journal-American Institute of Steel Construction* (0.033).

Top three class journals as per Eigen factor score were (ES score in parenthesis): *Construction and Building Materials* (0.0415), *Energy and Buildings* (0.02792) and *Building and Environment Journal* (0.01903). *Revista De La Construccion* scored the lowest ES score (0.0009) for the journals chosen for this study.

Ranking of top three journal as assessed by SJR (SJR score in parenthesis) are: *Cement and Concrete Research Journal* (3.826), *Cement and Concrete Composites* (3.017) and *Building and Environment* (2.121). *Engineering Journal-American Institute of Steel Construction* tailed the record of evaluated journals, with SJR scores of 0.125.

H5 Index incidentally coincided with JIF for ranking its top three journal particularly (H5 index in parenthesis): *Energy and Buildings* (70), *Building and Environment* (64) and *Building and Environment* (60). The trail of journals followed yet a closer score as is shared by *ZKG International and Science and Technology* for the *Built Environment* (5 for each).

Table 1 shows a bivariate correlation among the four indicator (JIF, ES, SJR and H5) for ranking of the selected construction and building technology journals. As shown in the table, there is a high Pearson's (r) statistical correlation

Table 1 Bivariate correlation between three indicator for ranking of journals in the area of construction and building technologies

Correlation statistic	Coefficient value	Sig.
Pearson's r between JIF and ES values	0.545	.000
Pearson's r between JIF and SJR values	0.716	.000
Pearson's r between JIF and H5 values	0.752	.000
Spearman's rho between JIF and ES rankings	0.776	.000
Spearman's rho between JIF and SJR rankings	0.848	.000
Spearman's rho between JIF and H5 rankings	0.799	.000

between JIF and H5 and SJR indicators (r = 0.752 and 0.716, respectively) and a rather low statistical correlation between JIF and H5 indicators for journals in the selected category (r = 0.545).

Spearman's rho statistical correlation revealed a high correlation among JIF and each of SJR and H5 indicators for Construction and building technology journals (coefficient values of 0.848 and 0.799, respectively), while a low correlation was recorded between JIF and ES rankings (coefficient value = 0.776).

Figure 1 represents a bump chart for the top ten (10) JIF-ranked Construction and building technology journals in comparison with their respective ES ranking. Fig. 1 clearly describes the varying array of ranking of both indicators for the selected journals.

Figure 2 depicts a bump chart for the top ten (10) JIF-ranked construction and building technology journals in comparison with their respective SJR ranking. Fig. 2 evidently describes the varying assortment of ranking of both indicators for the designated journals. Apart from *Indoor Air* and *Materials and Structures journals*, the rest kept their H5 quality ranks. *Building Research & Information Journal* scored high per H5 ranking.

Figure 3 signifies a bump chart for the top ten (10) JIF-ranked construction and building technology journals in comparison with their respective H5 ranking. Fig. 2 describes the wavering assortment of ranking of both indicators for the selected journals.

Figure 4 illustrates six-scatter plots presenting the correlation between JIF, ES, SJR and H5 (values and rankings) as well as their fit lines for the ten (10) construction and building technology journals included in this study. Fig. 4(a) and Fig. 4(b) displays a stipulated linear correlation between the values and ranks of JIF and ES indicators. Fig. 4(c) and Fig. 4(d) shows a steep relationship between the values and ranks of JIF and SJR indices. Fig. 4(e) and Fig. 4(f) exhibits the same correlation between the values and ranks of JIF and H5. A linear correlation between the different values of indices (ES versus JIF, and SJR versus JIF) is clearly shown in the figures. Similarly, linearity of relationship is apparent between ranks of ES versus JIF, SJR versus JIF and H5 versus JIF.

Assembled research statistical data and information revealed that sole use of the SJR index does not warrant quality sorting of construction and building technology journals as compared to the JIF or its technique of calculation. Since SCImago Journal and

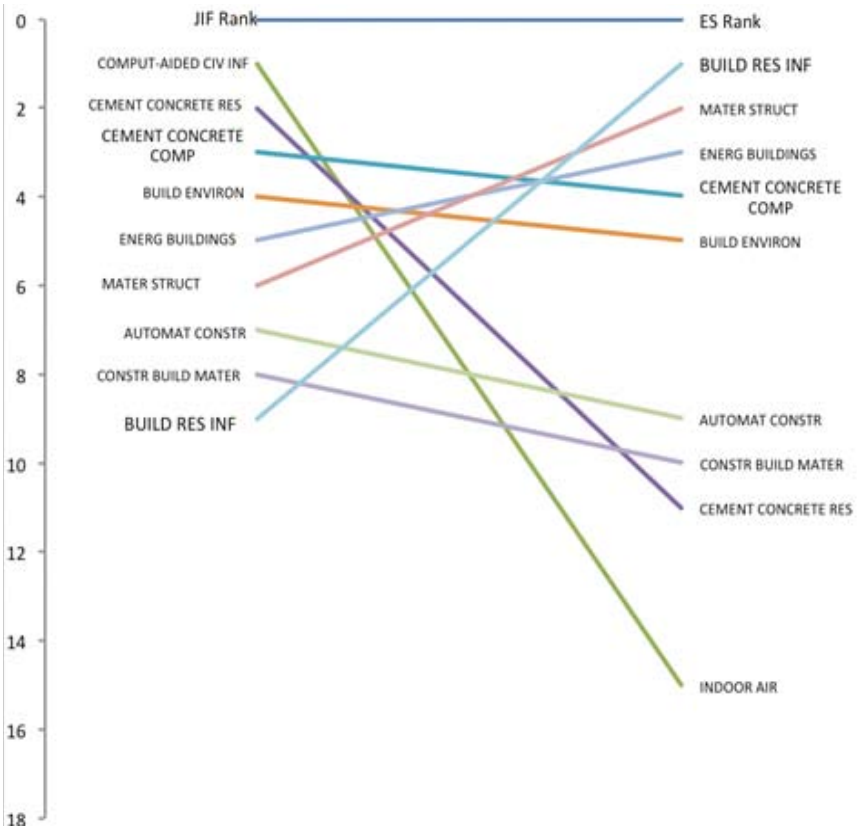


Figure 1. Bump chart for top 10 JIF ranked journals in the area of construction and building technologies in comparison with ES ranking.

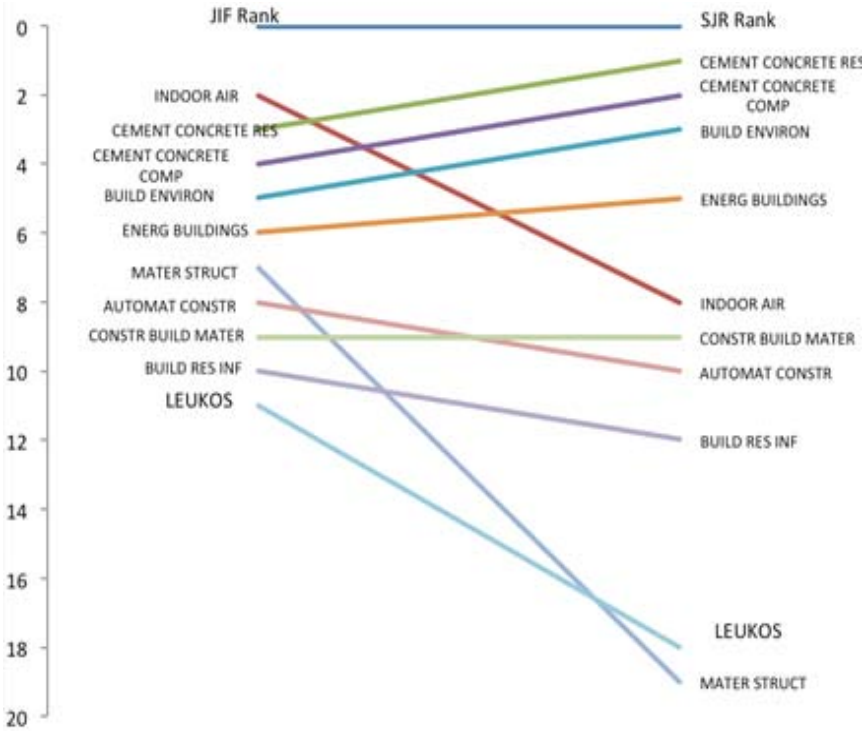


Figure 2. Bump chart for top 10 JIF ranked journals in the area of construction and building technology in comparison with SJR ranking.

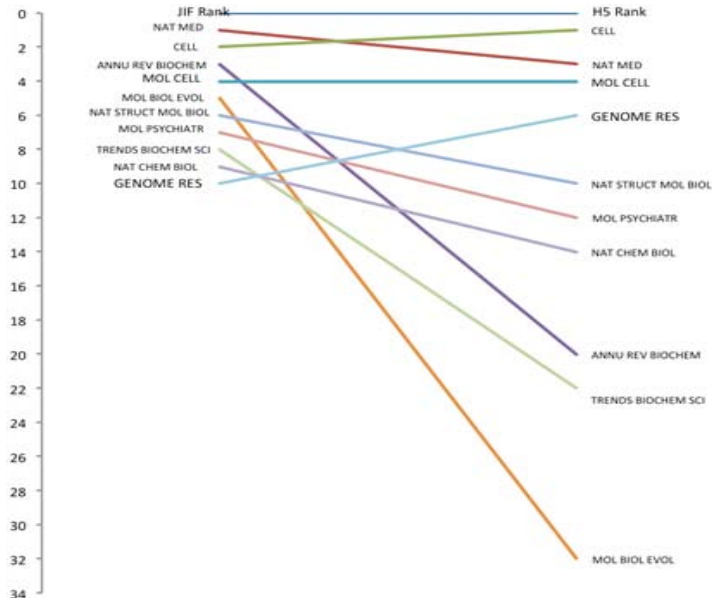


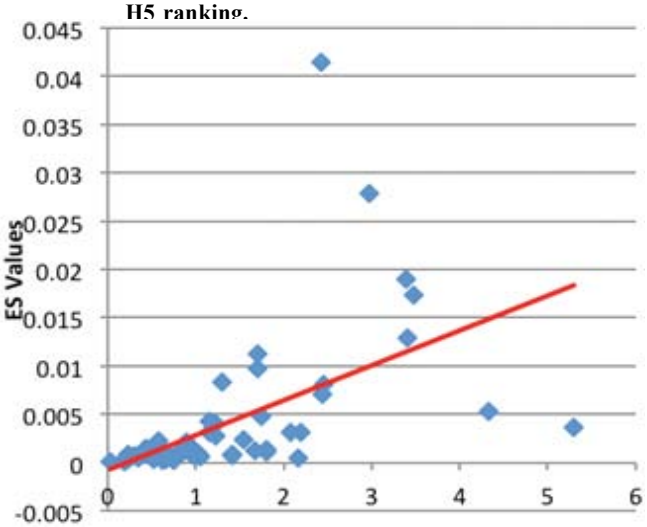
Figure 3. Bump chart for top 10 JIF ranked journals in the area of construction and building technology in comparison with H5 ranking.

Country Rank is a free access source, this shows that SJR may be used as an alternative, or in addition, to the JIF for Construction and building technology journals. Likewise, the H5 metric would be a reliable tool for quality evaluation of Construction and building technology journals.

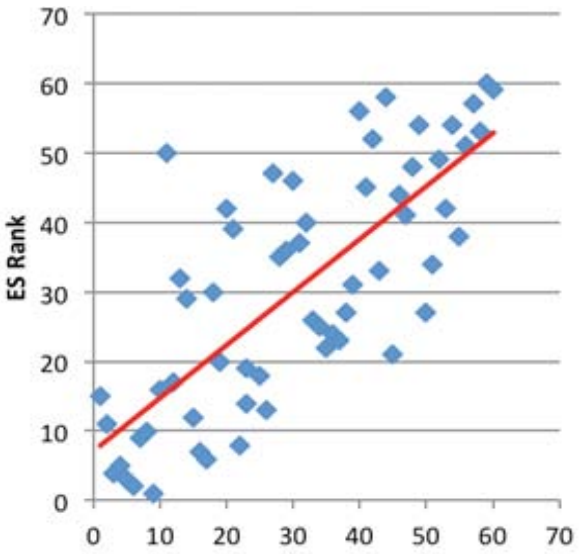
The four indicator (JIF, ES, SJR and H5) can be employed in an integrated manner to offer a more holistic and all-inclusive view of journal quality assessment. This finding is in agreement with Ahmad [5], *et al.*

5. CONCLUSIONS

In this research work four bibliometric research quality indices (JIF, SJR, ES and H5) were examined and assessed for sixty one construction and building technology journals. From the results it can be concluded that journal Impact Factor (JIF) is the chief indicator applied by investigators and academics for ranking construction and building technology journals, periodicals, bulletins and publications. JIF, SJR, ES and H5 indicators are recommended for quality assessment for construction and building technology journals. Apart from this

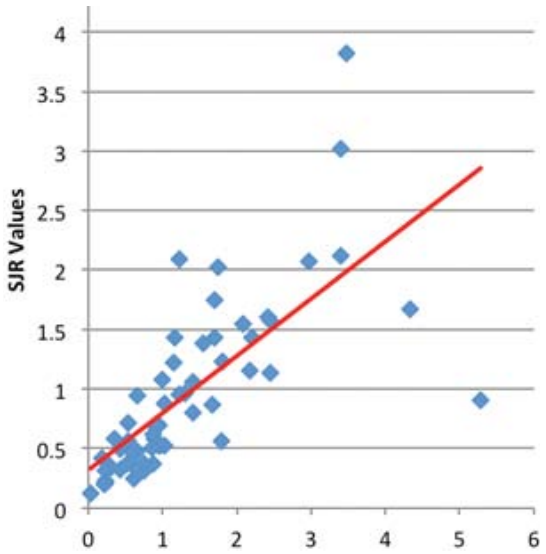


(a) JIF value

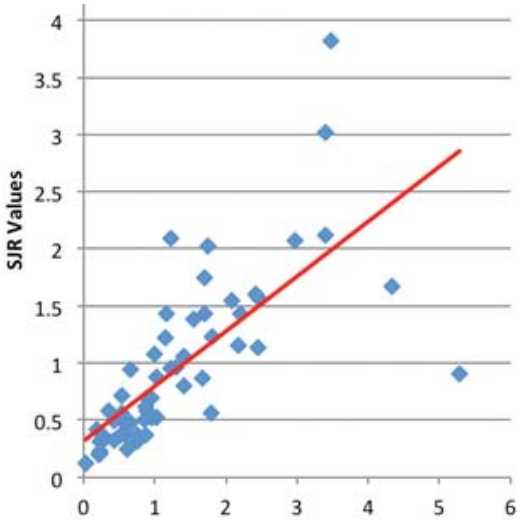


(b) JIF rank

(a) and (b) ES *vs* JIF.



(c) JIF value



(d) JIF rank

(c) and (d) SJR *vs* JIF.

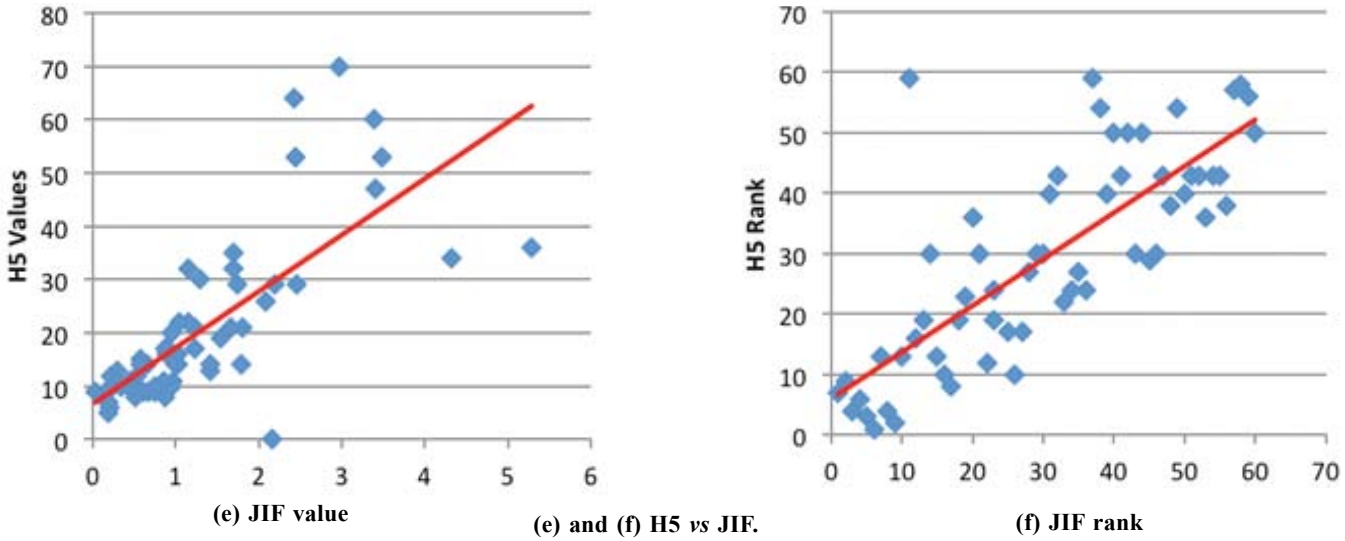


Figure 4. (a), (b), (c), (d), (e), (f): Scatter plots showing correlation between JIF, ES and SJR (values and rankings) as well as their fit lines for 289 journals in the area of construction and building technology.

bivariate correlation between the four indicator (JIF, ES, SJR and H5) for ranking of the selected construction and building technology journals show a high Pearson's (r) statistical correlation between SJR and JIF indicators (r = 0.752 and 0.716, respectively) for journals in the selected category. This correlation is lowest between JIF and ES values (r = 0.545). The Spearman's rho statistical correlation showed a high correlation among JIF and each of SJR and H5 indicators for Construction and building technology journals (coefficient values of 0.848 and 0.799, respectively), while a low correlation was noted between JIF and ES rankings (coefficient value = 0.776).

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CONTRIBUTORS

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digital repositories, web application in libraries, etc.
In this study, he retrieved and compare rankings of journals details which indexed in Web of Science and Scopus citation database in the area of construction and building technology.

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He has contributed the design of the work, data analysis and most importantly he has taken over data interpretation and writing of the manuscript in aforementioned study.

Dr Abu Waris has completed his PhD from Tilka Manjhi Bhagalpur University, India. Presently working as an Acquisition Librarian and Assistant Professor at Imam Abdulrahman bin Faisal University, Dammam, KSA.
He was checked all referencing and bibliography as per required standard, formatted and thoroughly review the manuscript in text citation as well full text bibliography.

Mr Amir Elginaid is a Chief Structural Engineer at Dar Al Handasah Consultants, Kingdom of Saudi Arabia.
He has contributed his expert suggestion and review to develop dependable construction and building technology. Journals were chosen from their category within Web of Science database, Journal Citation Report , SJR from the SCImago Journal and country rank website.

Dr Isam Mohammed Abdel-Magid Ahmed is a Professor of Water Resources and Environmental Engineering at College of Engineering, Department of Environmental Engineering, and Head, Proofreading and Revision Dept. Scientific Publication Centre, Imam Abdulrahman bin Faisal University, Dammam, KSA.
He supervised aforesaid study and verified and the correlations between indicators elucidated by means of Pearson's and Spearman's statistical correlations through SPSS software and calculate the journal indicators.

Appendix 'A'

Comparative rankings of journals in the area of construction and building technology by 2015 JIF, ES, SJR and H5 Index

Journal Title	Journal Impact Factor		Eigenfactor score		SCImago Journal Rank		H5- Index	
	JIF	JIF-Rank	ES	ES-Rank	SJR	SJR-Rank	H5	H5-Rank
Computer-Aided Civil and Infrastructure Engineering	5.288	1	0.00367	15	0.901	25	36	7
Indoor Air	4.33	2	0.00536	11	1.666	8	34	9
Cement and Concrete Research	3.48	3	0.01742	4	3.826	1	53	4
Cement and Concrete Composites	3.399	4	0.01297	5	3.017	2	47	6
Building and Environment	3.394	5	0.01903	3	2.121	3	60	3
Energy and Buildings	2.973	6	0.02792	2	2.073	5	70	1
Materials and Structures	2.453	7	0.00813	9	1.136	19	29	13
Automation in Construction	2.442	8	0.00703	10	1.571	10	53	4
Construction and Building Materials	2.421	9	0.0415	1	1.606	9	64	2
Building Research & Information	2.196	10	0.00317	16	1.433	12	29	13
Leukos	2.167	11	0.00043	50	1.153	18	0	60
Structural Control and Health Monitoring	2.082	12	0.00315	17	1.549	11	26	16
Journal of Building Performance Simulation	1.807	13	0.00106	32	1.231	16	21	19
Steel and Composite Structures	1.796	14	0.00136	29	0.561	36	14	30
Tunneling and Underground Space Technology	1.741	15	0.00474	12	2.023	6	29	13
Journal of Constructional Steel Research	1.702	16	0.00977	7	1.746	7	32	10
Journal of Structural Engineering	1.7	17	0.01127	6	1.431	13	35	8
Lighting Research & Technology	1.667	18	0.00129	30	0.867	27	21	19
Road Materials and Pavement Design	1.547	19	0.00232	20	1.384	15	19	23
International Journal of Concrete Structures and Materials	1.411	20	0.00075	42	0.804	28	13	36
Building Simulation	1.409	21	0.00084	39	1.054	21	14	30
Journal of Materials in Civil Engineering	1.295	22	0.00837	8	0.965	22	30	12
ACI Structural Journal	1.227	23	0.00407	14	2.088	4	21	19
Magazine of Concrete Research	1.227	23	0.00271	19	0.955	23	17	24
ACI Materials Journal	1.154	25	0.00309	18	1.43	14	22	17
Journal of Construction Engineering and Management	1.152	26	0.00426	13	1.219	17	32	10
Sustainable Cities and Society	1.044	27	0.00063	47		#N/A	22	17
International Journal of Architectural Heritage	1.025	28	0.00093	35	0.527	38	16	27
Structural Concrete	1.023	29	0.00091	36	0.874	26	14	30
Journal of Building Physics	1	30	0.00065	46	1.073	20	14	30
Materiales De Construccion	0.96	31	0.00089	37	0.523	39	11	40
Advances in Cement Research	0.949	32	0.00083	40	0.692	30	10	43
Indoor and Built Environment	0.943	33	0.0015	26	0.522	40	20	22
Structural Design of Tall and Special Buildings	0.898	34	0.00151	25	0.69	31	17	24
Journal of Performance of Constructed Facilities	0.893	35	0.00209	22	0.582	34	16	27
International Journal of Pavement Engineering	0.877	36	0.00178	24	0.622	33	17	24

Journal Title	Journal Impact Factor		Eigenfactor score		SCImago Journal Rank		H5- Index	
	JIF	JIF-Rank	ES	ES-Rank	SJR	SJR-Rank	H5	H5-Rank
HVAC & R Research	0.871	37	0.00197	23	0	#N/A	0	60
Bauingenieur	0.866	38	0.00148	27	0.372	46	8	54
Computers and Concrete	0.849	39	0.00114	31	0.506	41	11	40
Journal of Asian Architecture and Building Engineering	0.75	40	0.00025	56	0.313	52	9	50
Wind and Structures	0.746	41	0.00066	45	0.366	49	10	43
International Journal of Ventilation	0.662	42	0.00036	52	0.474	44	9	50
Journal of Advanced Concrete Technology	0.658	43	0.00103	33	0.941	24	14	30
RevistaRomana De Materiale-Romanian Journal of Materials	0.612	44	0.00018	58	0.243	54	9	50
Advances in Structural Engineering	0.577	45	0.00223	21	0.475	43	15	29
Building Services Engineering Research & Technology	0.575	46	0.00071	44	0.369	47	14	30
International Journal of Steel Structures	0.533	47	0.00082	41	0.557	37	10	43
PCI Journal	0.526	48	0.00051	48	0.716	29	12	38
Cement WapnoBeton	0.512	49	0.0003	54	0.369	47	8	54
Beton- Und Stahlbetonbau	0.431	50	0.00148	27	0.493	42	11	40
Proceedings of the Institution of Civil Engineers-Structures and Buildings	0.429	51	0.00097	34	0.323	51	10	43
Advanced Steel Construction	0.346	52	0.00044	49	0.582	34	10	43
Structural Engineering International	0.299	53	0.00075	42	0.339	50	13	36
Informes De La Construccion	0.227	54	0.0003	54	0.209	56	10	43
Stahlbau	0.225	55	0.00087	38	0.31	53	10	43
ASHRAE Journal	0.223	56	0.00041	51	0.227	55	12	38
Bauphysik	0.205	57	0.00021	57	0.194	57	6	57
ZKG International	0.187	58	0.00031	53	0.414	45	5	58
Revista De La Construccion	0.185	59	0.00009	60		#N/A	7	56
Engineering Journal-American Institute of Steel Construction	0.033	60	0.00011	59	0.125	58	9	50
Science and Technology for the Built Environment	0	61	0	61	0.644	32	5	58