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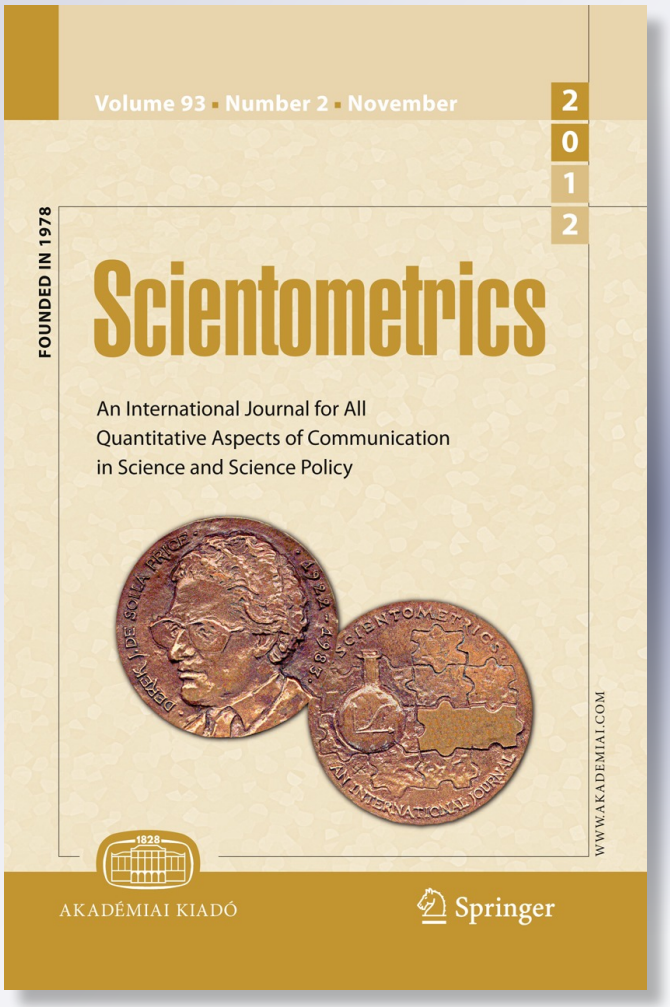

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Relative measure index: a metric to measure the quality of journals

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Abstract Journal impact factors (JIF) have been an accepted indicator of ranking journals. However, there has been increasing arguments against the fairness of using the JIF as the sole ranking criteria. This resulted in the creation of many other quality metric indices such as the h-index, g-index, immediacy index, Citation Half-Life, as well as SCIMago journal rank (SJR) to name a few. All these metrics have their merits, but none include any great degree of normalization in their computations. Every citation and every publication is taken as having the same importance and therefore weight. The wealth of available data results in multiple different rankings and indexes existing. This paper proposes the use of statistical standard scores or z-scores. The calculation of the z-scores can be performed to normalize the impact factors given to different journals, the average of z-scores can be used across various criteria to create a unified relative measurement (RM) index score. We use the 2008 JCR provided by Thompson Reuters to demonstrate the differences in rankings that would be affected if the RM-index was adopted discuss the fairness that this index would provide to the journal quality ranking.

Keywords Journal quality measure · Bibliometrics · Relative measurement index · Journal impact

Introduction

The issue surrounding identifying indicators to assess the quality of a journal is a never ending story. This may be because there is no perfect way to measure a journal's quality.

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There will always be "a better or fairer" way. The most popular and widely used is the Institute of Scientific Information Scientist (ISI) derived journal impact factor (JIF), which is used to measure the influence or visibility of a journal (Sharma 2007; Franceshet 2010). Thompson Reuters (ISI) calculates or more accurately publishes JIFs only for journals that meet a certain number of criteria. That criteria being a particular journal's publishing standards, the journal's editorial content, having consistent publication timelines, that those journals are peer-reviewed, have English-language bibliographic information, that cited references are in the Roman alphabet, the international diversity of authors who contribute to those journals as well the international diversity of its editorial board, and the citation data associated with that journal. The last criteria includes determination of whether a journal's self-citation rate is excessive based on its subject category norm. Most journals for which JIFs are published have self-citation rates less than 20%. Interestingly, even before a Journal's JIF is published, part of the evaluation criteria includes an examination of that journal's JIF and the citations that the said journal has received (Thompson Scientific 2011a).

However, there have been critical views about JIF as a sole indicator of journal quality. Garfield (1999, 2005), who states that in general journals with high impact factor are usually the most prestigious have also acknowledged other factors that are equally important such as whether the papers published in the journal cite all relevant literature, the field itself as citation behavior differ between fields, manuscript acceptance rate (Lee et al. 2002), and the type of papers published in a journal. Impact is also influenced by whether the journal is in print or electronic (Harter 1998), on subscription or on open access (Pringle 2004; Harnad and Brody 2004). The limitations of the JIF is criticized in its failure to measure the breadth of influence across literature in a field (Rowlands 2002; Frandsen et al. 2006) or to use a longer citation window for fields such as the social sciences and humanities (Archambault and Gagne 2004; Fok and Franses 2007; Haddow and Genoni 2009). Alternative indicators of assessing quality has been proposed such as using Google Scholar (Harzing and Van der Wal 2007), the G index (Egghe 2006), and the h index (Hirsch 2005) which has also been applied to journals and SCImago journal rank (SJR) (Gonzalez-Pereira et al. 2010).The question is how do we assess the quality of national journals for developing countries, which are very often ranked low in these matric indices? Does it mean that the journals which are important in the respective countries publishing articles that are relevant and can be applied to solve national problems are of no quality? On this background we propose the use of a relative measurement (RM) index that takes into account more than one journal indexing scheme. The schemes that are taken into account could be those that are deemed important to the given ranking, but the more indexation schemes that are taken into account, the more of an all-rounder the RM-index top ranking journals will be. This should result in rankings that indicate high quality journals with less bias.

Review of relevant literature

The Thompson Reuters (ISI) JIF is a ratio of citations received in the current year for articles published in the 2 years prior to the current year, to the number of articles published in those two preceding years. For example, a Journal's JIF for 2011 is calculated by dividing the citations received in 2011 for articles published in 2010 and 2009 by the total number of articles published in 2010 and 2009. The 5 year JIF similarly, is calculated by dividing the total citations received in the current year for articles published in the

preceding 5 years, by the total number articles published in those preceding 5 years (Thompson Scientific 2011b). This leaves journal publishers in a quandary on how many articles to publish within a given year because the greater the number of articles produced or published, the greater the number of citations required becomes important to maintain a given JIF. Additionally since JIF directly affects a journal's rank in JCR, it indirectly affects the number of citations that the journals would receive in future, since author publication decisions tend to be reliant on whether their article will be cited once published.

The scientometrics methodology base has recently been expanded with network analysis techniques such as those seen in Abbasi et al. (2010) or Guns et al. (2011). Many of these techniques result in indices that utilize an h-index type calculation to distinguish and catalog both networks as well as the elements within those networks for scientometric purposes (Korn et al. 2009; Schubert et al. 2009). As originally introduced by Hirsch (2005), the h-index was intended to ''quantify an individual's scientific output''. More variations on the h-index are as that seen in Zhao et al. (2011), where a novel framework based on an H-degree provides indicators that characterize the nodes within a network. Of course this shows that the h-index is indeed useful for certain purposes and as shown by Glanzel (2006); it provides a very simple relation between the h-index itself and the number of publications as well as the citation rates of the individual papers.

Since each of the indexing measures has its merits, we propose a method to unify the indexes, in order to provide an all-round indication of a journal's quality. By taking into account all the criteria that are important in one indexation score, citation reports can provide authors as well as readers with a better guide to selecting where to publish and what to read.

There is a wealth of literature on the benefits as well as detriments of using JIFs (Adler et al. 2008; Amin and Mabe 2000; Campbell 2008; Monastersky 2005). Other criticisms of the JIF include (a) the relatively small period for the citation and publication count that is only 2 years (Bornmann et al. 2008) and (b) the possibility that the citation practices within the journal may be manipulated (Harnad 2008; Todd and Ladle 2008).

The RM-index provides a way to reduce the simplicity of abusing the system as it makes more than one index important.

RM-index as the average of z-scores

We propose the following method to derive the RM-index of a journal.

The mean of a given set of terms $\mu = [W_1 + W_2 + W_3 + \cdots + W_i]/n$,

Where W = the individual values

n = the number of values;

The standard deviation of a set of terms is $\sigma = \sqrt{\left[\left(\sum_{i=n}^{i=1}(W_i - \mu)^2\right)/(n-1)\right]}$;

The z-score $Z_i = (W_i - \mu)/\sigma$.

The advantage of using the number of standard deviations as a measure is that a given journal will be given credit for performing above the other journals in the same ranking set and the degree of the higher journal superiority is indicated in the score, likewise for authors. This can also be used to normalize the values for impact factors. This is done by taking the average of the z-scores (Zs) for individual journals as the final impact factor. So instead of weighting the journals in which the citations come from based on that journal's

own impact factor, the weighting is based on how difficult it was to be cited by that particular journal. The RM-index of a particular journal is the average of all the z-scores scored by that journal in all the criteria that are to be taken into account.

$$\text{RM} - \text{index} = \sum_{j=\text{m}}^{j=1} Z_j/m, \text{ where } m = \text{the number of criteria taken into account;}$$

Additionally, if the total number of publications is added to the calculation of the RM-index, we obtain a score that reflects the journals excellence over the number of articles published, which reduces the benefits of journals, limiting the number of articles published in order to inflate rankings. The fact that the RM-index is a relative measure means that the RM-index for a single journal without taking into account of others is not possible.

Top JCR journals as ranked by RM-index

The data used for our tests were obtained from the 2008 *Journal Citation Report* (*JCR*) from Thompson Reuters (Thomson Scientific 2009). The report had 6,958 journals listed and all the journals and indices were taken into account in our RM-index computations. Shown in Table 1 are the traditional top ten journals in the 2008 Thompson Reuters rankings as ordered by the JIF. As this is a general journal ranking, the disciplines and sub-disciplines are not considered.

Notice that the number one ranked journal in Table 1, 'CA-CANCER JCLIN', has only 19 articles, resulting in a much easier climb to the top. It does score well in all the traditional criteria with the exception of its Eigenfactor score which takes into account the ranks of the journals, from which citations are garnered. It also scored well in the cited half-life. Please note, for experimental purposes, journals which were listed with a cited half-life of >10 in the JCR were taken as having a cited half-life value of 10.10.

The RM-index scores are calculated by taking into account the impact factor, 5-year impact factor, immediacy index, Cited half-life, Eigenfactor score as well as the article influence of all the journals listed in the 2008 JCR. The Eigenfactor score is an indexing scheme that takes into account the rank of the journals from where citations are received. As such, it is an indexing scheme that is heavily influenced by the JIF, since it is the JIF that is the primary criteria for journal ranking. The reliance of the Eigenfactor score on the journal's ranks, and therefore reliance on the JIF, in its computation, results in the Eigenfactor score rankings being very different from the other rankings. This resulted in the number one raked journal in most indices 'CA-CANCER JCLIN', not being positioned in the top ten. This leads to what we feel is a ranking that is heavily skewed in favor of journals with very high publication numbers, as can be seen in the articles column of Table 2. This results, in a condition that is the opposite of only using the JIF rankings where controlling the number of publications can be helpful in improving JIF. As such a middle ground is required and the easiest way is to take into account both indices and others. For comparative purposes, we have provided the rankings as ordered by Eigenfactor score in Table 2.

The different indices produce varied rankings among the journals, indicating strengths in different areas. If we look at the RM-index scores for the journals we notice a considerable change in how the journal rankings turn out as shown in Table 3. Additionally, the scores become closer to each other since so many criteria are taken into account. The journal that ranks top in RM-index is the best all-rounder.

Table 1 ISI JCR journals (ordered by impact factor)

Rank	Abbreviated journal title	ISSN	Total cites	Impact factor	5-Year impact	Immediacy index	Articles	Cited half-life	Eigenfactor score	Article influence	RM-index
1	CA-CANCER J CLIN	0007-9235	7,522	74.58	50.77	24.68	19.00	3.30	0.04	17.51	16.74
2	NEW ENGL J MED	0028-4793	205,750	50.02	49.91	12.22	356.00	7.30	0.68	18.76	14.32
3	ANNU REV IMMUNOL	0732-0582	15,519	41.06	46.20	7.62	24.00	7.10	0.07	24.69	9.34
4	NAT REV MOL CELL BIO	1471-0072	19,628	35.42	34.22	7.24	84.00	4.00	0.18	19.97	7.91
5	PHYSIOL REV	0031-9333	17,865	35.00	35.85	4.30	40.00	7.80	0.06	15.26	7.03
6	REV MOD PHYS	0034-6861	24,577	33.98	40.40	7.03	36.00	10.10	0.09	24.86	8.42
7	JAMA-J AM MED ASSOC	0098-7484	114,250	31.72	27.96	7.56	225.00	7.20	0.38	11.15	8.33
8	NATURE	0028-0836	443,967	31.43	31.21	8.19	899.00	8.50	1.76	17.28	14.85
9	CELL	0092-8674	142,064	31.25	30.15	6.13	348.00	8.80	0.67	18.88	9.49
10	NAT REV CANCER	1474-175X	18,908	30.76	35.01	4.61	85.00	4.50	0.14	15.27	6.72

Table 2 ISI JCR journals (ordered by Eigenfactor score)

Rank	Abbreviated journal title	ISSN	Total cites	Impact factor	5-Year impact	Immediacy index	Articles	Cited half-life	Eigenfactor score	Article influence	RM-index
1	NATURE	0028-0836	443,967	31.43	31.21	8.19	899.00	8.50	1.76	17.28	14.85
2	P NATL ACAD SCI USA	0027-8424	416,018	9.38	10.23	1.64	3508.00	7.40	1.70	4.85	9.03
3	SCIENCE	0036-8075	409,290	28.10	30.27	6.26	862.00	8.40	1.58	16.28	13.17
4	J BIOL CHEM	0021-9258	407,492	5.52	5.58	1.07	3,761.00	7.60	1.33	2.27	6.58
5	PHYS REV LETT	0031-9007	310,717	7.18	7.13	1.97	3,905.00	7.30	1.28	3.30	6.86
6	J AM CHEM SOC	0002-7863	318,252	8.09	8.26	1.66	3,242.00	7.30	0.95	2.72	5.52
7	PHYS REV B	1098-0121	250,465	3.32	3.28	0.89	5,782.00	8.30	0.76	1.27	3.76
8	APPL PHYS LETT	0003-6951	179,925	3.73	4.10	0.69	5,449.00	5.40	0.72	1.40	3.37
9	NEW ENGL J MED	0028-4793	205,750	50.02	49.91	12.22	356.00	7.30	0.68	18.76	14.32
10	CELL	0092-8674	142,064	31.25	30.15	6.13	348.00	8.80	0.67	18.88	9.49

Table 3 ISI JCR journals (ordered by RM-index)

Rank	Abbreviated journal title	ISSN	Total cites	Impact factor	5-Year impact	Immediacy index	Articles	Cited half-life	Eigenfactor score	Article influence	RM-index
1	CA-CANCER J CLIN	0007-9235	7,522	74.58	50.77	24.68	19.00	3.30	0.04	17.51	16.74
2	NATURE	0028-0836	443,967	31.43	31.21	8.19	899.00	8.50	1.76	17.28	14.85
3	NEW ENGL J MED	0028-4793	205,750	50.02	49.91	12.22	356.00	7.30	0.68	18.76	14.32
4	ACTA CRYSTALLOGR A	0108-7673	11,622	2.05	2.10	49.56	72.00	10.10	0.01	1.09	13.70
5	SCIENCE	0036-8075	409,290	28.10	30.27	6.26	862.00	8.40	1.58	16.28	13.17
6	CELL	0092-8674	142,064	31.25	30.15	6.13	348.00	8.80	0.67	18.88	9.49
7	ANNU REV IMMUNOL	0732-0582	15,519	41.06	46.20	7.62	24.00	7.10	0.07	24.69	9.34
8	P NATL ACAD SCI USA	0027-8424	416,018	9.38	10.23	1.64	3,508.00	7.40	1.70	4.85	9.03
9	LANCET	0140-6736	148,106	28.41	27.26	8.51	289.00	8.10	0.41	9.95	8.46
10	REV MOD PHYS	0034-6861	24,577	33.98	40.40	7.03	36.00	10.10	0.09	24.86	8.42

Now if we take into account the number of publications produced by the journals, we notice again a significant change in the scores as well as some change in the rankings as shown in Table 4. The purpose behind including the number of publications in the RM-index calculation is to give credit to those journals that perform well over many articles as opposed to just a few as is the case with 'CA-CANCER J CLIN', which does nevertheless remain as the number one ranked journal although it does experience a drop in its score.

Table 5 shows a comparison of the journal rankings as based on different criteria along with the scores obtained by those journals via the various indexation schemes. 'NATURE' in particular experiences considerable changes in its rankings under different indices. Although it is ranked eighth in the JIF rankings, it has the best Eigenfactor score and is not even in the top ten for cited half-life. However, once the RM-index is applied, it becomes the number two ranked journal, which looking at 'NATURE's indexation figures is appropriate due to its respectable if not excellent figures in every index. Even though it does not figure in the cited half-life top ten, it does not have a bad cited half-life value at all at 8.50 (please see Table 4) which is far superior to that of 'CA-CANCER J CLIN' at 3.30 (please see Table 4).

'SCIENCE' which does not figure in the top ten of any traditional index other than Eigenfactor score, proves its all-round performance by being ranked fifth in the RM-index and when publications are taken into account a very good fourth, indicating consistent performance under all indices over a considerable number of articles.

Applying the RM-index to a national citation database

In order to emphasize its general applicability to measure journals that are not covered by JCR, national citation centers can use scientometric information to create their own rankings of local journals. These journals can be ranked using an RM-index that takes into account the indices that are viewed as important to the nations to which the citations centers belong.

Table 6 shows the top ten journals as ranked on based on an RM-index that is calculated using the scientometric information available between the journals listed in the Malaysian citation database. In order to show the applicability of the RM-index in providing a measure of journal quality we apply the index to a set of journals listed in the Malaysian citation database (http://myais.fsktm.um.edu.my). The RM-index used takes into account the impact factor, 5-year impact factor, h-index, immediacy index, and the cited half-life of the Journals. Once again the journal that performs well in most indices will perform well using the RM index. In this case the number one ranked journal, *Malaysian Journal of Library and Information Science*, is the best all-rounder in this group.

Discussion and conclusion

We have introduced a new journal quality index, the RM-index. It takes into account multiple indices in order to produce a more fair and all-rounded journal quality indicator. It is based on the simple notion that the quality of a journal is fairly measured when its performance in multiple indices are taken into account and within each index its relative position among its peers are considered. A journal may perform well in one index and less on the other. Therefore, to achieve a high score a journal needs to perform well in all indices. The primary limitation of the RM-index is that it is not possible to generate the

Table 4 ISI JCR journals (ordered by RM-index with publications)

Rank	Abbreviated journal title	ISSN	Total cites	Impact factor	5-Year impact	Immediacy index	Articles	Cited half-life	Eigenfactor score	Article influence	RM-index	RM-index with publications
1	CA-CANCER J CLIN	0007-9235	7,522	74.58	50.77	24.68	19.00	3.30	0.04	17.51	16.74	13.30
2	NATURE	0028-0836	443,967	31.43	31.21	8.19	899.00	8.50	1.76	17.28	14.85	12.49
3	NEW ENGL J MED	0028-4793	205,750	50.02	49.91	12.22	356.00	7.30	0.68	18.76	14.32	11.62
4	SCIENCE	0036-8075	409,290	28.10	30.27	6.26	862.00	8.40	1.58	16.28	13.17	11.11
5	ACTA CRYSTALLOGR A	0108-7673	11,622	2.05	2.10	49.56	72.00	10.10	0.01	1.09	13.70	10.90
6	P NATL ACAD SCI USA	0027-8424	416,018	9.38	10.23	1.64	3,508.00	7.40	1.70	4.85	9.03	9.91
7	PHYS REV LETT	0031-9007	310,717	7.18	7.13	1.97	3,905.00	7.30	1.28	3.30	6.86	8.49
8	J BIOL CHEM	0021-9258	407,492	5.52	5.58	1.07	3,761.00	7.60	1.33	2.27	6.58	8.15
9	CELL	0092-8674	142,064	31.25	30.15	6.13	348.00	8.80	0.67	18.88	9.49	7.75
10	PHYS REV B	1098-0121	250,465	3.32	3.28	0.89	5,782.00	8.30	0.76	1.27	3.76	7.51

Table 5 ISI JCR journals (Comparison of different rankings)

Rank	Impact factor	Score	Eigenfactor score	Score	Immediacy index	Score	Cited half-life	Score	Total RM-index	Score	RM-index with publications	Score
1	CA-CANCER J CLIN	74.58	NATURE	1.76	ACTA CRYSTALLOGR A	49.56	J CHEM PHYS	10.10	CA-CANCER J CLIN	16.74	CA-CANCER J CLIN	13.30
2	NEW ENGL J MED	50.02	P NATL ACAD SCI USA	1.70	CA-CANCER J CLIN	24.68	BIOCHEM J	10.10	NATURE	14.85	NATURE	12.49
3	ANNU REV IMMUNOL	41.06	SCIENCE	1.58	NEW ENGL J MED	12.22	ECOLOGY	10.10	NEW ENGL J MED	14.32	NEW ENGL J MED	11.62
4	NAT REV MOL CELL BIO	35.42	J BIOL CHEM	1.33	NAT GENET	8.55	BRAIN RES	10.10	ACTA CRYSTALLOGR A	13.70	SCIENCE	11.11
5	PHYSIOL REV	35.00	PHYS REV LETT	1.28	LANCET	8.51	REV MOD PHYS	10.10	SCIENCE	13.17	ACTA CRYSTALLOGR A	10.90
6	REV MOD PHYS	33.98	J AM CHEM SOC	0.95	NATURE	8.19	NUCL PHYS B	10.10	CELL	9.49	P NATL ACAD SCI USA	9.91
7	JAMA-J AM MED ASSOC	31.72	PHYS REV B	0.76	NAT BIOTECHNOL	7.73	GEOCHIM COSMOCHIM AC	10.10	ANNU REV IMMUNOL	9.34	PHYS REV LETT	8.49
8	NATURE	31.43	APPL PHYS LETT	0.72	ANNU REV IMMUNOL	7.62	J APPL PHYSIOL	10.10	P NATL ACAD SCI USA	9.03	J BIOL CHEM	8.15
9	CELL	31.25	NEW ENGL J MED	0.68	JAMA-J AM MED ASSOC	7.56	J FLUID MECH	10.10	LANCET	8.46	CELL	7.75
10	NAT REV CANCER	30.76	CELL	0.67	NAT REV MOL CELL BIO	7.24	J COMP NEUROL	10.10	REV MOD PHYS	8.42	PHYS REV B	7.51

Table 6 Malaysian abstracting and indexing system (MyAIS)

No.	Journal	Total citations	Total articles	h-index	5-year impact factor	Citations for (2008 and 2009)	Publications for (2008 and 2009)	Impact factor (2010)	Immediacy index	Cited half-life	RM-index
1	Malaysian Journal of Library & Information Science	174	247	4	1.38	69	34	2.03	0.82	9.00	6.78
2	Medical Journal of Malaysia	541	866	7	0.40	87	219	0.40	0.64	8.50	3.66
3	Jurnal Syariah	83	199	4	0.39	31	54	0.57	1.14	4.50	3.45
4	Malaysian Journal of Analytical Sciences	26	150	2	0.15	12	49	0.24	2.00	3.00	3.09
5	Journal of Tropical Forest Science	34	477	3	0.52	34	76	0.45	0.00	17.50	2.76
6	Malaysian Journal of Pathology	69	308	3	0.33	13	11	1.18	0.00	9.00	2.71
7	Jurnal Pendidikan	23	163	2	0.43	23	20	1.15	0.00	0.00	2.01
8	Malaysian Journal of Nutrition	131	172	4	0.47	3	0	0.00	0.00	3.00	1.46
9	Matematika	29	150	2	0.18	4	31	0.13	0.00	12.00	1.19
10	Malaysian Journal of Psychiatry	38	151	2	0.21	7	25	0.28	0.00	8.00	1.16

Journal Citation Statistics (ordered by RM index) This list generation was started on :Wed Dec 14 0:26:35 2011 MYT

scores without the scores of other journals being available. We have shown that it can be applied to universal citation reports such as the JCR since Thompson Reuters publishes such data on a yearly basis. We have also shown that it can be applied to a national citation report such as those provided by MyAIS (Malaysian Indexing and Abstracting System) as long as the required data is available. The JIF does have limitations and weaknesses (Campanario et al. 2011), and other indices have their strengths and weaknesses too. However, despite all this the JIF remains the primary criteria when it comes to assessing the quality of journals and authors. The combination of the indices as a relatively measured index helps to moderate those strengths and weaknesses and provide a fairer rankings measure that are indicative of more rounded excellence since multiple criteria can be taken into account. Since many of the indices used in our RM-index computations have been tried and tested, it helps validate the efficacy of using such a combined indexation metric. Additionally, the flexibility of the RM-index allows indexation bodies to calculate RM-indexes as tailored to their needs and the need of their nations where judgment of journal quality needs to be a little different. Future study could compare journals performance based on the RM-index and professional ratings in the various subject disciplines to determine whether they are correlated, comparable to studies by Hodge and Lacasse (2011), who found the ISI 5-year impact factor correlates with expert opinion in assessing social work journals and Saha et al. (2003) who found correlation between impact factor scores of journals in general medicine with physician's ratings. We hope that other researchers will examine this index, experiment with it and perhaps make suggestions and modifications that might lead to the contribution of a standard journal quality indicator that considers multiple indices.

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References

Abbasi, A., Altmann, J., & Hwang, J. (2010). Evaluating scholars based on their academic collaboration activities: two indices, the RC-index and the CC-index, for quantifying collaboration activities of researchers and scientific communities. *Scientometrics, 83*(1), 1–13.

Adler, R., Ewing, J. & Taylor, P. (2008). *Citation Statistics*. Retrieved February 24, 2009, from http://www.ams.org/ewing/Documents/CitationStatistics-FINAL-1.pdf.

Amin, M., & Mabe, M. (2000). Impact factor: use and abuse. *Perspectives in Publishing, 1*, 1–6.

Archambault, E., & Gagne, E. V. (2004). *The use of bibliometrics in social sciences and humanities*. Montreal: Social Sciences and Humanities Research Council of Canada (SSHRCC).

Bornmann, L., Mutz, R., Neuhaus, C., & Daniel, H. D. (2008). Citation counts for research evaluation: standards of good practice for analyzing bibliometric data and presenting and interpreting results. *Ethics in Science and Environmental Politics, 8*(1), 93–102.

Campanario, J. M., Carretero, J., Marangon, V., Molina, A., & Ros, G. (2011). Effect on the journal impact factor of the number and document type of citing records: a wide-scale study. *Scientometrics, 87*, 75–84.

Campbell, P. (2008). Escape from the impact factor. *Ethics in Science and Environmental Politics, 8*(1), 5–6.

Egghe, L. (2006). Theory and practice of the g-index. *Scientometrics, 69*, 131–152.

Fok, D., & Franses, P. H. (2007). Modeling the diffusion of scientific publications. *Journal of Econometrics, 139*(2), 376–390.

Franceshet, M. (2010). Journal influence factors. *Journal of Informatics, 4*(3), 239–248.

Frandsen, T., Rousseau, R., & Rowlands, I. (2006). Diffusion factors. *Journal of Documentation, 62*(1), 58–72.

Garfield, E. (1999). Journal impact factor: a brief review. *Canadian Medical Association Journal, 161*(8), 979–980. http://www.cmaj.ca/cgi/content/full/161/8/979?ijkey=nr8.IXo1aXxvc 19 October.

Garfield, E. (2005). The agony and the ecstasy: the history and meaning of the journal impact factor. *International Congress on Peer Review and Biomedical Publication*. http://garfield.library.upenn.edu/papers/jifchicago2005.pdf. Accessed 1 May 2009.

Glanzel, W. (2006). On the h-index—a mathematical approach to a new measure of publication activity and citation impact. *Scientometrics, 67*(2), 315–321.

Gonzalez-Pereira, B., Guerrero-Bote, V. P., & Moya-Anegon, F. (2010). A new approach to the metric of journal scientific prestige: the SJR indicator. *Journal of Informetrics, 4*(3), 379–391. Accessed at http://www.sciencedirect.com/science/article/pii/S1751157710000246

Guns, R., Liu, Y. X., & Mahbuba, D. (2011). Q-measures and betweenness centrality in a collaboration network: a case study of the field of informetrics. *Scientometrics, 87*(1), 133–147.

Haddow, G., & Genoni, P. (2009). Australian education journals: quantitative and qualitative indicators. *Australian Academic & Research Libraries, 40*(2), 88–104.

Harnad, S. (2008). Validating research performance metrics against peer rankings. *Ethics in Science and Environmental Politics, 8*(1), 103–107.

Harnad, S. & Brody, T. (2004). Comparing the impact of open access (OA) vs non-OA articles in the same journals. *D-Lib Magazine*, 10(6), (June 2004). Retrieved from: http://www.dlib.org/dlib/june04/harnad/06harna.html. Accessed 13 Oct 2011.

Harter, S. P. (1998). Scholarly communications and electronic journals: an impact Study. *Journal of the American Society of Information Science, 49*(6), 507–516.

Harzing, A.W. & Van der Wal, R. (2007). Google scholar: the democratization of citation analysis? *Ethics in Science and Environmental Politics*. Retrieved from: http://imechanica.org/files/gsdemo.pdf. Accessed 13 Oct 2011.

Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. *Proceedings of the National Academy of Sciences, USA, 102*(46), 16569–16572.

Hodge, D. R., & Lacasse, J. R. (2011). Evaluating journal quality: is the H index a better measure than impact factors. *Research on Social work Practice, 21*(2), 222–230.

Korn, A., Schubert, A., & Telcs, A. (2009). Lobby index in networks. *Physica A: Statistical Mechanics and its Applications, 388*, 2221–2226.

Lee, K. P., Schotland, M., Bacchetti, Peter., & Bero, L. A. (2002). Association of journal quality indicators with methodological quality of clinical research articles. *Journal of American Medical Association, 287*(21), 2805–2808.

Monastersky, R. (2005). The number that's devouring science. *Chronicle of Higher Education, 52*(8), A12–A17.

Pringle, J. (2004). Do open access journals have impact. *Nature*. Retrieved from: http://www.nature.com/nature/focus/access/debate/19.html. Accessed 13 Oct 2011.

Rowlands, I. (2002). Journal diffusion factors: a new approach to measuring research influence. *Aslib Proceedings, 54*(2), 77–84.

Saha, S., Saint, C., & Christakis, D. R. (2003). Impact factor: a valid measure of journal quality? *Journal of Medical Librarian Association, 91*(1), 42–46.

Schubert, A., Korn, A., & Telcs, A. (2009). Hirsch-type indices for characterizing networks. *Scientometrics, 78*(2), 375–382.

Sharma, O. (2007). Journal impact factor: an essential quality indicator. *Current Science, 23*(3), 141–142.

Thomson Scientific (2009). *2008 Journal Citation Report*. Available: http://wokinfo.com/products_tools/analytical/jcr. Accessed on: 1 Dec 2011.

Thomson Scientific (2011a). *Thompson Reuters Journal Selection Process*. Available: http://thomsonreuters.com/products_services/science/free/essays/journal_selection_process. Accessed on 2 Feb 2012.

Thomson Scientific (2011b). *The Thompson Reuters Impact Factor*. Available: http://thomsonreuters.com/products_services/science/free/essays/impact_factor. Accessed on: 2 Feb 2012.

Todd, P. A., & Ladle, R. J. (2008). Hidden dangers of a 'citation culture'. *Ethics in Science and Environmental Politics, 8*(1), 13–16.

Zhao, S. X., Rousseau, R., & Ye, F. Y. (2011). h-Degree as a basic measure in weighted networks. *Journal of Informetrics, 5*, 668–677.