Asian Academy of Management Journal, Vol. 18, No. 2, 37–54, 2013

AN IMPROVED METHOD FOR ASSESSING THE IMPACT OF MANAGEMENT JOURNALS

Daniela Rosenstreich[1*] and Ben Wooliscroft[2]

[1] Faculty of Business and Education, Swinburne University of Technology, PO Box 218, Hawtorn, Victoria 3122, Australia
[2] School of Business, University of Otago, PO Box 56, Dunedin, 9054, New Zealand

*Corresponding author: drosenstreich@swin.edu.au

ABSTRACT

Despite their limitations, journal rankings and impact data often form the basis of evaluations of research performance. Recent advances in citation analysis may facilitate the creation of journal rankings with broader coverage, particularly in terms of international coverage. This study explores three sources of citation data: Web of Science, Scopus and Google Scholar. It was found that Web of Science indexes approximately one-fifth of all academic management titles and includes fewer citations than Google Scholar. Six rankings of management journals were combined to produce a list of 57 titles. Overall, the analysis of citation data in this study suggests that the g-index provides an improved mechanism for measuring the impact of journals.

Keywords: Journal ranking, citation analysis, g-index, Google Scholar, impact factors

BACKGROUND

Many of the systems that are used worldwide for the allocation of funding and career progression within academia rely on journal status as the basis for assessing research performance, either explicitly or implicitly (for example, see Geary, Marriott, & Rowlinson, 2004). Due to the focus on the journals in which research is published, journal-ranking studies are relatively common in the management literature (for example, see Marsh & Hunt, 2006; Mingers & Harzing, 2007; Rogers, Campbell, Louhiala-Salminen, Rentz, & Suchan, 2007). One of the most common approaches to assess journal status is through citation analysis.

New approaches have emerged for citation analysis over the last five years, but to date, there has been little discussion of these approaches within the management literature. Recent studies have applied new citation data sources and formulae to

other business disciplines (Rosenstreich & Wooliscroft, 2009; 2012), and the current study applies the same methods to assess the measurement of journal impact within the management field. This study involved reviewing different techniques and data sources used for citation analysis through the investigation of samples of management journals. Six published rankings of journals were combined to produce a list of highly regarded management titles. Citation data for the titles were gathered from *Google Scholar*, and the g-index formula was applied to produce an innovative ranking of management journals.

MEASUREMENTS OF THE IMPACT OF ACADEMIC JOURNALS

There is a large amount of literature focused on the use of citation data to measure the impact of academic research. Those in favour of citation analysis generally emphasise its relative simplicity and objectivity compared to perceptual surveys (Beamish, 2006; Tahai & Meyer, 1999).

While simple citation counts have been widely used in citation research within the management discipline (for example, DuBois & Reeb, 2000; Goh, Holsapple, Johnson, & Tanner, 1996; Phene & Guisinger, 1998; Sharplin & Mabry, 1985), citation formulae provide a convenient (although sometimes controversial) shortcut in the analysis of journal impact (Garfield, 2000). As citation data have become more available, new formulae for citation analysis have been developed. The best known of the new formulae is the h-index (Hirsch, 2005) and g-index (Egghe, 2006). The new indices have been applied and modified in various studies (for example, see Antonakis & Lalive, 2008; Bar-Ilan, 2008; Jacsó, 2008; Jin, Liang, Rousseau, & Egghe, 2007; Kalervo & Olle, 2008; Ronald & Fred, 2008) and incorporated into online resources, including *Scopus*, *SSCI* and Harzing's *Publish or Perish* software (Harzing, 2008). Table 1 provides an overview of each of the three major citation analysis formulae.

CITATION DATA SOURCES

While the traditional sources of citation data are those provided by Thomson Reuters, the *Science Citation Index* (SCI), *Social Sciences Citation Index* (SSCI), and *Journal Citation Reports* (JCR), alternatives, such as *Google Scholar* and Elsevier's *Scopus* database, are becoming more popular (Bar-Ilan, 2008; Gray & Hodkinson, 2008; Law & Veen, 2008; Neuhaus & Daniel, 2008). The general background and limitations of the databases are provided by Rosenstreich and Wooliscroft (2009, 2012) and are summarised in Table 2.

Table 1
Descriptions of the three major citation analysis formulae

Formula	Description
JCR Impact Factor	Developed in the early 1960s for selecting journals for *SCI* (Garfield, 2006).
	Used within Thomson's *Web of Science* databases, specifically the *Journal Citation Reports* (JCR).
	Calculated by dividing the total numbers of citations (C) to a particular journal (j) in the year of the edition of the *JCR* (y) by the total number of articles (A) published in that journal over the two previous years (Thomson Scientific, 2008b).
	Reduces the influence of the total number of articles published in a journal and offsets the advantages of age (Thomson Scientific, 2008b).
	Commonly relied upon in management literature (for example, Clark & Wright, 2007; Franke, Edlund, & Oster, 1990; Kirkpatrick & Locke, 1992; Marsh & Hunt, 2006; Tahai & Meyer, 1999).
	Problems are created by variations in citation patterns across (and within) disciplines (Garfield, 2000; Marsh & Hunt, 2006).
	Data gathered one and two years post-publication can provide an unrepresentative snapshot of the use of articles because the number of years until an article is widely cited can vary across fields of study (Egghe & Rousseau, 2000; Garfield, 2000).
	Can be skewed by a small number of highly cited articles (Egghe & Rousseau, 2008; Garfield, 2000; Weale, Bailey, & Lear, 2004).
h-index	Developed by Hirsch in 2005 for assessing the impact of an author (Hirsch, 2005), but can also be applied to journals (Egghe, 2008).
	Is h if h of the author's papers (p) have at least h citations each and the other papers (N $p - h$) have no more than h citations each.
	Can cover as many years as desired and therefore is not affected by a time lag between the publication and citation of material.
	Is widely applied and has made a significant impact on scientific thinking (Egghe, 2008).
	Ignores the most highly cited articles (Egghe, 2008).
g-index	Developed by Egghe in 2006.
	Designed to avoid the problems of the impact factor and h-index by having highly cited articles influence but not dominate results.
	If g is the highest rank, such that the top g articles have a cumulative sum of at least g^2 citations (Egghe, 2006), then a journal has a g-index, g.

Table 2
Descriptions of the three major citation data sources (adapted from Rosenstreich and Wooliscroft, 2009; 2012)

Source	Description
SSCI / JCR	Originally created in the 1960s by Garfield and is now available through *Web of Science* by Thomson Reuters.
	SSCI fully indexes 2,474 social science titles (Thomson Reuters, 2011c).
	JCR provides impact factors and rankings for approximately 1,800 of the journals from the SSCI (Thomson Reuters, 2011a) that have been fully indexed for at least 3 years. JCR coverage, therefore, differs significantly from the SSCI.
	Does not include book literature; has varying coverage of conferences; has incomplete coverage of journals; has varying numbers of indexed journals from year to year. Only title lists from the current year are available for SSCI, and the list does not include the details of the years of coverage.
	Titles are selected by Thomson Reuters. The criteria for inclusion are not clear, and some suggest there is bias for inclusion (Egghe & Rousseau, 1990; Klein & Chiang, 2004).
Scopus	Launched in 2004 by Elsevier.
	Includes more than 5,900 social science sources (Elsevier BV, 2011), suggesting broader coverage than JCR or SSCI, but most social science titles before 1996 are not fully indexed.
	Most sources are academic journals.
	Criteria for inclusion and coverage are not made clear by Elsevier.
Google Scholar	A free web-based database launched in 2004.
	Indexes a wide range of scholarly sources and citations.
	Does not have authoritative indexes; therefore, variant forms of titles, duplicate entries and other errors are more likely to occur in keyword searches than in a controlled database.
	Includes working papers, conferences and books.
	No details are provided on content or schedules; therefore, it is not clear how often new material is added nor which sources are included.

To understand whether these citation databases cover an adequate sample of management titles, it is necessary to have a basis for comparison. A good method for estimating the total number of academic journals is the use of *Ulrich's International Periodicals Directory* (Proquest LLC, 2008; Tenopir, 2004). A snapshot comparison of the number of discipline-specific scholarly journals in *Ulrich's International Periodicals Directory* (2008) and those represented in JCR (Thomson Scientific, 2008a) is presented in Table 3 (because there can be a time

lag in journals being indexed in Thomson's databases, the data from 2008 were selected). The results in Table 3 suggest that for a given year, JCR may contain as little as one-fifth of all scholarly management journals.

Table 3
Discipline coverage in Ulrich's Periodical Directory compared to JCR

Discipline	**Active Academic Refereed Titles in Ulrich's (2008)**	**Subject Titles in JCR (2008)**
Economics	234	209 (89%)
Chemistry	752	447 (59%)
Physics	757	314 (41%)
Finance	142	48 (34%)
Women's Studies	109	28 (26%)
Public Administration	111	28 (25%)
Management	**467**	**89 (19%)**
Anthropology	336	61 (18%)
Sociology	579	100 (17%)
Social Work	198	29 (15%)

COMPARISON AND INVESTIGATION OF CITATION DATABASES

To explore the coverage of management journal citations across the three major citation data sources, we selected 15 varied management journals for comparison using the h-index.

As shown in Table 4, *Google Scholar* appears to include more citing references than the other sources. With only one exception (*Administrative Science Quarterly*), *Google Scholar* produces a higher h-index than the other databases. The difference can be marked; for example, the *MIT Sloan Management Review* receives an h-index five times larger through the use of *Google Scholar* than through the use of SSCI, and the *British Journal of Management* has an h-index twice as large through the use of *Google Scholar* than through the use of other databases. It is also interesting to note that two Asian titles (*Asia Pacific Management Review* and *Asian Academy of Management Journal*) were rarely assessed by the commercial citation databases. These results suggest that, overall, *Google Scholar* indexes a broader set of citing sources than the other two databases.

Table 4
Comparison of h-index scores across citation databases – a snapshot from 2008

	Place of publication	**First Issue Year**	**Google Scholar h-index**	**SSCI h-index** (1956–)	**SSCI h-index** (1996–)	**Scopus h-index**
Academy of Management Journal	U.S.	1958	137	135	84	100
Academy of Management Review	U.S.	1976	156	136	86	92
Administrative Science Quarterly	U.S.	1956	151	161	67	77
Asia Pacific Management Review	China	1996	8	[b]	[b]	[a]1
Asian Academy of Management Journal	Malaysia	1996	8	[b]	[b]	[b]
British Journal of Management	U.K.	1990	37	17	17	28
Journal of Management	U.S.	1975	78	73	50	65
Journal of Management Studies	India	2000	69	55	37	44
Journal of Organ. Change Mgmt	U.K.	1988	24	21	21	18
Management Learning	U.K.	1994	33	19	18	25
MIS Quarterly	U.S.	1977	105	87	60	90
MIT Sloan Management Review	U.S.	1960	90	16	16	24
Strategic Management Journal	U.K.	1979	143	126	80	92

[a] Journal only included in Scopus from 2008 onwards; therefore, only seven articles were analysed.
[b] Not indexed in this source in 2008.

Scopus does not fully index material from the years before 1996, and the database produced consistently lower scores for this reason. Therefore, to allow for a meaningful comparison between *Scopus* and *SSCI*, h-index scores with a restricted date range are also shown for *SSCI* and, within this date range, *Scopus* performed better than *SSCI* for the selected journals.

The data in Table 4 do not address two major criticisms of *Google Scholar*, namely, its lack of administrative oversight, which may lead to spurious results and duplicate entries (for example, see Bar-Ilan, 2008), and its inclusion of non-academic sources (an issue explored by Harzing, 2008). To determine whether the citation data within *Google Scholar* are of poor quality, we selected three management articles and examined the sources listed as citing those three articles. The three articles were selected from the journals that received the three highest h-index scores in the exploration of citation coverage shown in Table 4: The *Academy of Management Review (AMR)*, *Administrative Science Quarterly (ASQ)*, and the *Strategic Management Journal (SMJ)*. We chose a convenient article from each of the three journals that had approximately 400 citing references to create a large and manageable dataset. Articles were chosen that were at least ten years old to enable the exploration of citations across a substantial period of time. The following articles were selected: Carland, Hoy,

Boulton, and Carland, 1984 from Academy of Management Review (AMR); Davis, 1991 from Administrative Science Quarterly (ASQ); and Bettis and Prahalad, 1995 from Strategic Management Journal (SMJ).

The citing reference data for the three articles gathered from *Google Scholar* produced a set of 1,289 citing sources. The data set included 60 duplicate entries that amount to 5% of the total data. These duplicates were easily identified and removed from the data set by sorting by title, leaving 1229 unique citing references. It was not possible to reliably identify the type of source for approximately half of the data (46%) without foreign languages translation or carefully checking individual source titles, which was beyond the scope of this exploration. However, a simple scan to identify the types of sources that were easily recognisable clearly showed that *Google Scholar* indexes sources other than journals (16% of the identifiable sources were books, 6% were conference papers, 4% were working papers and 1% were theses or dissertations).

While we consider working papers, conferences, books, and dissertations to be appropriate sources for inclusion in a citation analysis because they are publicly available and a part of academic interchange, this consideration may be debated. It is likely that such sources occur more frequently in *Google Scholar* than in *SSCI*, *JCR* or *Scopus*, and this finding should be taken into account in future citation analyses. It is interesting to note that 193 (16%) of the references to the three selected articles were in a language other than English; these references are not as likely to be included in the major commercial citation databases.

A NEW JOURNAL RANKING

Following the same method used in the studies of accounting and marketing journals (Rosenstreich & Wooliscroft, 2009, 2012), the g-index and *Google Scholar* were used to generate a new ranking based on g-index scores. The new ranking was then used in a comparison with the selected existing management journals rankings. In the current study, h-index scores and journal rankings were also included in the analysis.

Six management journal rankings were selected for analysis based on the period of time that was covered and the diversity of methodology and the respondents. The six sources are described briefly in Table 5. The rankings from the six studies were entered into a database, and the items that were in the form of ratings were converted to rankings.

Table 5
Management journal rankings used in the current study

Ranking Source	**Method**	**Titles included in the current study**
Geary et al. (2004)	This ranking is based on Research Assessment Exercise (RAE) submission data and relies on the premise that the staff of universities with a higher RAE rating tend to publish in journals that are of higher quality.	54
Comité national de la recherche scientifique (Economics & Management) (CNRS) (2004)	This ranking was assigned by the committee in consultation with French and overseas 'experts' on the basis of criteria such as reputation, audience and impact.	19
Aston University 2006 (Harzing, 2007)	This list was originally compiled from a large survey of academics in the Midland Universities in the UK. The list was later updated with input from Aston research convenors.	27
Harvey-Morris Business Journals Listing (HMB) (Harzing, 2007)	This list was created by the Bristol Business School in 2004 and then gained feedback from UK business school deans and research directors.	26
Marsh and Hunt (2006)	This ranking was initially generated from the SSCI impact factor 10-year average for 80 titles and was then enhanced through a survey of the members of the Academy of Management to rate each of 45 journals.	39
JCR 2005 Social Science Edition (Thomson Scientific, 2007)	This ranking was based on the impact factors)of journals listed under the subject category of 'management.'	52

Titles ranked by two or more of the six sources were selected, and references to articles from those journals were then gathered from *Google Scholar*.

The year 2005 was the upper date limit for all of the gathered data, ensuring that the results would be commensurate with the published ranking studies that were conducted from 2004 to 2006. Each journal's current title (and, separately, any previous titles) was entered into *Google Scholar's* advanced search feature to

search for all articles from that journal. The results were checked for duplicate entries (misspelled or badly entered data), and duplicate citations and were combined where appropriate. The "cited by" field was extracted from the processed data. The resulting data were exported to Excel and sorted by the "cited by number of article" text in descending order. Formulae were entered into Excel to calculate both g-index and h-index scores.

RESULTS

The compilation of the six ranking sources resulted in a list of 57 journals. Most of the titles are published in the U.S. or U.K.: 25 titles (44%) are published in the U.S.; 22 titles (39%) are published in the U.K., with six from mainland Europe; and one listed as published in both the U.K. and Canada. It is noteworthy that none of the titles from the published rankings are from the southern hemisphere.

The g-index and h-index rankings produced by the analysis of *Google Scholar* citations are listed in Table 6, alongside the other ranking sources.

Table 6
Management journals listed by g-index rank

Journal Title	**First Year**	**g-index Rank**	**h-index Rank**	**JCR IF Rank**	**Geary et al. Rank**	**CNRS Rank**	**Aston Rank**	**HMB Rank**	**Marsh & Hunt Rank**
Academy of Management Review	1976	**1**	1	2	51	1	1	1	1
Administrative Science Quarterly	1956	**1**	2	3	51	-	1	1	1
Strategic Mngmt Journal	1979	**1**	4	6	51	-	1	1	1
Management Science	1954	**4**	3	8	51	-	-	-	17
Harvard Business Review	1922	**5**	6	12	1	-	1	7	1
Organization Science	1990	**6**	8	5	51	1			1
Academy of Mgmt Journal	1958	**7**	5	4	51	1	1	1	1
MIS Quarterly	1977	**8**	7	1	51	1			
The Journal of Business	1922	**9**	9	33	37	-	1	1	17
Research Policy	1972	**10**	10	7	51	-	-	-	17
Journal of Management	1975	**11**	13	9	51	6	1	7	17
MIT Sloan Management Review	1960	**12**	10	38	1	6	1	7	1
Journal of International Business Studies	1970	**13**	12	18	-	14	1	1	17

(continued)

Table 6 (*continued*)

Journal Title	First Year	g-index Rank	h-index Rank	JCR IF Rank	Geary et al. Rank	CNRS Rank	Aston Rank	HMB Rank	Marsh & Hunt Rank
California Management Review	**1958**	**14**	**16**	**24**	**51**	**6**	**1**	**7**	**17**
Journal of Management Studies	2000	**15**	14	13	199	6	1	7	17
Human Relations	1947	**15**	15	32	199	-	-	-	17
Journal of Economic Behavior & Organisation	1980	**17**	19	34	51	-	-	-	51
Journal of Product Innovation Mgmt	1984	**18**	16	27	51	-	-	-	17
Industrial & Corporate Change	1991	**19**	20	19	51	-	-	-	-
Organization Studies	1980	**19**	20	15	199	6	-	-	17
Academy of Mgmt Perspectives	1987	**21**	18	14	51	-	17	15	-
Indust. & Labour Relat. Rev.	1947	**22**	20	25	199	-	-	-	1
Decision Sciences	1970	**23**	23	22	1	-	-	-	17
Long Range Planning	1968	**24**	23	23	199	14	17	15	51
Organizational Dynamics	1972	**25**	26	39	174	6	-	-	17
Organizational Behavior & Human Decision Processes	1966	**26**	27	15	51	-	-	-	1
Operational Research Soc. Journal	1950	**26**	27	45	51	-	-	-	-
Journal of Business Research	1973	**28**	29	41	51	-	-	-	51
Journal of Business Ethics	1982	**29**	25	43	523	-	-	-	51
Omega	1973	**30**	33	42	199	-	-	-	51
Industrial Marketing Mgmt	1971	**31**	30	36	199	-	-	-	-
Information & Mgmt	1968	**31**	31	10	51	14	-	-	17
Journal of Econ. & Mgmt Strategy	1992	**33**	32	31	199	-	-	-	17
Journal of World Business	1965	**34**	43	28	51	-	1	7	51

(continued)

Table 6 (*continued*)

Journal Title	First Year	g-index Rank	h-index Rank	JCR IF Rank	Geary et al. Rank	CNRS Rank	Aston Rank	HMB Rank	Marsh & Hunt Rank
International Journal of Forecasting	1985	**35**	40	37	199	-	-	-	-
British Journal of Mgmt	1990	**36**	34	29	199	27	17	7	-
MIR - Mgmt International Review	1961	**37**	34	-	51	27	17	15	-
Business Horizons	1957	**38**	37	-	174	-	17	-	-
Intl. Journal of Service Indust. Mgmt	1990	**39**	37	43	199	-	-	-	-
Journal of Forecasting	1981	**39**	40	46	51	-	17	15	-
Organization	1994	**41**	44	15	199	6	-	-	17
IEEE Trans. on Engin. Mgmt	1954	**42**	46	29	51	-	-	-	51
Mgmt Learning	1994	**43**	40	26	-	-	1	15	51
Work Employment & Society	1987	**44**	39	21	199	-	-	-	17
International Business Review	1992	**45**	48	-	199	-	29	15	-
Review of Indust. Organization	1984	**46**	45	49	174	-	-	-	51
Techn. Analysis & Strat. Mgmt	1989	**47**	46	48	199	-	29	27	-
Intl. Journal of Technology Mgmt	1986	**47**	48	52	199	27	-	-	51
Group Decision & Negotiation	1992	**49**	50	40	199	-	17	27	51
Journal of Organ. Change Mgmt	1988	**50**	52	50	199	27	17	15	51
R & D Management	1970	**51**	51	47	378	-	-	-	17
The Service Industries Journal	1981	**52**	53	51	199				
Intl. Journal of Mgmt Reviews	1994	**53**	55	20	51	-	17	27	-
Journal of Management Inquiry	1992	**54**	54	34	199	27	17	15	17
Corporate Governance	1992	**55**	56	11	405	-	-	-	-
Thunderbird International Business Review	1959	**56**	57	-	199	-	17	27	-
European Business Review	1989	**57**	58	-	-	-	29	27	-

The g-index ranking results in three titles sharing the top position: *Academy of Management Review (AMR), Administrative Science Quarterly (ASQ)* and *Strategic Management Journal (SMJ)*. Observing how these three titles fared in other ranking methodologies, Marsh and Hunt (2006), Aston University (Harzing, 2007) and HMB (Harzing, 2007) all gave these three titles their highest rating. A ranking based on *JCR* impact factors ranked these titles in the top ten, with *AMR* and *ASQ* ranked second and third and *SMJ* ranked sixth. The CNRS (2004) ranked *AMR* first, but the *ASQ* and *SMJ* were not ranked. None of the three titles were highly ranked by Geary et al. (2004) based on RAE submissions.

In a further analysis of the full journal dataset, the g-index rank showed relatively strong and significant correlations with all of the published ranking sources ($.900 > rs < .604$; $p < .002$). The rankings based on *JCR* journal impact factors were also significantly related to the other ranking sources but with somewhat weaker relationships; the strongest correlation was given by Marsh and Hunt (2006) ($rs = .672$; $p = .000$). While there were significant correlations between all ranking sources, except for HMB (Harzing, 2007) and CNRS (2004), the strength of the correlations varied greatly (as would be expected due to their differing methodologies).

Many journals' impact factors produced rankings out of line with their g-index. For example, *MIT Sloan Management Review* received a relatively high g-index, ranked eighth in this study, even though it was ranked forty-third in the *JCR* impact factor ranking. While the *Journal of Economics and Management Strategy* was ranked thirty-sixth based on the *JCR* impact factor, it was ranked twenty-fifth based on the g-index.

Correlation and regression analyses of the ages of the journals against their g-indexes revealed that journals that have been in existence longer tend to have higher g-index scores; however, this relationship is weak ($r = -.467$, $p = .000$), and the year of first issue accounts for approximately 22% ($r^2 = .218$) of the variance in the g-index ranking. In comparison, because impact factors only assess the previous two years, they are not related to the age of the journal. The relationship between the year of first publication and the g-index is shown in Figure 1, and the use of a scatter plot reveals that many journals fall distant from the trend line. *Organization Science* and the *Journal of Management Studies* are good examples of relatively new journals (started in 1990 and 2000, respectively) that rank as well under a g-index-based ranking as they do under a ranking based on impact factors.

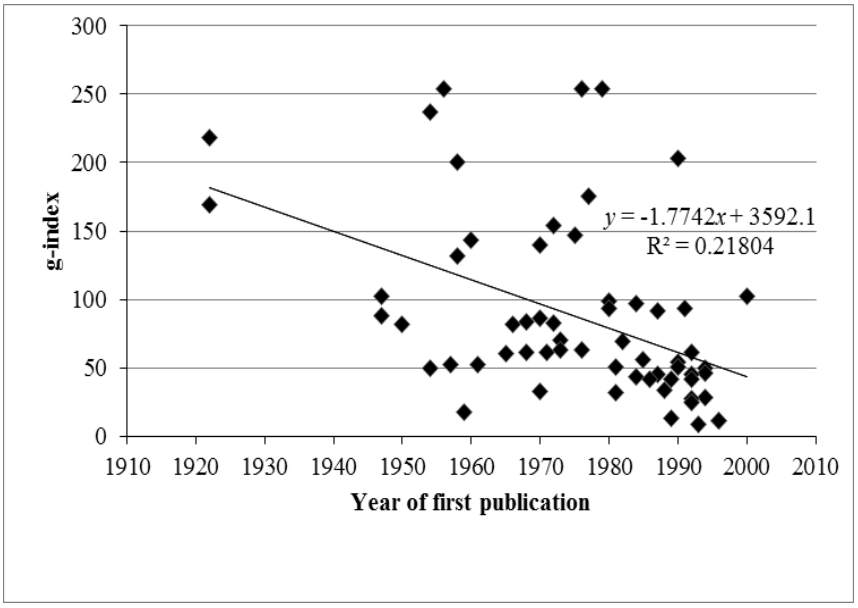

Figure 1. Comparison of the year of first publication and the g-index scores

DISCUSSION

In this study, *Google Scholar* was used as the data source for the generation of g-index scores for management journals. *Google Scholar* provides the advantage of free access and broad coverage (both in terms of titles and period of time). The results of the current study suggest that the Elsevier and Thomson Reuters databases do not provide good coverage of management literature, particularly titles from the Asia-Pacific region, and therefore understate the impact of many titles.

The improved ranking that journals such as the *Strategic Management Journal* and *MIT Sloan Management Review* received in our study likely results from the broader range of sources that are indexed in *Google Scholar* compared to the journals that are listed within *JCR* or *Scopus*. It is appropriate that journal rankings account for the use of research across a broad range of academic sources. In business disciplines, in particular, a number of academic publications are more practitioner-focussed than others and therefore may be cited more broadly. *Google Scholar's* inclusion of foreign language material and its better coverage of international titles is a clear advantage because management is an international discipline.

However, the lack of transparency about how and what data are added to *Google Scholar* is of concern, and the lack of quality control can lead to multiple entries for each journal title unless the data are processed, as they have been in this study. If researchers are aware of these limitations and search, process and use the *Google Scholar* data appropriately, these weaknesses can be eliminated or minimised. Of course, journal g-index scores can also be generated from citation data that is sourced elsewhere, and it is likely that over time, higher quality sources will emerge.

The relationship between the age of the journal and the g-index was not found to be particularly strong, but the age of a journal affects the g-index more than *JCR* impact factors because of the inclusion of data from more than just the previous two years. Generally, older journals are regarded to have greater status in most disciplines, and it may be appropriate that the journals that have survived for several decades are more highly regarded. Because the g-index is a measure of highly cited articles, any advantage older journals may have is not based on their age per se but on the use of their content, which appears to be appropriate. Regardless of the age of the citation, the fact remains that a g-index is an overall objective indication of how well cited that journal's body of work has been. In contrast, in an opinion survey, an older journal could have a good reputation regardless of how well cited its content has been. If the time factor is of concern, the g-index can be calculated for any period of time to obtain a current ranking rather than an overall ranking of the journal. However, the results of the current study showed that even without limiting the time coverage, relatively new journals were still able to receive strong g-index scores.

The use of g-index scores to rank journals has the advantage of allowing comparisons between journals in an objective and quantitative manner. However, it is important to recognise that the culture of individual journals (for example, in terms of how many references are included in articles) may impact the citation behaviour of journals and thus their g-index. Similarly, the cultures of disciplines also vary and therefore cross-discipline comparisons remain problematic. However, the g-index has the advantage of measuring the degree of difference between journals, which is objective and not based on perceptual rankings. Furthermore, the g-index is based on the articles in the journal, not the reputation of the journal (although the reputation may affect whether journals are cited and therefore have an indirect effect on the g-index results).

Moving beyond the limitations of the relatively poor business journal coverage in the *Web of Science* and the *JCR* impact factor formula represents a positive step; however, moving beyond these limitations does not resolve the basic problem of construct validity when citation counts are used to assess the quality or use of articles or journals. It should be clear that citations do not reflect all of the

potential uses of research and that the use of a citation is not synonymous with the quality of the work. Citation analysis is merely a convenient quantitative measure of a complex construct.

CONCLUSIONS

This study has reviewed some of the techniques and data sources that can be used to assess the impact of research. The g-index has been applied to journals from the management discipline and appears to provide a useful score for use in ranking journals. Data for the g-index were sourced from *Google Scholar* due to its convenience and broad, as well as international, coverage of business sources.

In an ideal world, academic performance would be assessed based on the expert assessment of the merit of individual research. In practice, evaluation is aided by an understanding of the relative standing of the journals in which research is published. The results of the present study show that some management journals that perform well in opinion-based rating lists are not particularly highly cited. Citation-based rankings of journals are recognised as providing both a more objective and practical means of assessing the impact of research than opinion-based rankings. However, traditional approaches to the citation-based rankings of journals, such as the use of *JCR* impact factors, have serious limitations. Recent developments in citation analysis provide researchers with more choices for data sources and methods for citation analysis.

The g-index reflects the impact of a journal and allows a few highly cited articles to influence but not dominate the overall index score of the journal. The g-index provides the advantage of allowing impact to be assessed for any desired period of time and is not limited by the journal selection policies of database providers or opinion surveys of authors. Important journals can be omitted from rankings based on opinion surveys and/or commercial databases. The g-index values for journals are not difficult to calculate, particularly compared to the effort involved in conducting an opinion survey. A perfect measure of journal impact is unlikely to exist; however, g-index scores represent an improvement over the current alternatives.

ACKNOWLEDGEMENT

We are very grateful to Professor Leo Egghe, the original developer of the g-index, for his invaluable feedback on our research.

REFERENCES

Antonakis, J., & Lalive, R. (2008). Quantifying scholarly impact: *IQp* versus the Hirsch *h*. *Journal of the American Society for Information Science and Technology, 59*(6), 956–969.

Bar-Ilan, J. (2008). Which h-index? – A comparison of WoS, Scopus and Google Scholar. *Scientometrics, 74*(2), 257–271.

Clark, T., & Wright, M. (2007). Reviewing journal rankings and revisiting peer reviews: Editorial perspectives. *Journal of Management Studies, 44*(4), 612–621.

Comite National de la Recherche Scientific. (2004). Journal ranking in economics and management. Retrieved 11 November, 2006, from http://hp.idefi.cnrs.fr/marty /comnat/revues.pdf

DuBois, F. L., & Reeb, D. (2000). Ranking the international business journals. *Journal of International Business Studies, 31*(4), 689–704.

Elsevier B. V. (2011). *Scopus database*. Retrieved 1 November 2011, from http://www.scopus.com/home.url

Egghe, L. (2006). Theory and practise of the g-index. *Scientometrics, 69*(1), 131–152.

Egghe, L. (2008). Mathematical theory of the h- and g-index in case of fractional counting of authorship. *Journal of the American Society for Information Science and Technology, 59*(10), 1608–1616.

Egghe, L., & Rousseau, R. (2000). The influence of publication delays on the observed aging distribution of scientific literature. *Journal of the American Society for Information Science, 51*(2), 158–165.

Egghe, L., & Rousseau, R. (2008). An h-index weighted by citation impact. *Information Processing & Management, 44*(2), 770–780.

Franke, R. H., Edlund, T. W., & Oster, F. I. (1990). The development of strategic management: Journal quality and article impact. *Strategic Management Journal, 11*(3), 243–253.

Garfield, E. (2000). Use of Journal Citation Reports and Journal Performance Indicators in measuring short and long term journal impact. *Croatian Medical Journal, 41*(4), 368–374.

Garfield, E. (2006). The history and meaning of the Journal Impact Factor. *Journal of the American Medical Association (JAMA), 295*(1), 90–93.

Geary, J., Marriott, L., & Rowlinson, M. (2004). Journal rankings in business and management and the 2001 research assessment exercise in the UK. *British Journal of Management, 15*, 95–141.

Goh, C.-H., Holsapple, C. W., Johnson, L. E., & Tanner, J. R. (1996). An empirical assessment of influences on POM research. *Omega: International Journal of Management Research, 24*(3), 337–345.

Gray, E., & Hodkinson, S. Z. (2008). Comparison of Journal Citation Reports and Scopus impact factors for ecology and environmental science journals. *Issues in Science and Technology Librarianship, 54*(Summer). doi: 10.5062/F4FF3Q9G

Harzing, A.-W. (2007, 5 March). The journal quality list. Retrieved 4 October 2007, from http://www.harzing.com

Harzing, A.-W. (2008, 24 June). Google Scholar – a new data source for citation analysis. Retrieved 3 July 2008, from http://www.harzing.com/pop_gs.htm

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

Jacsó, P. (2008). The plausibility of computing the h-index of scholarly productivity and impact using reference-enhanced databases. *Online Information Review, 32*(2), 266–283.

Jin, B., Liang, L., Rousseau, R., & Egghe, L. (2007). The R- and AR-indices: Complementing the h -index. *Chinese Science Bulletin, 52*(6), 855–863.

Kalervo, J., & Olle, P. (2008). The DCI index: Discounted cumulated impact-based research evaluation. *Journal of the American Society for Information Science and Technology 59*(9), 1433–1440.

Kirkpatrick, S. A., & Locke, E. A. (1992). The development of measures of faculty scholarship. *Group and Organization Management, 17*(1), 5–23.

Law, R., & Veen, R. v. d. (2008). The popularity of prestigious hospitality journals: A Google Scholar approach. *International Journal of Contemporary Hospitality Management, 20*(2), 113–125.

Marsh, S. J., & Hunt, C. S. (2006). Not quite as simple as A-B-C: Reflections on one department's experiences with publication ranking *Journal of Management Inquiry, 15*(3), 301–315.

Mingers, J., & Harzing, A.-W. (2007). Ranking journals in business and management: A statistical analysis of the Harzing data set. *European Journal of Information Systems, 16*(4), 303–316.

Neuhaus, C., & Daniel, H.-D. (2008). Data sources for performing citation analysis: An overview. *Journal of Documentation, 64*(2), 193–210.

Phene, A., & Guisinger, S. (1998). The stature of the Journal of International Business Studies. *Journal of International Business Studies, 29*(3), 621–632.

Proquest LLC. (2008). Ulrich's Periodicals Directory. Retrieved 16 December 2008, from http://ulrichsweb.com

Rogers, P. S., Campbell, N., Louhiala-Salminen, L., Rentz, K., & Suchan, J. (2007). The impact of perceptions of journal quality on business and management communication academics. *Journal of Business Communication, 44*(4), 403–426.

Ronald, R., & Fred, Y. Y. (2008). A proposal for a dynamic h-type index. *Journal of the American Society for Information Science and Technology, 59*(11), 1853–1855.

Rosenstreich, D., & Wooliscroft, B. (2009). Measuring the impact of accounting journals using Google Scholar and the g-index. *British Accounting Review, 41*(4), 227–239.

Rosenstreich, D., & Wooliscroft, B. (2012). Assessing international journal impact: The case of marketing. *European Business Review, 24*(1), 58–87.

Sharplin, A. D., & Mabry, R. H. (1985). The relative importance of journals used in management research: An alternative ranking. *Human relations, 38*(2), 139–149.

Tahai, A., & Meyer, M. J. (1999). A revealed preference study of management journals' direct influences. *Strategic Management Journal, 20*, 279–296.

Tenopir, C. (2004). Online databases—Online scholarly journals: How many? *Library Journal Academic Newswire*, (1 February). Retrieved from http://www.libraryjournal.com/article/CA374956.html

Thomson Scientific. (2007). JCR Social Sciences Edition. Retrieved 16 December 2008, from http://www.thomsonreuters.com/products_services/scientific/Journal_Citation_Reports

Thomson Scientific. (2008a). Journal citation reports. Retrieved 16 December 2008, from http://www.thomsonreuters.com/products_services/scientific/Journal_Citation_Reports

Thomson Scientific. (2008b). Using Journal Citation Reports wisely. Retrieved 11 August 2008, from http://admin-apps.isiknowledge.com/JCR/help/h_using.htm

Weale, A. R., Bailey, M., & Lear, P. A. (2004). The level of non-citation of articles within a journal as a measure of quality: A comparison to the impact factor. *BMC Medical Research Methodology, 4*, 14–22.