

Ranking Taiwanese management journals: A case study

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To improve the quality of journals in Taiwan, the National Science Council (NSC) of the Republic of China evaluates journals in the fields of humanities and social sciences periodically. This paper describes the evaluation of 46 management journals conducted by the authors, as authorized by the NSC. Both a subjective approach, with judgments solicited from 345 experts, and an objective approach, with data collected on four indicators: journal cross citation, dissertation citation, authors' scholastic reputation, and author diversity, were used to make a comprehensive evaluation. Performance in the four indicators were aggregated using weights which were most favourable to all journals, in a compromise sense, to produce the composite indices. The subjective evaluation reflects the general image, or reputation, of journals while the objective evaluation discloses blind spots which have been overlooked by experts. The results show that using either approach alone would have produced results which are misleading, which suggests that both approaches should be used. All of the editors of the journals being evaluated agreed that the evaluation was appropriate and the results are reasonable.

Introduction

Scientific journals are the media used for disseminating, exchanging, and sharing the knowledge explored by scholars. To have a higher impact, prestigious scholars select prestigious journals to publish their research work. At the same time, journals try

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to publish influential work to attract a wider group of readers. Due to this recursive cause-effect relationship, journals compete with each other to become number one. A direct consequence is that individuals and groups, especially libraries, allocate part of their limited budget to subscribe to only prestigious journals.

In addition to disseminating knowledge, an unintended function of journals is to serve as an indicator of the academic performance of researchers. Scholars with research published in prestigious journals are valued higher than those with research published in common journals. For this reason, many institutions evaluate journals in various fields. The simplest way to do this is to list the journals they acknowledge. Only articles published in those journals are counted. A more advanced way is to categorize journals into classes of different levels. Journals in a higher class are valued higher than those in a lower one, with journals of the same class being valued equally. The most complicated way is to assign each journal a score, or rank, so that knowing which journal is better than another, and by how much, is clear. No matter which way is chosen, a method to evaluate journals is required.

A lot of effort has been devoted to this topic since the pioneering work of GROSS & GROSS [1927]. The approaches for evaluating journals that appear in the literature can be separated into subjective or objective. The former is based on the subjective judgment of experts while the latter is based on objective data collected on different indicators. The quality of a journal should be considered from different aspects. However, it is impractical to consider them all. Besides, some aspects cannot be quantified. Hence, the most straightforward way is to ask experts who are familiar with the field of concern to rank journals from an overall point of view. The study of PARAMESWARAN & SEBASTIAN [2006] for South and Southeast Asian studies journals is an example. However, finding experts who are familiar with all of the journals to be evaluated is a problem. Most scholars are only familiar with famous journals, which makes ranking common journals difficult. Moreover, accurately ranking journals of similar quality is difficult for human judgment [MCGRATH, 1987]. Another problem is that some experts may have a prejudice. A sufficient number of experts is necessary to average out contradictory and biased opinions. These are the two major problems faced in subjective evaluation.

In contrast to subjective evaluation, which is a personal impression, objective evaluation relies on solid data from indicators which best represent the quality of a journal. The most popular indicator is probably citations [GARFIELD, 1972]. If an article is influential, it will be referenced by many papers. This idea can be extended to journals, where the more influential articles a journal contains, the more influential it becomes. The study of LINTON & THONGPAPANL [2004] is an example of this. There are also other indicators, such as publishers, editorial board, acceptance rate, etc. [COE & WEINSTOCK, 1984; JARLEY & AL., 1998]. Although objective evaluation is more persuasive, it also suffers from some problems. One is the selection of indicators.

Obviously, some indicators are more favourable to certain journals, and if omitted will harm the rankings of those journals. Another is the importance, usually expressed as weights, used in aggregating the performance of a journal applied to all indicators to form a composite index for comparison [HOROWITZ, 2003]. A large weight assigned to a journal's best performance indicator would surely favour this journal.

Both the subjective and objective approaches have pros and cons. In order to obtain better results, many studies have combined these two approaches in different ways [DUL & AL., 2005; TURBAN & AL., 2004]. For example, OLSON [2005] used opinion surveys and citation analyses to rank journals in operations management and related fields. By using a similar mixed method, BAUERLY & JOHNSON [2005] evaluated journals used in doctoral marketing programs. Obviously, having more aspects to consider, on one hand, produces more reliable results; the effort, on the other hand, increases proportionally. To minimize effort while maintaining the same quality of results, the method used should depend on the purpose of the evaluation.

The National Science Council (NSC) of the Republic of China is the major funding agency in Taiwan for university professors and institute researchers. Its mission is to improve the research environment and promote the research capability of researchers in Taiwan. Its ultimate goal is to raise the research performance, in all aspects, of Taiwan to the world standard. In this regard, one thing that the NSC has been doing in recent years is to evaluate journals published in Taiwan in the fields of humanities and social sciences. The aim is to improve the quality of those journals. It is hoped that a couple of them will become well known in the world in the near future. A secondary purpose of the evaluation is to know which journals are better so that in reviewing the applications for grants, the NSC will have some idea of the academic status of the applicants from their publications. There are sixteen fields in the Department of Humanities and Social Sciences of the NSC. The journals in each field are evaluated periodically. In 2006, journals in the field of management were evaluated, and a project was granted to the authors of this paper to conduct the evaluation. This paper describes the whole process of the evaluation.

In the sections that follow, the method used for evaluation is first introduced. Then, the results from evaluating the management journals published in Taiwan are reported and discussed. Finally, conclusions are drawn from the results and discussion.

Method

A lot of articles in the literature have discussed a method for evaluating journals (see, for example, [BONNEVIE-NEBELONG, 2006; BUTLER, 2002; HOROWITZ, 2003; MCGRATH, 1987; NISONGER, 1999; TURBAN & AL., 2004]). Depending on the purpose of evaluation, a method which is suitable for one case may not be suitable for another. The NSC does not have a specific method for conducting the evaluation. The evaluation

team had complete freedom in determining the method. The NSC only has some general requirements for a journal to be qualified for evaluation:

- (a) Its major content must be related to management.
- (b) It must have a review system.
- (c) It must have been published for at least three years.
- (d) Each issue must contain at least four articles.

There were 60 journals which satisfied these requirements. These journals, on one hand, were delighted to be evaluated because they had been acknowledged by the NSC. On the other hand, they were also afraid of being evaluated as unsatisfactory. This was especially the case for new or non-mainstream journals in management. Out of respect, the evaluation team asked the 60 journals' permission for evaluation, with 46 journals agreeing to be evaluated.

The most important part of an evaluation is the method used. Many studies found that either the purely subjective or the purely objective approach had deficiencies, and the results obtained would be more reliable if these two approaches were combined. For this reason, the two approaches were used together in the evaluation.

Subjective approach

In subjective evaluation, the experts being requested to provide judgment play a decisive role in the results. The results are convincing only if the experts are scholastically prestigious. In Taiwan, most scholars in universities and research institutes rely on research grants from the NSC to conduct research. The number of grants from the NSC is also a key indicator of the academic status of universities. In this regard, professors with research projects funded by the NSC are considered as scholastically prestigious, and were thus consulted. The professors who received a grant from the NSC needed not be senior scholars because the NSC has a track for young scholars. A professor in his/her first five years of teaching/research career is eligible to apply the NSC grants from that track. Its approval rate is a little higher than the normal track. Hence, the sample in the survey would not be biased towards senior scholars. Professors who had conducted at least one project funded by the NSC in the years 2003, 2004, and 2005 were considered. From the record of the NSC, there were 1300 scholars who fulfilled this condition. They were the experts whose opinion was solicited in this study.

The survey was conducted on the internet. In the questionnaire, an expert was asked whether he/she was familiar with each journal. If the answer was no for a particular journal, this journal would be skipped. Otherwise, the expert was asked to indicate how familiar he/she was with the journal on a scale of 1 to 5, where 1 represented the lowest and 5 the highest level of familiarity. In addition, the expert was asked to evaluate the

quality of the journal on a scale of 1 to 7. The evaluation was a general impression the expert had on each journal based on subjective judgment. One expert might emphasize a specific aspect while another might emphasize other aspects. The reason why this study used a 7-point scale, instead of the same 5-point one, in evaluating the quality level of a journal was because most people are hesitant to give extreme scores, such as 1 or 7, in evaluation. If the same 5-point scale were used, there would be only three choices left. This is not a serious issue for distinguishing the level of familiarity; however, discriminating power would be lost in evaluating the important element of quality.

For each journal, excluding the experts who were not familiar with the journal, the level of familiarity was not the same for all experts. The opinions from those who were more familiar with the journal should be more emphasized than those from who were less familiar with it in order to obtain a more reliable result. In this evaluation, the level of familiarity was used as the weight in calculating the average level of quality. Suppose there are m_i experts who reply that they are familiar with the i th journal. Let F_{ij} denote the level of familiarity and Q_{ij} the level of quality assigned to the i th journal by the j th expert. Then, the subjective index of the i th journal, S_i , is the average of Q_{ij} weighted by F_{ij} :

$$S_i = \frac{\sum_{j=1}^{m_i} F_{ij} Q_{ij}}{\sum_{j=1}^{m_i} F_{ij}} \quad (1)$$

The indices S_i , $i=1, \dots, 46$ are then used for subjective evaluation.

Objective approach

Objective evaluation relies on indicators which properly reflect the quality of a journal. The indicator which has been considered by many studies as the most representative is citations. A journal with articles being cited more frequently has a stronger impact than those with fewer cited articles, and is considered to have better quality. Several factors will affect the number of citations: publication frequency, publication age, and self-citation [LINTON & THONGPAPANL, 2004; PASTERKAMP & AL., 2007]. Each factor needs to be adjusted to avoid obtaining a misleading result.

A journal that publishes more articles each year has more citations than those with fewer published articles, *ceteris paribus*. In this study, the volumes published in the years 2003, 2004, and 2005 were used to evaluate the quality of journals. Hence, the total number of citations was divided by the total number of articles published in those three years. The result is the average number of times that each article of a journal was cited.

To adjust for publication age so that the number of citations for articles published in different years are comparable, this study applied an idea of window analysis with a

period of four years. Instead of looking forward, as conventional citation analyses have been doing, this study looked back. Articles from all journals published in 2003–2005 were traced back for four years. The method was to look into the references of all articles published in 2003–2005 and find those articles published in the last four years. For example, for an article published in 2005, the articles in its references published in 2001, 2002, 2003, and 2004 were examined. For an article published in 2003, the articles in the references published in 1999, 2000, 2001, and 2002 were examined. Articles less than five years old in the references were then grouped according to journal titles, which yielded the number of citations for each journal. The number of citations was divided by four to obtain a yearly average. Note that it was not how an article was being cited by later articles that was examined, but rather the articles being referenced by this article. This method should provide a similar measure of the impact of a journal.

Self-citation also needs to be considered. Most authors have an inclination to cite their own work because they are more familiar with their work. This is unfair to other similar or related studies. A similar issue is the citation of articles in the same journal. Usually, there are two reasons for doing this. One is to let the reviewers know that the submission fits the scope of the journal. Another, which is usually requested by the journal, is to promote the popularity of the journal. To make a fair comparison, citations of articles by the same author (including co-authors) and from the same journal were excluded.

Since most of the articles being cited were published in international journals, the number of citations for domestic journals was low. To obtain a result which is more representative, this study also examined citations from doctoral dissertations in management, in addition to the traditional cross-citation count. The method was the same as that for the cross-citation count. Since the field of management is rather wide and ambiguous in its boundary, determining whether a dissertation belongs to the field of management or not may be controversial. In this study, only dissertations from colleges of management, business, or the like, were counted. Similar to the case of the cross-citation count, citations of work by the same author were excluded, a same period of four years backwards was applied to adjust for publication age, and the total number was divided by three to obtain a yearly average.

Citations alone may not be enough to represent the quality of a paper. For example, research which has completed all of what can be done in a particular field may not be cited by later researchers because there is no space for future studies. A very good paper in a narrow area may not have many citations, either. A more serious issue is that of a paper containing the wrong results and being criticized by others, with the citations being negative. To overcome these deficiencies, this study selected the scholastic reputation of authors as another indicator. People believe that prestigious scholars produce good research results and they usually publish their research in those journals

which they consider as prestigious. This is also why many journals invite prestigious scholars to write articles for them. Hence, the number of prestigious authors in a journal is an indicator of its quality. How to define an author as prestigious, again, is not easy, with prestige having different levels. Similar to the case of subjective evaluation, where scholars with research grants from the NSC were considered as “experts” to provide judgments, here the average number of research projects that the author of each article of a journal had received from the NSC in the last three years was used as an indicator of the scholastic reputation of authors. For articles with more than one author, their average was used. Foreign authors were excluded from the calculation.

One final criterion, which may not have a direct connection with the quality of a journal but has considerable impact on dissemination, is the diversity of authors. In Taiwan, there are many journals which are published by universities. Their purpose is primarily to provide an outlet for the research conducted by their faculties. As a matter of fact, the faculty also has a tendency to submit papers to their own journal because it is easier to be accepted. Although these journals welcome submissions from outsiders, the authors are mostly from their own faculties, and the readers are quite limited. On the contrary, if a journal has contributions from a variety of authors, then its group of readers will be wider and, consequently, its impact will be larger.

The measure for author diversity used in this study is entropy [DE LUCA & TERMINI, 1972; ZIMMERMANN, 1996]. This measure has been used by KAO [2007] to compare the international diversity of the authors of operations research journals. Suppose there are n articles published in a journal in the last three years and the authors are from k different organization units. For articles with more than one author, each author receives an equal portion of the article. Let n_i be the number of authors from the i th organization unit and $p_i = n_i/n$ be its proportion. Note that the sum of all p_i is equal to 1. The entropy measure is [ZELENY, 1982]:

$$E = - \sum_{i=1}^k p_i \ln p_i \quad (2)$$

For an extreme case that all n articles are contributed by the same organization unit, that is, one p_i is equal to 1 and all others are equal to 0; then E is equal to 0. The largest value of this measure occurs when all n articles are from different organization units, that is, $p_i = 1/n$, $i=1, \dots, n$. The corresponding value is $E_{\max} = \ln n$. Since the entropy measure E calculated from different n has different scales, usually it is divided by E_{\max} so that journals with different numbers of articles have a common basis for comparison. This standardization yields a measure lying between 0 and 1, where a value close to 1 indicates wider diversity while that close to 0 indicates narrower diversity. The organization unit used for calculation in this study is a department.

To summarize, this study used cross-citation, dissertation citation, authors' scholastic reputation, and author diversity as indicators to objectively evaluate the quality of journals.

Performance aggregation

Each journal may perform differently in each criterion. The performance in the four criteria must be aggregated to yield a composite index, which represents the overall performance, for comparison. There are two approaches to obtain the weights for aggregation: *a priori* weights subjectively solicited from experts and *a posteriori* weights objectively derived from the data itself [KAO & HUNG, 2003, 2005]. To avoid subjectivity, the weights used in this study were *a posteriori* weights. The basic idea is to find the ideal, or maximum, composite index that each journal can attain in the first stage. A constrained least-squares method which minimizes the total squared-difference between the ideal composite index and the final composite index for all journals is applied in the second stage to find the common weights. With the final weights, the composite index of each journal is calculated.

Let S_{ij} denote the score of journal i in indicator j , and w_{ij} the associated weight that this journal uses to yield the maximal composite index. Although each journal was allowed to select the most favourable weights in calculating its ideal composite index, no indicator should be ignored or over-emphasized. Hence, a lower bound L_j and upper bound U_j are imposed for each indicator. The calculation of the ideal index I_i for journal i was via the following linear program:

$$\begin{aligned}
 I_i = \text{Max} \quad & \sum_{j=1}^4 w_{ij} S_{ij} \\
 \text{s.t.} \quad & \sum_{j=1}^4 w_{ij} = 1 \\
 & L_j \leq w_{ij} \leq U_j, j=1, \dots, 4.
 \end{aligned} \tag{3}$$

The constraint of $\sum_{j=1}^4 w_{ij} = 1$ is imposed to fulfil the definition of weighted average.

The weights used to calculate the ideal composite index could be different from journal to journal. In the second stage, the weights from all journals are compromised by applying a least-squares method to yield a common set of weights so that the resulted composite indices have a common base for comparison. Let $\beta_j, j=1, \dots, 4$ denote

the common weights. Then, $\sum_{j=1}^4 \beta_j S_{ij}$ is the final composite index of the i th journal. Since the i th journal is expecting to have a composite index of I_i , the difference between I_i and $\sum_{j=1}^4 \beta_j S_{ij}$ is the level of disappointment of this journal. A set of common weights β_j which will produce the minimum total squared-disappointment among all journals is desired. The corresponding mathematical program to achieve this goal is:

$$\begin{aligned} \text{Min } & \sum_{i=1}^{46} \left(I_i - \sum_{j=1}^4 \beta_j S_{ij} \right)^2 \\ \text{s.t. } & \sum_{j=1}^4 \beta_j = 1 \end{aligned} \tag{4}$$

$$L_j \leq \beta_j \leq U_j, j=1, \dots, 4.$$

Here, the bound constraints are also imposed. After the weights β_j are solved from (4), the objective index O_i of each journal is calculated as $O_i = \sum_{j=1}^4 \beta_j S_{ij}$. This index is then used for objective evaluation.

Both the subjective evaluation and objective evaluation have contributions in determining the quality of a journal. In this study, they had equal weight, and their average was used for final comparison.

Results

The 46 journals evaluated had different numbers of articles published in the years 2003, 2004, and 2005. The first column of Table 1 shows the title and the second column shows the number of articles published in those three years. There are several journals whose titles look to be not directly related to management; for example, the *Journal of the Chinese Institute of Industrial Engineers*, *Taiwan Journal of Public Health*, the *Journal of Taiwan Association for Medical Informatics*, etc. The policy of the NSC is to encourage journals to be evaluated. Hence, as long as a journal has more than four articles in an issue which are related to management, in a loose definition, it is included for evaluation. The average number of articles is 64.15 for three years, or 21.38 for one year. The largest number is 172, appearing in the *Journal of the Chinese Institute of Industrial Engineers*. This journal is not a mainstream one in management.

Table 1. Data and results of the subjective evaluation

Journal title	Number of articles	Number of respondents	Weighted average
<i>Journal of Management</i>	128	253	6.1478 (1)
<i>Review of Securities and Futures Markets</i>	57	102	5.7869 (2)
<i>Journal of Financial Studies</i>	41	86	5.7320 (3)
<i>NTU Management Review</i>	48	237	5.5617 (4)
<i>Management Review</i>	71	248	5.5255 (5)
<i>Journal of Information Management</i>	95	123	5.4535 (6)
<i>J. Chinese Institute of Industrial Engineers</i>	172	130	5.2524 (7)
<i>International Journal of Accounting Studies</i>	24	79	5.2413 (8)
<i>Journal of Management & Systems</i>	72	229	5.2172 (9)
<i>Chiao Da Management Review</i>	46	222	5.1879 (10)
<i>Sun Yat-Sen Management Review</i>	87	278	5.1073 (11)
<i>J. Chinese Institute of Transportation</i>	56	56	4.9390 (12)
<i>Journal of e-Business</i>	42	116	4.7052 (13)
<i>Asia Pacific Management Review</i>	127	201	4.6524 (14)
<i>Int. J. Information and Management Sciences</i>	80	91	4.5535 (15)
<i>Journal of Human Resource Management</i>	81	124	4.5486 (16)
<i>Taiwan Accounting Review</i>	32	72	4.4408 (17)
<i>Taiwan Journal of Public Health</i>	167	36	4.4262 (18)
<i>Journal of Quality</i>	65	75	4.3626 (19)
<i>Taiwan Banking & Finance Quarterly</i>	102	92	4.3444 (20)
<i>Journal of Technology Management</i>	74	156	4.2972 (21)
<i>Electronic Commerce Studies</i>	53	105	4.2552 (22)
<i>Fu Jen Management Review</i>	60	156	4.0935 (23)
<i>Journal of Contemporary Accounting</i>	28	58	4.0381 (24)
<i>Industry Forum</i>	132	92	4.0000 (25)
<i>Journal of Tourism Studies</i>	63	40	3.9355 (26)
<i>Journal of Health Management</i>	52	43	3.9248 (27)
<i>Int. J. Electronic Business Management</i>	79	85	3.8813 (28)
<i>Commerce & Management Quarterly</i>	78	158	3.8469 (29)
<i>Soochow Journal of Economics and Business</i>	59	126	3.8041 (30)
<i>Pan-Pacific Management Review</i>	32	148	3.7464 (31)
<i>Journal of Healthcare Management</i>	87	48	3.6932 (32)
<i>Asia-Pacific Economic & Management Review</i>	34	95	3.6619 (33)
<i>Chung Yuan Management Review</i>	38	130	3.5223 (34)
<i>Journal of Environment and Management</i>	32	33	3.5146 (35)
<i>Bulletin of Labour Research</i>	23	32	3.4526 (36)
<i>Insurance Monograph</i>	25	43	3.4429 (37)
<i>Business Review</i>	28	109	3.3989 (38)
<i>J. Taiwan Association for Medical Informatics</i>	58	28	3.3580 (39)
<i>The Journal of Health Science</i>	88	30	3.1059 (40)
<i>J. Management & Educational Research</i>	25	35	3.0632 (41)
<i>Chung Hua Journal of Management</i>	63	111	2.9897 (42)
<i>Tourism Management Research</i>	32	51	2.9568 (43)
<i>Chaoyang Business and Management Review</i>	31	84	2.8269 (44)
<i>Journal of Chang Jung Christian University</i>	58	72	2.5325 (45)
<i>Hsuan Chuang Journal of Management</i>	26	61	2.2543 (46)
Average	64.15	108.24	4.1900

Interestingly, the journal with the second largest number of articles, *Taiwan Journal of Public Health*, is not a mainstream journal in management, either. In addition to these two journals, there are four more journals which have a number of articles greater than 100. The journal with the least number of articles is *Bulletin of Labour Research*, with only 23.

Subjective evaluation

In subjective evaluation, the 1300 scholars who had at least one research project funded by the NSC in the years 2003, 2004, and 2005 were invited to provide judgment, using the internet, regarding the overall quality of the 46 journals published in Taiwan. Of the 1300 scholars, 345 responded, giving a response rate of 26.5%, which is quite normal for surveys in Taiwan. Due to unfamiliarity, not all of the 345 respondents evaluated all 46 journals. The third column of Table 1 shows the number of experts who made an evaluation for each journal. There were seven journals, *Sun Yat-Sen Management Review*, *Journal of Management*, *Management Review*, *NTU Management Review*, *Journal of Management & Systems*, *Chiao Da Management Review*, and *Asia Pacific Management Review*, whose number of respondents was greater than 200. All have a scope of general management, as implied by their titles. This is reasonable, since journals of general management have a broader readership, and, proportionally, they had more respondents. There were six journals, *Journal of Taiwan Association for Medical Informatics*, *The Journal of Health Science*, *Bulletin of Labour Research*, *Journal of Environment and Management*, *Journal of Management & Educational Research*, and *Taiwan Journal of Public Health*, whose number of respondents was less than 40. As expected, the scope of these journals is relatively narrow. They are limited to healthcare, tourism, environment, or education. On average, each journal had 108.24 respondents. There seems to be no correlation between the number of articles (in column 2) and the number of respondents.

The last column of Table 1 shows the quality level of each journal calculated as the weighted average of the respondents. The numbers in parentheses are the ranks of the journals. Of the 46 journals, none has a score of less than 2 and only one has a score of greater than 6. As mentioned in the preceding section, psychologically, people are hesitant to give extreme scores such as 1 or 7. This is why this study used a 7-point scale, instead of a 5-point scale, in evaluating the quality level. The average for the 46 journals is 4.19. The journal with the highest score is the *Journal of Management*, which was also the one with the most respondents. Again, there seems to be no correlation between the number of articles (in column 2) and the quality level. By comparing the numbers in columns 3 and 4, however, it is noted that journals with a larger number of respondents, in general, have higher scores. For example, the seven journals with the number of respondents of more than 200 are among the top 14, while

the six journals with the number of respondents of less than 40, except *Taiwan Journal of Public Health*, are among the bottom 12. Nevertheless, this does not imply that a highly-valued journal must have a large number of respondents. It is noted in Table 1 that the *Journal of Financial Studies*, with 86 respondents, is still ranked third, the *International Journal of Accounting Studies*, with 79 respondents, is ranked eighth, and the *Journal of the Chinese Institute of Transportation*, with 56 respondents, is ranked twelfth. There are several journals whose number of respondents is more than 100 yet their quality scores are low. Most of them are university journals. The reputation of this type of journal is not comparable with general journals.

Before conducting the survey, the evaluation team was slightly concerned that experts of small area, such as, tourism, healthcare, education, etc., might protect their territory by assigning high scores to journals of their area and low scores to others. This turned out to be not the case. As a matter of fact, journals of these areas were ranked relatively lower than others. Moreover, in the top ten journals, five have a scope of general management and five are of specific function areas.

Objective evaluation

Four indicators were considered in the objective evaluation. The first was cross-citation. The results in the second column of Table 2 indicate that the numbers of citations, as expected, are rather low, with an average of 0.172. The largest number is 1.125, appearing for the *International Journal of Accounting Studies*. The next is *Management Review*, with a value of 0.8451; followed by *Review of Securities and Futures Markets* (0.7719), and *Journal of Management* (0.75). All of the remaining journals have a value of smaller than 0.5. There are nine journals which have never been cited by other journals. If these journals are excluded, as done in other studies, the average of the remaining 37 journals is raised to a value of 0.2138.

The second indicator was dissertation citation. The results are shown in the third column of Table 2. Again, the numbers are quite low, with an average of 0.1032. The largest number is 0.5833, which occurs for the *International Journal of Accounting Studies*. The next three journals are the same as those in the cross-citation: *Management Review* (0.5211), *Review of Securities and Futures Markets* (0.4561), and the *Journal of Management* (0.3594). Only thirteen journals have a number of citations of greater than 0.1. There are twelve journals whose number of citations is 0, with eight of these having a number of cross-citations of 0. If journals with zero citations are excluded, the average number of dissertation citations is raised to 0.1396.

The third indicator was the scholastic reputation of authors, which is represented by the average number of NSC projects granted to the authors in the last three years.

Table 2. Data and results of the objective evaluation

Journal title	Cross citation	Dissertation citation	Authors' reputation	Author diversity	Weighted average
<i>Management Review</i>	0.8451	0.5211	1.5927	0.8418	0.8612 (1)
<i>International Journal of Accounting Studies</i>	1.1250	0.5833	1.4967	0.7255	0.8523 (2)
<i>Review of Securities and Futures Markets</i>	0.7719	0.4561	1.7047	0.8171	0.8489 (3)
<i>Journal of Management</i>	0.7500	0.3594	1.6006	0.8503	0.8061 (4)
<i>Sun Yat-Sen Management Review</i>	0.4598	0.3563	1.6194	0.8331	0.7719 (5)
<i>NTU Management Review</i>	0.3125	0.3333	1.5008	0.8655	0.7346 (6)
<i>Journal of Financial Studies</i>	0.3659	0.0976	1.4376	0.8129	0.6381 (7)
<i>Asia Pacific Management Review</i>	0.1102	0.0236	1.6222	0.8206	0.6290 (8)
<i>Int. J. Information and Management Sciences</i>	0.0000	0.0000	1.6746	0.7993	0.6138 (9)
<i>Pan-Pacific Management Review</i>	0.0000	0.0313	1.3238	0.9139	0.5874 (10)
<i>Chiao Da Management Review</i>	0.2609	0.1739	1.0026	0.8939	0.5852 (11)
<i>Journal of Information Management</i>	0.1895	0.0947	1.3488	0.7099	0.5656 (12)
<i>Journal of Human Resource Management</i>	0.1728	0.2222	1.0912	0.7541	0.5630 (13)
<i>J. Chinese Institute of Industrial Engineers</i>	0.0814	0.0291	1.4324	0.7298	0.5579 (14)
<i>Taiwan Accounting Review</i>	0.0000	0.0000	1.9058	0.4804	0.5577 (15)
<i>Journal of Management & Systems</i>	0.1806	0.1389	1.0342	0.8195	0.5480 (16)
<i>Journal of Contemporary Accounting</i>	0.1786	0.1429	0.9850	0.7913	0.5294 (17)
<i>Journal of Technology Management</i>	0.3784	0.1351	0.8749	0.7989	0.5282 (18)
<i>Int. J. Electronic Business Management</i>	0.0000	0.0000	1.2862	0.7443	0.5143 (19)
<i>Journal of Quality</i>	0.0000	0.0000	1.2095	0.7895	0.5130 (20)
<i>Fu Jen Management Review</i>	0.2000	0.1500	0.8688	0.7858	0.5077 (21)
<i>Journal of e-Business</i>	0.0714	0.0238	0.9644	0.6795	0.5071 (22)
<i>Commerce & Management Quarterly</i>	0.1154	0.1538	0.7677	0.8339	0.4943 (23)
<i>Bulletin of Labour Research</i>	0.0435	0.0435	0.9165	0.8178	0.4788 (24)
<i>Chung Yuan Management Review</i>	0.0526	0.0263	0.8968	0.8217	0.4717 (25)
<i>Insurance Monograph</i>	0.2000	0.0400	0.8916	0.7595	0.4704 (26)
<i>Journal of Environment and Management</i>	0.0625	0.0313	0.9771	0.7478	0.4669 (27)
<i>Soochow Journal of Economics and Business</i>	0.1017	0.0169	0.8144	0.7803	0.4433 (28)
<i>Electronic Commerce Studies</i>	0.0000	0.0000	1.0773	0.8561	0.4405 (29)
<i>Asia-Pacific Economic and Management Review</i>	0.0882	0.0588	0.6568	0.8354	0.4396 (30)
<i>Industry Forum</i>	0.0379	0.0758	0.7214	0.7741	0.4327 (31)
<i>Taiwan Banking & Finance Quarterly</i>	0.0686	0.0784	0.5255	0.8679	0.4266 (32)
<i>Taiwan Journal of Public Health</i>	0.1018	0.0120	0.7576	0.7138	0.4080 (33)
<i>Chung Hua Journal of Management</i>	0.0317	0.0794	0.8102	0.5760	0.3867 (34)
<i>Journal of Healthcare Management</i>	0.1494	0.0460	0.3993	0.7966	0.3756 (35)
<i>Chaoyang Business and Management Review</i>	0.0323	0.0000	0.5055	0.8036	0.3734 (36)
<i>Business Review</i>	0.0357	0.0000	0.6579	0.6984	0.3712 (37)
<i>Journal of the Chinese Institute of Transportation</i>	0.0179	0.0714	0.6057	0.6280	0.3570 (38)
<i>Journal of Tourism Studies</i>	0.0635	0.0317	0.3776	0.7952	0.3569 (39)
<i>Tourism Management Research</i>	0.1250	0.0938	0.2806	0.7679	0.3531 (40)
<i>Hsuan Chuang Journal of Management</i>	0.0000	0.0000	0.4392	0.7931	0.3525 (41)
<i>The Journal of Health Science</i>	0.0795	0.0000	0.3247	0.8217	0.3465 (42)
<i>J. Taiwan Association for Medical Informatics</i>	0.0345	0.0000	0.5289	0.6796	0.3379 (43)
<i>Journal of Chang Jung Christian University</i>	0.0172	0.0172	0.2098	0.8700	0.3368 (44)
<i>Journal of Health Management</i>	0.0000	0.0000	0.3177	0.8058	0.3312 (45)
<i>Journal of Management & Educational Research</i>	0.0000	0.0000	0.0870	0.8590	0.3002 (46)
Average	0.1720	0.1032	0.9592	0.7817	0.5081
Weight	0.1224	0.1776	0.4000	0.3000	

Theoretically, it has a ceiling value of 3; that is, all authors have a research project from the NSC each year. As shown in the fourth column of Table 2, the average of the 46 journals is 0.9592. The largest number is 1.9058, appearing for *Taiwan Accounting Review*. Eight journals have a number greater than 1.5. This is not easy to achieve because usually a paper is co-authored by a professor and a doctoral student. The doctoral student may not even be eligible to apply for the NSC grant. In this case, the professor must have an NSC project every year to produce an average of 1.5 with the student.

Finally, the results for the fourth indicator, author diversity, are shown in the fifth column of Table 2. The differences among the 46 journals are not as significant as those of the other three indicators. The largest value is 0.9139, occurring for *Pan-Pacific Management Review*, and the smallest is 0.4804, occurring for *Taiwan Accounting Review*. The average of the 46 journals is 0.7817. These values may not disclose the degree of diversity in a straightforward manner. To have a rough picture, consider the case of this study, where 46 journals have an average of 64 articles in the last three years. If these 64 articles are equally contributed by 1, 2, 4, 8, 16, 32, and 64 different departments, then the entropy measures will be 0, 0.1667, 0.3333, 0.5, 0.6667, 0.8333, and 1, respectively. For the journal with the smallest value of 0.4804, if it has 64 articles, then one possibility is that those 64 articles are equally contributed by less than 8 departments because 8 departments will result in an entropy measure of 0.5.

The scores of the four indicators have different scales. For example, the authors' reputation has a ceiling value of 3 and the author diversity has a ceiling value of 1. To provide a common base for calculating the weighted average, the scores in each indicator were divided by the largest one so that each indicator has a same ceiling value of 1. In applying Models (3) and (4) to obtain the common weights, the 345 experts were consulted, via a questionnaire on the internet, to provide bounds L_j and U_j for the weights. The results were [0.1, 0.7], [0.05, 0.6], [0.1, 0.4], and [0.05, 0.3] for cross-citation, dissertation citation, authors' reputation, and author diversity, respectively. The common weights obtained are 0.1224, 0.1776, 0.4, and 0.3, respectively, as shown in the last row of Table 2. Interestingly, the most popular indicator, cross-citation, was considered as the least important by the 46 journals. Authors' reputation has the largest weight. As a matter of fact, its value could be larger if the upper bound imposed for this weight was relaxed. Similarly, the second largest weight of 0.3, for author diversity, could also be raised if its upper bound is ignored. The first two indicators, cross-citation and dissertation citation, are related to citations. The sum of their weights is 0.3. This makes the weights for citation, authors' reputation, and author diversity to have similar values of 0.3, 0.4, and 0.3, respectively.

By applying the weights of 0.1224, 0.1776, 0.4, and 0.3 to the standardized scores of cross-citation, dissertation citation, authors' reputation, and author diversity, respectively, a composite index which represents the objective performance of each journal was calculated. The results are shown in the last column of Table 2. The

numbers in parentheses are ranks. Different from the subjective evaluation, where five of the top ten journals are of general management and five are of specific functions, seven of the top ten journals evaluated objectively are of general management. However, for the top twenty journals, it is nine versus eleven, which is quite similar. As was the case in subjective evaluation, journals with unsatisfactory performance are university journals and those of areas which are non-mainstream in management.

Aggregated evaluation

To have a comprehensive evaluation, results from the subjective and objective evaluations were aggregated using the same weight. Since the scales of the two measures are different, with subjective measures having a ceiling of 7 while objective measures that of 1, scores from each evaluation were divided by their largest value so that each evaluation had the same ceiling of 1. The results are shown in Table 3, where the second and third columns are standardized scores for the subjective and objective evaluations, respectively, and the last column shows the aggregated evaluation. The numbers in parentheses are ranks.

The first four journals, the *Journal of Management*, *Review of Securities and Futures Markets*, *Management Review*, and the *International Journal of Accounting Studies*, have an aggregated score greater than 0.9, with a gap between the scores of the fourth (0.9211) and the fifth (0.8788) ranked. Therefore, these four journals are considered as the most excellent management journals in Taiwan. Next, there are three journals, *NTU Management Review*, *Sun Yat-Sen Management Review*, and the *Journal of Financial Studies*, whose aggregated scores are between 0.8 and 0.9, and there is a clear gap between the seventh (0.8367) and the eighth (0.7719) ranked. Therefore, these three journals are considered as excellent journals. Together with the preceding four journals, they constitute the *A*-class management journals of Taiwan. Following this class, there are six journals whose aggregated scores are in the range of 0.7 and 0.8. Again, the gap between the smallest score in this group, which is 0.7267, and the score below it, which is 0.6968, is quite significant. Hence, these six journals are categorized as *B*-class journals.

Intuitively, the next class to be considered should be those with aggregated scores in the range of 0.6 and 0.7. However, the smallest score in this range is 0.6010 and the two scores below it are 0.5998 and 0.5969, which are very close to 0.6010. There is also a notable difference between 0.5969 and the score below it, which is 0.5765. It will be more appropriate to consider these two scores as members of those in the range of 0.6 and 0.7. Under this categorization, there are, in total, fourteen journals constituting class *C*. The next ten journals, with a score between 0.5765 and 0.5115 (the smallest one being over 0.5), are categorized into class *D*. Finally, the remaining nine journals, with an aggregated score of smaller than 0.5, are categorized as *E*-class journals.

Table 3. Results of the aggregated evaluation

Journal title	Subjective evaluation		Objective evaluation		Aggregated evaluation
<i>Journal of Management</i>	1.0000	(1)	0.9360	(4)	0.9680 (1)
<i>Review of Securities and Futures Markets</i>	0.9413	(2)	0.9857	(3)	0.9635 (2)
<i>Management Review</i>	0.8988	(5)	1.0000	(1)	0.9494 (3)
<i>International Journal of Accounting Studies</i>	0.8525	(8)	0.9897	(2)	0.9211 (4)
<i>NTU Management Review</i>	0.9047	(4)	0.8530	(6)	0.8788 (5)
<i>Sun Yat-Sen Management Review</i>	0.8307	(11)	0.8963	(5)	0.8635 (6)
<i>Journal of Financial Studies</i>	0.9324	(3)	0.7409	(7)	0.8367 (7)
<i>Journal of Information Management</i>	0.8871	(6)	0.6568	(12)	0.7719 (8)
<i>Chiao Da Management Review</i>	0.8439	(10)	0.6795	(11)	0.7617 (9)
<i>J. Chinese Institute of Industrial Engineers</i>	0.8544	(7)	0.6478	(14)	0.7511 (10)
<i>Asia Pacific Management Review</i>	0.7568	(14)	0.7304	(8)	0.7436 (11)
<i>Journal of Management & Systems</i>	0.8486	(9)	0.6363	(16)	0.7425 (12)
<i>Int. J. Information and Management Sciences</i>	0.7407	(15)	0.7127	(9)	0.7267 (13)
<i>Journal of Human Resource Management</i>	0.7399	(16)	0.6537	(13)	0.6968 (14)
<i>Taiwan Accounting Review</i>	0.7223	(17)	0.6476	(15)	0.6849 (15)
<i>Journal of Technology Management</i>	0.6990	(21)	0.6133	(18)	0.6562 (16)
<i>Journal of Quality</i>	0.7096	(19)	0.5957	(20)	0.6526 (17)
<i>Pan-Pacific Management Review</i>	0.6094	(31)	0.6821	(10)	0.6457 (18)
<i>Electronic Commerce Studies</i>	0.6921	(22)	0.5888	(22)	0.6405 (19)
<i>Journal of e-Business</i>	0.7654	(13)	0.5115	(29)	0.6384 (20)
<i>Journal of Contemporary Accounting</i>	0.6568	(24)	0.6147	(17)	0.6358 (21)
<i>Fu Jen Management Review</i>	0.6659	(23)	0.5895	(21)	0.6277 (22)
<i>Int. J. Electronic Business Management</i>	0.6313	(28)	0.5972	(19)	0.6142 (23)
<i>Journal of the Chinese Institute of Transportation</i>	0.8034	(12)	0.4145	(38)	0.6090 (24)
<i>Taiwan Banking & Finance Quarterly</i>	0.7067	(20)	0.4954	(32)	0.6010 (25)
<i>Commerce & Management Quarterly</i>	0.6257	(29)	0.5740	(23)	0.5998 (26)
<i>Taiwan Journal of Public Health</i>	0.7200	(18)	0.4738	(33)	0.5969 (27)
<i>Industry Forum</i>	0.6506	(25)	0.5024	(31)	0.5765 (28)
<i>Soochow Journal of Economics and Business</i>	0.6188	(30)	0.5147	(28)	0.5668 (29)
<i>Chung Yuan Management Review</i>	0.5729	(34)	0.5477	(25)	0.5603 (30)
<i>Bulletin of Labour Research</i>	0.5616	(36)	0.5560	(24)	0.5588 (31)
<i>Journal of Environment and Management</i>	0.5717	(35)	0.5422	(27)	0.5569 (32)
<i>Insurance Monograph</i>	0.5600	(37)	0.5466	(26)	0.5531 (33)
<i>Asia-Pacific Economic and Management Review</i>	0.5956	(33)	0.5105	(30)	0.5530 (34)
<i>Journal of Tourism Studies</i>	0.6401	(26)	0.4144	(39)	0.5273 (35)
<i>Journal of Healthcare Management</i>	0.6007	(32)	0.4361	(35)	0.5184 (36)
<i>Journal of Health Management</i>	0.6384	(27)	0.3846	(45)	0.5115 (37)
<i>Business Review</i>	0.5529	(38)	0.4310	(37)	0.4920 (38)
<i>J. Taiwan Association for Medical Informatics</i>	0.5462	(39)	0.3924	(43)	0.4693 (39)
<i>Chung Hua Journal of Management</i>	0.4863	(42)	0.4490	(34)	0.4676 (40)
<i>The Journal of Health Science</i>	0.5052	(40)	0.4023	(42)	0.4538 (41)
<i>Chaoyang Business and Management Review</i>	0.4598	(44)	0.4336	(36)	0.4467 (42)
<i>Tourism Management Research</i>	0.4810	(43)	0.4100	(40)	0.4455 (43)
<i>Journal of Management & Educational Research</i>	0.4983	(41)	0.3486	(46)	0.4234 (44)
<i>Journal of Chang Jung Christian University</i>	0.4119	(45)	0.3911	(44)	0.4015 (45)
<i>Hsuan Chuang Journal of Management</i>	0.3667	(46)	0.4093	(41)	0.3880 (46)
Average	0.6817		0.5900		0.6358

For the seven *A*-class journals, four are general management journals and three are specific function journals. All of them have good reputations in Taiwan. The nine journals categorized as class *E* are either university journals or journals which are non-mainstream areas in management. The results are reasonable and coincide with the expectations of the academics.

Discussion

Both the subjective and objective approaches have pros and cons, and relying only on either one may obtain a result which is misleading. In this study, the results from the subjective and objective approaches are fairly inconsistent. Comparing the ranks in columns 2 and 3 of Table 3, it is noted that, of the 46 journals, only one has the same rank as evaluated by the two approaches. Ten have a rank difference of 1 or 2 and nine have a rank difference of 3 or 4. Suppose we consider 4 or less as indifference. Then there are 26 journals (56.52%) whose ranks evaluated by the two approaches are significantly different. Notably, there are nine journals whose rank differences are even greater than 10. The study of MAIER [2006] for journals in regional science also showed inconsistent results from the subjective and objective approaches. This inconsistency of results suggests that both approaches should be applied to obtain reliable rankings.

Usually, people are more concerned with journals evaluated as being good. For the top fifteen journals ranked by either of the two approaches, the largest discrepancy occurs for the *Journal of the Chinese Institute of Transportation*, where the subjective evaluation ranked it 12th while the objective evaluation ranked it 38th. One problem of the subjective evaluation is that experts normally evaluate a journal based on the image of this journal in their mind, which is established over a period of time. The situation of a journal may have changed in recent years. The *Journal of the Chinese Institute of Transportation* is a typical case. This journal had a good reputation in the past. However, if one looks into its recent performance as revealed by the data in Table 2, one finds that its cross-citations are close to zero, its dissertation citation is below average, its authors' reputation is ranked 35th, and its author diversity is among the bottom three. The second largest discrepancy occurs at *Pan-Pacific Management Review*. Conversely, in this case the subjective evaluation gave it an unfavourable rank of 31 while the objective evaluation gave it a favourable rank of 10. The reason is similar, yet in reverse. *Pan-Pacific Management Review* is published by a young private university. Its image, therefore, is not as good as those published by older public universities. However, the data in Table 2 shows that its authors have a good scholastic reputation (ranked 13th) and it has the widest author diversity. Another case is the *International Journal of Information and Management Sciences*. This journal is also published by a private university, and hence has an unfavourable subjective rank of 15. The case of *Asia Pacific Management Review* is similar. This journal is relatively new,

and its reputation is not established yet. However, the objective performance of these two journals should be acknowledged.

Traditionally, citation count has been the major way for objectively evaluating journals. This indicator was also used in this study. One deficiency of this indicator is that when citations are low, the resulting rankings will be misleading. For the 46 journals, there are eight journals which have never been cited either by other journals or by doctoral dissertations. Supposedly, these journals should be excluded from evaluation, as some studies have done. However, this study found that five of these eight journals have been ranked in the upper half: the *International Journal of Information and Management Sciences* being 13th, *Taiwan Accounting Review* being 15th, the *Journal of Quality* being 17th, *Electronic Commerce Studies* being 19th, and the *International Journal of Electronic Business Management* being 23rd. This, again, suggests that a single indicator is not sufficient to make an evaluation which reflects reality.

The case of the *Journal of Information Management* and *Journal of the Chinese Institute of Industrial Engineers* is another one worth explaining. These two journals are the leading journals in their respective areas, namely, information and production. They have a good tradition, and the experts value them very highly. Nevertheless, they have not been often cited by other journals or dissertations. Therefore, their objective performance is not as good as their image. This is especially true for the *Journal of the Chinese Institute of Industrial Engineers*.

Finally, the weights applied to the indicators in this study were obtained from the data of the indicators themselves. An indicator with a large value will have a larger weight because this will produce larger composite indices. Obviously, different weights yield different composite indices and, consequently, different rankings. In this study, what weights should be applied to the indicators was asked in the expert survey. The weights solicited from the 345 experts have averages of 0.32, 0.2087, 0.2631, and 0.2082, for cross-citation, dissertation citation, authors' reputation, and author diversity, respectively. When this set of weights is used to calculate the composite indices, the final results obtained are quite similar to those calculated from the *a posteriori* weights (as shown in the last column of Table 3). The seven A-class journals are the same, only the order is somewhat different. For all 46 journals, 18 have the same rank, 20 have a rank difference of 1 or 2, 7 have a rank difference of 3 or 4, and 1 has a rank difference of 5. The total difference in rank is 58, with an average of 1.26. A formal Spearman rank correlation analysis shows that these two sets of rankings have a correlation coefficient of 0.9901, with a *p*-value of greater than 0.9999. This indicates that they are highly correlated, which also implies that the result of this study is quite robust.

Conclusion

Scientific journals play an important role in disseminating knowledge. Their quality reflects the quality of knowledge they are disseminating. Aiming at improving the quality of management journals published in Taiwan, the National Science Council of the Republic of China invited the authors of this paper to conduct a comprehensive evaluation. Forty-six journals were evaluated. Both a subjective approach based on experts' judgment, and an objective approach, based on performance in four indicators, viz., cross-citation, dissertation citation, authors' reputation, and author diversity, were used. From the aggregated scores, the 46 journals were ranked and further categorized into five classes: 7 in class *A*, 6 in class *B*, 14 in Class *C*, 10 in class *D*, and 9 in class *E*.

The results indicate that while subjective evaluation is able to provide an overall evaluation, especially taking into account those factors which are not quantifiable, it depends too heavily on images of journals in the mind of the experts. The situation of some journals may have changed, while the image remains the same. Moreover, new journals and those published by unpopular organizations have relatively bad images, and thus receive unfair rankings. Hence, subjective evaluation alone is not sufficient for a satisfactory evaluation. The objective evaluation, on the other hand, is bounded by the finite number of indicators that can be considered. More importantly, some indicators, such as citations, may not reflect the real situation. Thus, objective evaluation alone is not sufficient for a good evaluation, either. As a result, this study found that both the subjective and objective evaluations should be used to produce reliable results.

After the evaluation was completed, a meeting with the editors-in-chief of the 46 journals was held. The results were shown and their opinion was asked. Although some editors were not satisfied with the ranks of their journals, they all agreed that the evaluation was appropriate and the results were reasonable. There were two suggestions raised in the meeting for the next evaluation. One was that the experts invited for opinion survey should include people from industry because a good journal should benefit not only the academics, but also industries. The other was that, although only 46 journals agreed to be evaluated, all 60 journals should be considered in counting the number of citations. This is especially important for journals of narrow areas. For example, suppose there are only two journals in an area, and one agrees to be evaluated and the other does not. Since these two are the only journals in their area, the articles in these two journals will be citing each other. If the one that does not agree to be evaluated is excluded from counting its citations, it will be unfair to the one that did agree to be evaluated.

In this paper, journal self-citations were excluded in counting citations. This has little effect to journals covering wider areas. For specialized journals, however, the effect is large. Clearly, if self-citations are excluded, the number of citations will drop drastically because the number of journals of the same area is few and most authors

have no other journals to cite. On the other hand, if self-citations are counted, the number of citations for specialized journals will be unusually high. There was a short discussion regarding whether journal self-citations should be excluded in the meeting with the editors. But there was no conclusion. A better way will be reporting two measures, one includes and one excludes self-citations, in the next evaluation.

Finally, subjective evaluation shows the long-term performance of a journal while objective evaluation shows the short-term performance. The long-term performance must be fine-tuned by the short-term performance to update the image of journals. The methodology used in this study combines subjective evaluation with objective evaluation. It is applicable not only to management journals, but to journals of other fields as well. Practically, it does not need data from editorial offices, so the evaluation can be conducted independently, avoiding a possible bias and producing reliable results.

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