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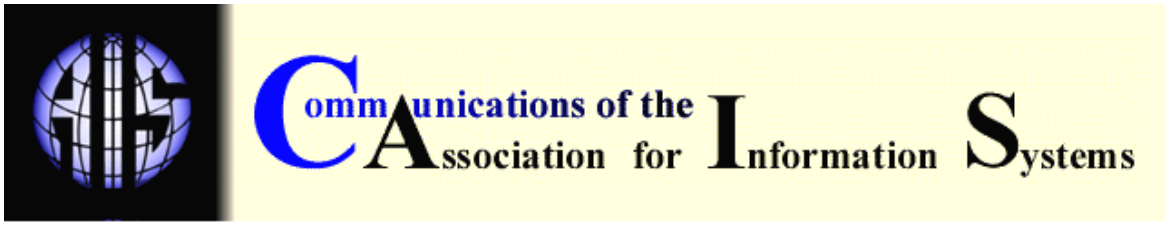

QUALITY AND KNOWLEDGE CONTRIBUTIONS OF MISQ: A CITATION ANALYSIS

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ABSTRACT

This study uses citation analysis to assess the quality of *MIS Quarterly* and compares this assessment to journals of other disciplines. The study also investigates the knowledge contributions of *MIS Quarterly* to the publications in both information systems and other disciplines. Some 3497 citations were made to 251 articles published in *MIS Quarterly* during 1989-1998. The study results show that the quality of *MIS Quarterly* is commensurate with its intended role as a general journal of the specialty IS area. *MIS Quarterly* ranks favorably when compared to specialty journals and respectably among general journals of specific disciplines. Moreover, most research appearing in *MIS Quarterly* is used by researchers in various disciplines and, thus, contributes to advancing the body of knowledge.

Keywords: journal quality, citation analysis, IS maturity, IS discipline, IS research

I. INTRODUCTION

Perceived journal quality is an important issue to scholars. Scholars are interested in assessing the relative quality of academic journals since journal quality influences academic peer recognition, institutional and departmental rankings, allocation of resources, research grant awards, promotion and tenure, and faculty pay [Mylonopoulos and Theoharakis, 2001; Walstrom and Hardgrave, 2001].

Academic journals are a major part of the formal communication system for exchanging knowledge. Thus, an idealistic reason that journal quality is of interest to scholars is to understand the role and knowledge contributions, within and across disciplines, that "specific journals have made to advancing the body of knowledge" [Johnson and Padsakoff, 1994 pp.1392]. Scientists want to know where they stand among the larger scientific community [Zinkhan and Leigh, 1999]. Leaders in the academic field of information systems (IS) believe that the quality of IS academic journals is comparable to that of other disciplines [Watson *et al*., 1999].

Similarly, Baskerville and Myers [2002] argued, using two frequently cited IS articles [Davenport and Short, 1990; Markus, 1983], that IS offers much to researchers in many other disciplines.

Evaluations of the quality of IS journals go back almost two decades [e.g., Gillenson and Stutz, 1991; Hamilton and Ives, 1982; Hardgrave and Walstrom, 1997]. However, no previous study provides empirical data to support the argument that the quality or knowledge contributions of IS journals are comparable to those of other disciplines or demonstrates how IS research is used by others.

This study does not attempt to rank IS journals; rather, it employs a citation analysis to assess quality and knowledge contributions of *MIS Quarterly* (*MISQ*), one of the top-ranked IS journals, and compares this assessment to journals of other disciplines. Section II presents essential concepts of citation analysis and the derivations of citation-based indices for journal quality. Research methodology is discussed in Section III and study results are presented in Section IV.

II. CITATION ANALYSIS AND CITATION-BASED INDICES FOR JOURNAL QUALITY

Kuhn [3rd ed.,1996] argued that research firmly based upon one or more past scientific achievements supplies the foundation for future research. Thus, the assessment of journal quality should be derived from knowledge contributions or the actual use of the journals and their articles [Cooper *et al*., 1993]. Citation analysis allows the contributions of disciplines, journals, articles, or scholars to be evaluated by giving substantive expression to the use and diffusion of knowledge [Jackson and Rushton, 1987]. Cittion analysis is recommended as an objective method for assessing journal quality [Salancik, 1986].

Citation analysis, long used in physical and biological sciences, is now being used to examine the quality of business-related journals [Zinkhan and Leigh, 1999]. Although the use of citation analysis in business research is not new, most past research might better be termed "reference analysis" since the unit of analysis is the references in, rather than the citations of, an article [Cote *et al*., 1991]. Examining the references provided in a single journal is useful for identifying what disciplines influence that journal, but not for identifying that journal's contributions to others [Cote *et al*., 1991]. Whom we reference may indicate where our own knowledge base comes from [Leong, 1989]; conversely, where the research is cited may provide insights into its contributions. This study employs citation analysis by examining the number of citations to articles published in *MISQ* to assess its quality and knowledge contributions.

Citation data are available in *Social Science Citation Index (SSCI)* and *Science Citation Index (SCI)* for a broad range of publications. Based on the citation data, seven citation-based indices for journal quality are derived. Journal quality is a multifaceted concept and can be reflected by different measures [Mylonopoulos and Theoharakis, 2001; Zinkhan and Leigh, 1999]. Definitions and derivations of each citation-based index for journal quality are presented in Table 1.

Table 1. Citation-Based Indices for Journal Quality

Index	**Definitions and Derivations**
Citations per article	*Citations per article* is the average number of citations received per target article published in each year.
	$= \frac{\text{number of citations received by articles published in base year}}{\text{number of articles published in base year}}$
	Un-cited ratio is the percentage of the target articles, published each year, that are not cited.

Un-cited ratio	*Un-cited ratio* is the percentage of the target articles, published each year, that are not cited.
	$= \frac{\text{number of un-cited articles published in base year}}{\text{number of articles published in base year}} \times 100$
20 + citations	*20+ citations* is the percentage of the target articles, published in each year, that are cited at least 20 times.
	$= \frac{\text{number of articles, published in base year, receiving at least 20 citations}}{\text{number of articles published in base year}} \times 100$
Self-citations	If any author of the citing article is one of the authors of the cited article (that is, the target article), it is coded as a self-citation. *Self-citation* is the ratio of the number of self-citations for the target articles published in each year to the total number of citations made to these target articles.
	$= \frac{\text{number of self-citations for target articles published in base year}}{\text{number of citations made to target articles published in base year}} \times 100$
Annual mean citation rate per article	*Annual mean citation rate per article* provides a normalized quality index of the target articles based on the number of years since publication because older articles are likely to be cited more often than recent articles. This index is computed by dividing the *Citation per article* (see above) by the number of years elapsed since the publication of the target articles.
	$= \frac{\text{number of citations received by articles published in base year}}{\text{number of articles published in base year} \times \text{years of publication}}$
Cited-to-Citing ratio	*Cited count*, the number of citations to a specific journal, is a measure of the journal's cumulative influence on knowledge production. Cumulative influence signals journal quality because it demonstrates that a journal is a current knowledge source and research is valued for its originality [Zinkhan and Leigh 1999]. In contrast, *Citing count*, the number of citations by a specific journal to other journals, is a measure of the journal's knowledge use. All else being equal, a journal with high citing rate is accorded less prestige because of its knowledge use role [Zinkhan and Leigh 1999]. Given such connotation, the *Cited-to-Citing ratio* may be an indicator of journal quality. A relatively high ratio would indicate that the journal is a knowledge source; a relatively low ratio would indicate that the journal is a knowledge user or storer.
	$= \frac{\text{number of citations received by articles published in base year}}{\text{number of references made by articles published in base year}}$
Current article impact	This index measures the frequency with which the articles in the journal were cited over the most recent two-year period [Garfield, 1979]. *Current article impact* for a reference year is derived by dividing the number of citations made only to the target articles published during two years prior to the reference year by the number of target articles that were published during the same time period.
	$= \frac{\text{number of citations received by articles published in last two years}}{\text{number of articles published in last two years}}$

Note: The number of citations used in the derivations of *Citations per article*, *20+ citations*, *Annual mean citation rate per article*, *Cited-to-Citing ratio*, and *Current article impact* is from all citations made to the target articles, including self-citations.

III. RESEARCH METHODOLOGY

We selected *MISQ* as the journal that best represents IS research since, in the results of several previous studies [e.g., Mylonopoulos and Theoharakis, 2001; Walstrom and Hardgrave, 2001; Whitman *et al*., 1999], it is consistently rated as one of the top journals publishing solely IS research. We compiled a list of the 251 target articles published in *MISQ* during 1989-1998. We also recorded the numbers of references provided in each of these 251 target articles.

In compiling another list of the citations made to each of the target articles by the articles published during 1991-2000, we used a two-year lag time between publication of the target articles and their citations to ensure a reasonable citation history for analysis since the modal elapsed time between IS article publication and IS article citation was found to be about two years[1] [Hamilton and Ives, 1982]. In all, 3,497 citations were made to those 251 target articles by articles published in 240 different journals (the citing journals). Then, we recorded the numbers of target articles published in each year that never received any citation and the numbers of target articles that were cited at least 20 times during 1991-2000. In addition, we collected the numbers of self-citations for the target articles published in each year. Table 2 summarizes the data collected.

Table 2. Citation Data Collected

Collected Data \Year	89	90	91	92	93	94	95	96	97	98	Total
Number of *MISQ* articles published in each year	32	27	30	31	26	22	24	20	19	20	251
References provided in *MISQ* articles published in each year (Citing counts)	926	779	1164	1157	1102	1029	1237	1030	1027	1138	10589
Citations made to *MISQ* articles published in each year (Cited counts)	646	333	615	483	441	314	338	198	92	37	3497
Number of *MISQ* articles, published in each year, that had never been cited	4	0	1	4	2	0	0	0	0	4	15
Number of *MISQ* articles, published in each year, that had received at least 20 citations	9	5	11	7	9	7	6	1	0	0	55
Number of self-citations coded for *MISQ* articles published in each year	33	20	37	35	35	14	26	10	9	7	226
Number of years since publication (until year 2000)	11	10	9	8	7	6	5	4	3	2	

Note: Years are abbreviated by using the last two digits. For example, 1993 is shown as 93

We used the journal categories provided in *SSCI* and *SCI*, with some modifications, to group 240 citing journals into the following eight areas of study:

[1] Two-year elapsed time is also the generally estimated time between submission of an article and its appearance in print.

- Business and Management (including general business, organization science, and strategic management)
- Other Businesses (including accounting, economics, finance, and marketing)
- Computer Science (including cybernetics and ergonomics)
- Management Information Systems (MIS)
- Management Science and Production and Operation Management (MS/POM)
- Psychology and Sociology
- Engineering
- Other Disciplines (e.g., communications study, education, health care, law, library)

Finally, we recorded the numbers of citations made to *MISQ* target articles by each of the 240 citing journals and then combine the numbers of citations from the citing journals in the same area of study.

IV. STUDY RESULTS

RELATIVE QUALITY OF AVERAGE *MISQ* ARTICLES

The study results (Table 3) show that *Citations per article* are highest in 1989 and lowest in 1998. In general, older articles in the journal receive more citations than recent articles. The higher number of citations for older articles is probably the result of more time to accumulate citations [Cote *et al*., 1991]. On average, each article published in *MISQ* received 13.1 citations per article. This result is comparable to 13.3 citations per article for *Journal of Consumer Research* (*JCR*) [Cote *et al*., 1991]. Only 6% of *MISQ* articles were never cited. This *Un-cited ratio* is much less than the 45% found in physical science [Begley, 1991] but is higher than 4.5% for *JCR* [Cote *et al*., 1991]. On the other hand, 21.9% of *MISQ* articles were cited at least 20 times. Thus *20+ Citations* is higher than 19.8% for *JCR* [Cote *et al*., 1991].

The *Self-citations* index for *MISQ* is 7.8% of all citations. This percentage is comparable to 7.4% found for *JCR* [Cote *et al*., 1991]. For the articles published in *MISQ*, the *Annual Mean Citation Rate Per Article* is 2.0 citations per year. This result compares favorably to 1.4 and 1.7 citations per year for *SSCI* and *JCR* respectively [Cote *et al*., 1991].

Table 3. Citations per Article, Un-Cited ratio, 20+ Citations, Self-citations, Annual Mean Citation Rate per Article, and Cited-to-Citing Ratio

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Mean
Citations per article	20.2	12.3	20.5	15.6	17.0	14.3	14.1	9.9	4.8	1.9	13.1
Un-cited ratio (percentage)	13	0	3	13	8	0	0	0	0	20	6
20+ Citations (percentage)	28.1	18.5	36.7	22.6	34.6	31.8	25	5	0	0	21.9
Self-citations (percentage)	5.1	6.0	6.0	7.2	7.9	4.5	7.7	5.1	9.8	18.9	7.8
Annual mean citation rate per article	1.8	1.2	2.3	2.0	2.4	2.4	2.8	2.5	1.6	0.9	2.0
Cited-to-Citing ratio	0.70	0.43	0.53	0.42	0.4	0.31	0.27	0.19	0.09	0.03	0.34

Similar to *Citations per article*, *Cited-to-Citing ratio* is generally higher for older articles than for recent articles (Table 3). Study results in Table 5 below show that the *Cited-to-Citing ratio* for *MISQ* is 0.34. This amount is less than 1.3 for *Management Science*, 0.95 for *JCR*, and the results (ranging from 0.67 to 1.98) for some other general journals (e.g., *Academy of Management Review*, *Journal of Marketing Research*). However, the *Cited-to-Citing ratio* for *MISQ* is comparable to those for some specialty journals (e.g., *Journal of International Business Studies*, *Journal of Advertising*) and is higher than the results for several other specialty journals and for some general journal (e.g., *Journal of Business Venturing*, *Journal of Public Policy & Marketing*, *Journal of Management*). On average, the *Cited-to-Citing ratio* for *MISQ* is lower than the average results for General Business and Management Journals and for General Marketing Journals (0.99 and 0.92 respectively) but is higher than the average results for Specialty Business and Management Journals and for Specialty Marketing Journals (0.25 and 0.29 respectively).

Finally, the *Current Article Impact* 1.1 for *MISQ* (Table 4 and Table 5) is lower than 2.07 for *JCR*; but it is comparable to 1.15 for *Sloan Management Review*, 1.47 for *Journal of Marketing Research*, 0.96 for *Marketing Science*, and 0.93 for *Management Science*. Study results in Table 5 also show that, although the *Current Article Impact* for *MISQ* is lower than that for some general journals (e.g., *Administrative Science Quarterly*, *Journal of Marketing*), it is higher than the results for all specialty journals and for *Journal of Management*, a general journal in business and management. On average, the *Current Article Impact* for *MISQ* is somewhat lower than the average results for General Business and Management Journals and for General Marketing Journals (1.74 and 1.63 respectively) but is higher than those average results for Specialty Business and Management Journals and for Specialty Marketing Journals (0.6 and 0.59 respectively).

KNOWLEDGE CONTRIBUTIONS OF *MISQ*

A useful view of IS is to conceive of its growth from its foundational fields in Computer Science, Management Science, and Organization Science [Culnan and Swanson, 1986]. Thus, IS research traditionally borrowed ideas from these foundations. It is also recognized that other disciplines contributed to IS both directly and indirectly [Culnan, 1986; Kling, 1980]. However, it is unclear whether other disciplines use IS research. If IS research influences other disciplines, then it should be cited by them.

Table 4. Current Article Impact

	91	92	93	94	95	96	97	98	99	00	Total
Number of citations made to *MISQ* target articles by articles published in 1991-2000	36	83	145	271	339	408	527	509	568	611	3497
Number of citations made to only *MISQ* target articles that were published during the last two years (prior to the reference year)	35	35	54	66	58	60	81	52	36		
Number of *MISQ* target articles that were published during the last two years (prior to the reference year)	59	57	61	57	48	46	44	39	39		
											Mean
Current article impact	.59	.61	.89	1.16	1.21	1.3	1.84	1.33	0.92		1.1

Table 5. MISQ vs. Other Journals

	CITED-TO-CITING RATIO	CURRENT ARTICLE IMPACT
MISQ	**0.34**	**1.1**
General Business and Management Journals:		
Academy of Management Review *	0.75	2.87
Administrative Science Quarterly *	1.98	2.58
Academy of Management Journal *	0.83	2.2
Management Science *	1.3	0.93
Sloan Management Review *	0.92	1.15
Journal of Management *	0.16	0.7
Average	0.99	1.74
General Marketing Journals:		
Journal of Consumer Research *	0.95	2.07
Journal of Marketing *	0.8	2.03
Journal of Marketing Research *	1.27	1.47
Marketing Science *	0.67	0.96
Average	0.92	1.63
Specialty Business and Management Journals:		
Journal of Environmental Economics and Management *	0.48	0.92
Journal of International Business Studies *	0.3	0.7
Journal of Business Venturing *	0.18	0.55
R&D Management *	0.23	0.46
American Business Law Journal *	0.08	0.38
Average	0.25	0.6
Specialty Marketing Journals:		
Journal of Product Innovation Management *	0.22	0.81
Journal of Public Policy & Marketing *	0.12	0.52
Journal of Advertising *	0.29	0.59
Journal of Retailing *	0.55	0.45
Average	0.29	0.59

*Source: Zinkhan and Leigh [1999]

Table 6. Citations Made to MISQ Articles by Discipline

Disciplines	Citations to *MISQ* Target Articles		Self-Citations to *MISQ* Target Article	
	Number of citations	% *	Number of citations	% **
Business and Management	223	6.4	27	12.1
Other Businesses	30	0.9	1	3.3
Computer Science	472	13.5	35	7.4
MIS	2042	58.4	124	6.1
MS/POM	394	11.3	21	5.3
Psychology and Sociology	143	4.1	9	6.3
Engineering	84	2.4	5	5.9
Other Disciplines	109	3.1	4	3.7
Total	3497	100.0	226	

* based on totally 3,497 citations made to *MISQ* target articles
** based on citations made to *MISQ* target articles from publications in each discipline

The highest proportion (58.4%) of the citations made to *MISQ* target articles is made within the IS discipline itself (Table 6). However, more than 40% of the citations are attributed to other areas of study. Three areas of study – Computer Science (13.5%), MS/POM (11.3%), and Business and Management (6.4%) – account for approximately 31% of the citations and nearly 9% of the citations are attributed to other external disciplines (e.g., economics, finance, marketing, psychology, engineering, health care, education).

Since IS scholars may publish in other disciplines and cite their own IS publications, we examined the number of self-citations made to *MISQ* articles from publications in other disciplines. On average, only 7% of the citations made to *MISQ* target articles from the publications in other disciplines are self-citations. Table 6 shows the percentage of self-citations made to *MISQ* articles from the publications in each of the eight areas of study. Results suggest that Business and Management is the area of study where IS scholars publish and cite their own publications in *MISQ* the most.

Finally, Appendix I presents a list of the citing journals for each of the eight areas of study. These journals account for 90% of the citations made to *MISQ* target articles by all of the citing journals in that specific area of study. In addition, a list of the first 49 journals citing *MISQ* target articles most frequently (more than 10 times) is presented in Appendix II.

V. DISCUSSION

QUALITY AND KNOWLEDGE CONTRIBUTIONS OF *MISQ*

General Business and Management Journals (e.g., *Academy of Management Review*, *Sloan Management Review*) publish articles that span business disciplines. They try to offer the best of what is really interesting or significant across business disciplines. Similarly, General Marketing Journals (e.g., *Journal of Marketing Research*, *Journal of Marketing*) cover interesting or significant articles in marketing and advertising.

In contrast, specialty journals emphasize narrow fields. Journals devoted to a particular specialty can be justified as a medium for the presentation and exchange of information for researchers working in that particular specialty. These specialty journals serve as the formative element of increasing knowledge and as the integrators of the development and advances of that particular specialty [Lyons, 1968]. For example, *Journal of International Business Studies* focuses on research in international business; *Journal of Product Innovation Management* emphasizes the total process of product innovation. Summaries of journal profiles are given in Appendix III.

Since *MISQ* solely emphasizes research related to the management and use of information technology for managerial and organizational purposes, it is considered a specialty journal in business. However, IS is divided by the special interests and talents of several groups. In contrast to many other IS journals that cover only a specific sub-area (e.g., *Decision Support Systems* focuses on concepts and operational basis for DSSs and techniques for implementing and evaluating DSSs; *Journal of Database Management* is dedicated to database management, systems analysis and design, and software engineering), *MISQ* encompasses all material in the IS discipline. From this view, *MISQ* is considered a general journal of IS. In summary, when compared to General Business and Management Journals, *MISQ* is considered a specialty business journal; but within the IS discipline, *MISQ* is a General IS Journal.

We compared the quality of *MISQ* derived in this study to various general journals and specialty journals reported in several previous studies [Begley, 1991; Cote *et al*., 1991; Zinkhan and Leigh, 1999]. Results of the *Un-cited ratio* suggest the percent of un-cited articles in *MISQ* is significantly lower than in physical science journals. Similarly, the *Cited-to-Citing ratio* and the *Current Article Impact* indicate that the quality of *MISQ* is better than that of specialty journals. In addition, the *Citations per Article*, the *20+ Citations*, the *Self-citations*, and the *Annual Mean Citation Rate per Article* suggest that the quality of *MISQ* is comparable to that of *JCR*, one of the general journals of marketing. The *Current Article Impact* also shows that the quality of *MISQ* is comparable to that of some general journals in marketing and in business and management. However, the *Cited-to-Citing ratio* and the *Current Article Impact* suggest that the quality of *MISQ* is inferior to

that of several other general journals, especially those general journals in business and management.

In summary, these study results show that the quality of MISQ is better than that of specialty journals, comparable to the quality of general journals in marketing, but inferior to that of general journals in business and management. As discussed above, *MISQ* is considered a specialty business journal when compared to General Business and Management Journals; but within IS discipline, *MISQ* is considered a General IS Journal. Given the more general positioning and the wider academic distribution of general journals in business and management, it should not be expected that specialty business journals, including *MISQ* in this case, would outrank their peer general business journals [Zinkhan and Leigh, 1999]. Similar to the quality of general journals in marketing (e.g., *JCR*), the quality of *MISQ* is lower than that of general journals in business and management, but higher than the quality of specialty journals. In conclusion, the results of this study suggest that the quality of *MISQ* is commensurate with its intended role as a general journal specializing in IS.

Knowledge contributions of *MISQ* are mainly confined to the IS discipline and to other closely related disciplines (i.e., Computer Science, Management Science, and Organization Science) as shown on the list of the first 49 journals most frequently citing *MISQ* target articles (Appendix II). However, more than 40% of the citations made to *MISQ* target articles are from the articles published in other disciplines. In addition, only 7% of the citations made to *MISQ* target articles from the publications in other disciplines are self-citations. Therefore, these results strongly indicate that IS research and *MISQ* do indeed influence or contribute to other disciplines.

RESEARCH DIRECTIONS AND IMPLICATIONS

We believe that further investigation of *MISQ*'s quality and knowledge contributions is warranted since the results of this study are an "average" across all *MISQ* articles published in the ten year period 1989-1998. In addition, an examination of the citation patterns for all major IS academic journals would reflect clearer role and knowledge contributions within and across disciplines of IS research and would also shed some light on the maturity of the IS discipline. For example, the investigation of the citation patterns for specific articles would provide further insight to the usefulness of *MISQ*'s knowledge archives. We examined the number of citations made, in each citing year between 1991 and 2000, to *MISQ* articles published each year during 1989–1993 (Appendix IV). This preliminary examination shows that number of citations reached its peak in approximately 5-7 years after the publication year and then started declining. Whether this pattern is a common phenomenon in any other academic journals or is a special characteristic only for IS journals because of some particular reasons should be investigated (e.g., Line and Sandison [1974] pointed that, in a fast growing field or in one with rapidly advancing technology, older articles may be superseded more quickly).

Furthermore, due to the lack of results from previous journal quality studies both in IS and in other fields, all citation-based indices derived for *MISQ* in this study are directly compared to those of only one journal (i.e., *JCR*) and only some indices (i.e., *Cited-to-Citing ratio* and *Current article impact*) are compared to sets of some general journals and some specialty journals. To broaden the results of this study and to obtain a better picture of *MISQ*'s status in comparison to leading journals of other disciplines, future research should derive the citation-based indices for the leading journals of each discipline and compare them to the indices for *MISQ*. Finally, the investigation of the extent to which the articles published in other disciplines and citing *MISQ* publications are written by non-IS scholars would show more precise impact of *MISQ* on the scholars conducting research in other disciplines.

For the implications of this study, since journal quality rightly or wrongly influences recognition, awards, tenure, and pay [Mylonopoulos and Theoharakis, 2001; Walstrom and Hardgrave, 2001], the scientific community needs to study the quality of its journals. Thus, journal quality assessment should be as systematic and objective as possible. However, most previous IS journal quality studies [e.g., Mylonopoulos and Theoharakis, 2001; Walstrom and Hardgrave, 2001; Whitman *et al*., 1999] used a questionnaire *to* collect data from academicians and practitioners to evaluate and rank IS journals. Data collected through a questionnaire are

primarily a reflection of the participants' perceptions about the journals. Thus, the survey approach may be affected by the subjective stances the participants choose to adopt [Mylonopoulos and Theoharakis, 2001] and by some inherent measurement biases [Cooper *et al*., 1993].

The citation analysis and the citation-based indices for journal quality conducted and derived in this study can enhance credibility of those practical academic decisions. This methodology can play a key role in assessing journal ranking objectively. That is, journals should be ranked according to the journals' aggregate mean scores derived from their scores on each citation-based index for journal quality.

In addition, the methodology in this study can provide answers to the arguments regarding journal quality. For example, as the "new-kid on the block" in comparison to other business disciplines, the IS discipline faced a challenge about the quality of its research and publications [Watson *et al*., 1999]. In his e-mail message to ISWorld Listserv on June 29, 2001, Mingers argued that European IS journals were underrated by several previous IS journal quality studies. For each of these arguments, we could compare journal scores on all citation-based indices for journal quality, draw conclusions from the comparison results, and provide answers for the quality argument.

LIMITATIONS

Despite its extensive use, citation analysis is not without its drawbacks. The number of citations made to a specific article could be affected by the number of researchers working in the areas related to that article; that is, an article could be important and represent a significant contribution, but it is infrequently cited because only few researchers work in the related areas [Cote *et al*., 1991]. Conversely, some disciplines publish more journals and consequently more articles published (per year) than others. This difference in scale might provide more opportunities for the articles of those disciplines to be frequently cited.

In addition, citations may be negative (i.e., as the examples of the errors or poor research). However, negative citations are relatively infrequent, accounting for less than 10% of all citations [Moravcsik and Murugesan, 1975] and, for the journals (e.g., *MISQ*) that conduct rigorous reviews, the problem of publishing "unsound" research is minimal. Though citation analysis is questionable in relation to a particular article and should never substitute for a detailed reading of an author's work, it is an excellent indicator of quality over the history of a journal [Zinkhan and Leigh, 1999].

Finally, citation data available in *SSCI* and *SCI* are by no means complete. However, these indices have the most extensive citation coverage available for more than 7,000 journals. Previous study results show that as few as 150 journals account for half of what is cited and a core of only approximately 2,000 journals account for about 85% of published articles and 95% of cited articles [Garfield, 1996]. Thus, the citation data available in *SSCI* and *SCI* should provide a valid picture of the knowledge contributions of journals.

VI. CONCLUSION

Any discipline striving toward scientific maturity is justifiably concerned about the utility of its knowledge and the rate at which such knowledge is disseminated across the scientific community [Cote *et al*., 1991]. The IS discipline is no exception. Results of the citation analysis conducted in this study provide a strong argument that IS research contributes to advancing the body of knowledge. IS research published in *MISQ* is frequently cited by other disciplines. The study results also support the belief of many IS academic leaders that the quality of IS academic journals is comparable to that of other disciplines. *MISQ* ranks favorably to specialty journals and respectably among general journals in marketing. Its quality and prestige are commensurate with its intended role as a general journal of the specialty IS area.

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APPENDIX I. JOURNALS BY AREA CITING MISQ ARTICLES

Citing Journals	Citations	% *
1. Business and Management: totally 223 citations made to MISQ target articles		
Organization Science	39	17
Group Decision And Negotiation	31	14
Organizational Behavior And Human Decision Processes	18	8
Sloan Management Review	18	8
Academy of Management Journal	13	6
Journal of Management	13	6
Journal of Business Ethics	12	5
Canadian Journal Of Administrative Sciences	10	4
Academy of Management Review	8	4
Long Range Planning	8	4
California Management Review	6	3
Journal of Business Research	6	3
Journal of International Business Studies	6	3
Journal Of Organizational Change Management	5	2
New Technology Work And Employment	5	2
Human Relations	4	2
2. Other Businesses: totally 30 citations made to MISQ target articles		
Marketing Science	5	17
Accounting Organizations And Society	4	13
Journal of Marketing	4	13
Journal Of Product Innovation Management	3	10
Journal Of Public Policy & Marketing	3	10
Industrial Marketing Management	2	7
International Journal of Research in Marketing	2	7
Journal Of Economic Psychology	2	7
Futures	1	3
Journal of the Academy of Marketing Science	1	3
3. Computer Science: totally 472 citations made to MISQ target articles		
International Journal Of Human-Computer Studies	61	13
Behaviour & Information Technology	59	13
Communications of the ACM	57	12
Journal of Systems and Software	41	9
IFIP Transactions A – Computer Science And Technology	37	8
Computers In Human Behavior	32	7
IEEE Transactions On Systems Man And Cybernetics	23	5
Information and Software Technology	22	5

IEEE Transactions On Software Engineering	20	4
Wirtschaftsinformatik (German)	19	4
International Journal Of Computer Applications In Technology	13	3
Journal Of Software Maintenance-Research And Practice	12	3
Australian Computer Journal	9	2
IBM Systems Journal	7	1
Interacting With Computers	7	1
International Journal Of Man-Machine Studies	6	1
Citing Journals	Citations	% *
4. MIS: totally 2042 citations made to MISQ target articles		
MIS Quarterly	413	20
Information & Management	367	18
Information Systems Research	171	8
Journal Of Information Technology	145	7
Journal of Computer Information Systems	131	6
Journal of Management Information Systems	115	6
European Journal of Information Systems	109	5
Decision Support Systems	99	5
Information Systems Journal	80	4
Data Base For Advances In Information Systems	77	4
International Journal Of Information Management	72	4
Journal Of Strategic Information Systems	69	3
5. Management Science and Production and Operation Management: totally 394 citations made to MISQ target articles		
Decision Sciences	160	41
Omega – International Journal of Management Science	89	23
Industrial Management & Data Systems	32	8
Management Science	31	8
European Journal of Operational Research	17	4
Journal Of Operational Research Society	12	3
Computers & Operations Research	8	2
International Journal Of Operations & Production Management	8	2
6. Psychology and Sociology: totally 143 citations made to MISQ target articles		
Small Group Research	20	14
Personnel Psychology	11	8
Systems Research And Behavioral Science	9	6
Evaluation And Program Planning	8	6
Public Administration Review	8	6
Journal Of Social Service Research	7	5
Administration In Social Work	6	4
Environment and Planning	5	3
Information Society	5	3
Journal of Applied Psychology	5	3
American Review Of Public Administration	4	3
Journal of Applied Social Psychology	4	3
Perceptual And Motor Skills	4	3
Social Science Computer Review	4	3
Annals Of Tourism Research	3	2
Behavior Research Methods Instruments & Computers	3	2
Psychological Reports	3	2
Work And Stress	3	2
Administration & Society	2	1
Creativity Research Journal	2	1

Journal Of Employment Counseling	2	1
Journal of Personality and Social Psychology	2	1
Sex Roles	2	1
Technological Forecasting And Social Change	2	1
Technology in Society	2	1
Citing Journals	Citations	% *
7. Engineering: totally 84 citations made to MISQ target articles		
IEEE Transactions On Engineering Management	41	49
Journal Of Engineering And Technology Management	14	17
International Journal Of Technology Management	9	11
Technology Analysis & Strategic Management	6	7
Computers & Industrial Engineering	5	6
Journal Of Management In Engineering	1	1
8. Other Disciplines: totally 109 citations made to MISQ target articles		
Government Information Quarterly	12	11
Computers & Education	8	7
Computers in Nursing	6	6
International Journal Of Medical Informatics	6	6
Journal Of The American Medical Informatics Association	6	6
Computers And Electronics In Agriculture	5	5
Journal of Educational Computer Research	5	5
Journal of Healthcare Management	5	5
Communication Education	4	4
Health Care Management Review	3	3
British Journal of Radiology	2	2
Communication Research	2	2
Education for Information	2	2
Educational Technology Research And Development	2	2
Hospital & Health Services Administration	2	2
Human Communication Research	2	2
Journal Of Communication	2	2
Journal Of Medical Systems	2	2
Journal of Telemedicine and Telecare	2	2
Library & Information Science Research	2	2
Program-Electronic Library And Information Systems	2	2
Academic Medicine	1	1
Communication Theory	1	1
Education	1	1
Innovations In Education And Training International	1	1
International Forum On Information And Documentation	1	1
International Journal of Cancer	1	1
Journal Of Academic Librarianship	1	1
Journal of Experimental Education	1	1
Journal of Forestry	1	1
Journal Of Government Information	1	1
Journal Of Pragmatics	1	1
Library Trends	1	1
Modern Language Journal	1	1
Substance Use & Misuse	1	1
Vanderbilt Law Review	1	1
Washington Law Review	1	1

* based on the total citations that the citing journals in each area of study have made to MISQ target articles

APPENDIX II. JOURNALS CITING MISQ ARTICLES

Citing Journals	Citations	% *
MIS Quarterly	413	11.81%
Information & Management	367	10.49%
Information Systems Research	171	4.89%
Decision Sciences	160	4.58%
Journal Of Information Technology	145	4.15%
Journal of Computer Information Systems	131	3.75%
Journal of Management Information Systems	115	3.29%
European Journal of Information Systems	109	3.12%
Decision Support Systems	99	2.83%
Omega – International Journal of Management Science	89	2.55%
Information Systems Journal	80	2.29%
Data Base For Advances In Information Systems	77	2.20%
International Journal Of Information Management	72	2.06%
Journal Of Strategic Information Systems	69	1.97%
International Journal Of Human-Computer Studies	61	1.74%
Behaviour & Information Technology	59	1.69%
Communications of the ACM	57	1.63%
IEEE Transactions On Engineering Management	41	1.17%
Journal of Systems and Software	41	1.17%
Organization Science	39	1.12%
IFIP Transactions A – Computer Science And Technology	37	1.06%
Computers In Human Behavior	32	0.92%
Industrial Management & Data Systems	32	0.92%
Group Decision And Negotiation	31	0.89%
Management Science	31	0.89%
Information Processing & Management	30	0.86%
Expert Systems with Applications	24	0.69%
Data Base	23	0.66%
IEEE Transactions On Systems Man And Cybernetics	23	0.66%
Information and Software Technology	22	0.63%
Annual Review Of Information Science And Technology	21	0.60%
IEEE Transactions On Software Engineering	20	0.57%
Small Group Research	20	0.57%
Wirtschaftsinformatik (German)	19	0.54%
Organizational Behavior And Human Decision Processes	18	0.51%
Sloan Management Review	18	0.51%
European Journal of Operational Research	17	0.49%
Information Systems Management	15	0.43%
Journal Of Organizational Computing And Electronic Commerce	15	0.43%
Journal Of Engineering And Technology Management	14	0.40%
Academy of Management Journal	13	0.37%
International Journal Of Computer Applications In Technology	13	0.37%
Journal of Management	13	0.37%
Government Information Quarterly	12	0.34%
Journal of Business Ethics	12	0.34%
Journal Of Operational Research Society	12	0.34%
Journal Of Software Maintenance-Research And Practice	12	0.34%
International Journal Of Electronic Commerce	11	0.31%
Personnel Psychology	11	0.31%

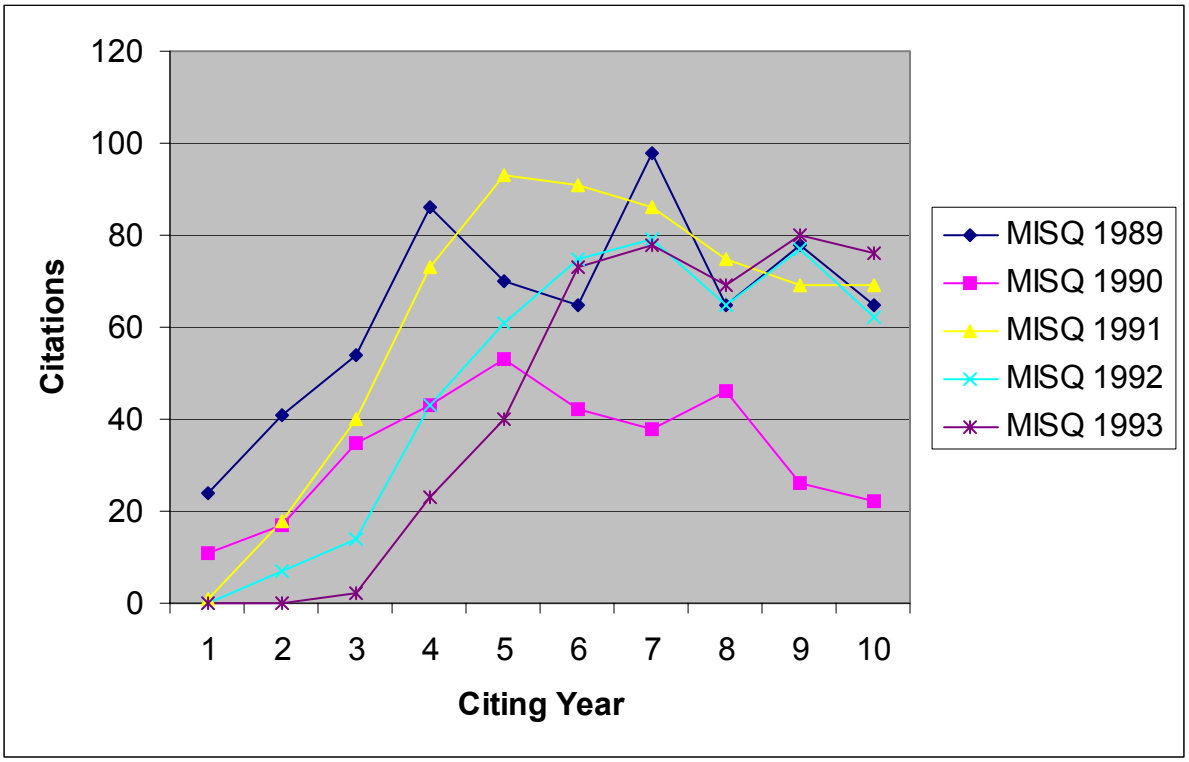
* based on totally 3,497 citations to MISQ target articles. Only journals with >10 citations shown.

APPENDIX III. JOURNAL PROFILES

Journals	Summary
MIS Quarterly	Published by University of Minnesota and Society for Information Management to contribute to high quality research concerning both the management of information technology and the use of information technology for managerial and organizational purposes.
Decision Support Systems	Published by Elsevier Science Inc. to advance knowledge about the concepts and operational basis for DSSs, techniques for implementing and evaluating DSSs, and DSS experiences.
Journal of Database Management	Published by Idea Group Publishing to present all aspects of database management, systems analysis and design, and software engineering.
Academy of Management Review	Published by the Academy of Management to present novel, insightful, and carefully crafted conceptual articles that challenge conventional wisdom concerning all aspects of organizations and their role in society.
Administrative Science Quarterly	An interdisciplinary journal publishing theoretical and empirical work that advances the study of organizational behavior and theory, sociology, psychology and social psychology, strategic management, economics, public administration, and industrial relations.
Academy of Management Journal	Published by the Academy of Management to focus on empirical articles that are relevant to management theory and to management practice.
Management Science	Published by Institute for Operations Research and the Management Sciences to scientifically address the problems, interests, and concerns of organizational decision makers.
Sloan Management Review	Published by Massachusetts Institute of Technology to cover all management disciplines, with a particular emphasis on corporate strategy, leadership and management of technology and innovation.
Journal of Management	An official journal of the Southern Management Association to cover such areas as business strategy and policy, human resource management, organizational behavior, organizational theory, and research methods.
Journal of Consumer Research	Founded in 1974 to publish the highest quality empirical, theoretical, and methodological articles to gain knowledge about consumer behavior or the conduct of consumer research.
Journal of Marketing	Published by the American Marketing Association to meet the challenge of bridging the gap between theory and application by publishing conceptually strong and theory-driven and managerially relevant research being conducted in all aspects of marketing.
Journal of Marketing Research	Published by the American Marketing Association to cover the philosophical, conceptual, and technical aspects, and methods and applications of marketing research.
Marketing Science	Published by Institute for Operations Research and the Management Sciences to discover the latest findings in the global marketplace with detailed results prepared through rigorous scientific methodology.
Journal of Environmental Economics and Management	Published by Association of Environmental and Resource Economists to focus on theoretical and empirical papers devoted to specific natural resources and environmental issues.
Journal of International Business Studies	A joint publication of the Copenhagen Business School and the McDonough School of Business at Georgetown University to focus on multinational and other firms' business activities, strategies and managerial processes that cross national boundaries.
Journal of Business	Published by Elsevier Science Inc. to provide a forum for the dissemination

Venturing	of superior empirical, and rigorously developed theoretical findings that advance knowledge in four key areas: entrepreneurship, new business development, industry evolution, and technology management.
R&D Management	Published by Blackwell Publishers Ltd. to address the interests of both practicing managers and academic researchers in R&D and innovation management by covering the full range of topics in research, development, design and innovation, and related strategic and human resource issues.
American Business Law Journal	Published by Academy of Legal Studies in Business to advance knowledge about legal issues related to business.
Journal of Product Innovation Management	Dedicated to the advancement of management practice in all of the functions involved in the total process of product innovation by publishing research, experiences, and insights of academics, consultants, practicing managers, economists, scientists, lawyers, sociologists, and thoughtful contributors from other professions and disciplines.
Journal of Public Policy & Marketing	Published by the American Marketing Association to analyze marketing's broader impact on consumer welfare and economic performance as well as relevant policies and actions taken by the various branches of government that affect marketing practice and consumers.
Journal of Advertising	Published by American Academy of Advertising to contribute to the development of advertising theory and its relationship to advertising practices and processes.
Journal of Retailing	Published by New York University to present scholarly articles devoted to advancing the state of knowledge and its application with respect to all aspects of retailing, its management, evolution, and current theory.

APPENDIX IV. NUMBER OF CITATIONS IN EACH CITING YEAR



Note: Citing years are abbreviated. For example, 1991 is shown as 1 and 2000 is shown as 10

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