Journal of the Association for Information Systems

Volume 7 | Issue 5 Article 12

5-25-2006

If the Tree of IS Knowledge Falls in a Forest, Will Anyone Hear?: A Commentary on Grover et al.

Michael Wade
York University, Canada, mwade@schulich.yorku.ca

Markus Biehl
York University, Canada

Henry Kim
York University, Canada

Recommended Citation
Wade, Michael; Biehl, Markus; and Kim, Henry (2006) "If the Tree of IS Knowledge Falls in a Forest, Will Anyone Hear?: A Commentary on Grover et al.," *Journal of the Association for Information Systems*, 7(5), .
DOI: 10.17705/1jais.00088
Available at: https://aisel.aisnet.org/jais/vol7/iss5/12

Journal of the Association for Information Systems

IS Research Perspective

If the Tree of IS Knowledge Falls in a Forest, Will Anyone Hear?: A Commentary on Grover et al.

Michael Wade
Schulich School of Business
York University
mwade@schulich.yorku.ca

Markus Biehl
Schulich School of Business
York University

Henry Kim
Schulich School of Business
York University

Introduction

Readers could be confused after reading our paper (Wade et al.) and the Grover et al. paper—both in this issue—one right after the other. Both papers examine a similar topic using a similar methodology on a similar dataset over a similar time period. Yet, we come to very different conclusions. Grover et al.'s conclusions are positive and its tone is congratulatory and upbeat. By contrast, our findings are negative, and the mood of our paper is humbling and critical. After reading Grover et al. you may feel like reaching for a glass of champagne, while after reading ours, you are more likely to reach for an aspirin!

How is it that Grover et al. can conclude that the IS field is "turning the tables on its references disciplines" and has begun "repaying its debts by contributing to other disciplines," while our paper finds that the IS field "has left a modest imprint on the other sub-fields of management" and remains "at the end of the intellectual food chain"? The answer to this question, in large measure, can be found in the assumptions made by each set of authors. The conclusions drawn by each paper are reasonable if you accept the assumptions upon which they are based. This paper will explore these assumptions, and critically examine the differences between Wade et al. and Grover et al.

Points of Agreement and Disagreement

There are important differences between Wade et al. and Grover et al., yet by focusing on these, it is easy to overlook areas in which they agree. Both papers find, for example,

that the IS field has developed nicely into a mature discipline with strong evidence of a cumulative research tradition. Further, we agree that, when taken in isolation, the IS field exhibits all the characteristics of an active, vibrant, and productive academic field.

The most substantial difference between our paper and Grover et al. regards the IS field's relationship with other fields. Our paper is exclusively interested in this question, as we strive to determine whether or not the IS field can be considered a reference discipline (we believe that it cannot) and what can be done about it (we offer a series of suggestions). Grover et al.'s paper is also concerned with this question (i.e. Hypothesis 4a), but is also generally concerned with the evolution of the field. We do not take issue, by and large, with Grover et al.'s findings as they relate to the evolution of the IS field. In fact, we believe that their paper makes a valuable contribution in this area. We do, however, challenge Grover et al.'s conclusions regarding the IS field's place within the constellation of reference disciplines.

In the following sections we critically examine the central question of where the IS field fits within the rubric of related fields. We challenge some of the assumptions made, and methods employed, by Grover et al. In particular, we question the exclusion of all non-IS papers within non-IS work points. However, the first issue we will look at is journal choice.

The Issue of Journal Choice

As both papers make clear, the results of citation analysis depend a great deal on the particular basket of journals chosen (Chua et al., 2003). Since there are no well-defined rules about which journals fit within which academic areas, categorizing them may be as much art as science. However, categorization is important since journal choice can exert a substantial bias (positive or negative) on the results. For example, some journals are more multi-disciplinary than others, and certain journals are consistently considered among the top tier, while the reputation of others rises and falls over time.

In our paper, we avoided a perception of bias by adopting the externally derived basket of top journals identified by the *Financial Times* (*FT*) newspaper. The *FT*, in turn, derived its list in consultation with academic leaders of the various disciplines. We cannot claim that the *FT* list is perfectly representative of each and every management field. However, we can claim that it provides a close approximation of the highest quality journals in each management sub-field. [1] Most deans are keenly aware of the journals on this list.

Grover et al.'s list was derived in a more iterative manner. They began with a list of journals from prior studies, and then added and subtracted journals based on discretionary factors and logic (see Grover et al., Table 1). The upshot of this process was a journal list not dissimilar to the *FT* list, although Grover et al. cover a smaller list of fields.. In the fields of IS, Organization Science (OS), Economics, and Marketing, we chose nearly[2] the same basket of journals.

[1] If we introduced a bias into our sample, it was to include two additional IS journals not on the FT list: JMIS and CACM. Since more journals translates into more opportunity for a field to be externally cited, then this bias is *in favor* of the IS field.

[2] The only exception comes at the OS work point. Grover et. al. included AMJ, AMR and Organization Science, while we included only AMJ and AMR due to lack of available data on Organization Science.

While we agree on these fields, we do take issue with Grover et al.'s inclusion of the journal *Decision Sciences* (*DS*) within the Management Science (MS) work point, due to uncertainty regarding its disciplinary home base. *DS* is regarded by many as a multi-disciplinary journal. We contacted an associate editor of *DS* and asked him whether he thought the journal should be considered IS or MS. He replied that the journal was actually at the intersection of three fields: IS, MS, and operations management. A quick check of the editorial board showed that he was probably right. As of early 2006, the editorial board was made up of 39 individuals, 16 of whom were in the information systems area at their home universities, 13 were in management science, and 10 were in operations management. So, over 40% of the editorial board of *DS* is made up of IS academics. While a journal's editorial board does not necessarily determine its disciplinary focus, it is likely to provide a strong indication of the types of papers that are accepted. A more appropriate choice to represent the MS work point might have been the journal *Operations Research*, as suggested by Dennis et al. (2006) and Trieschmann et al. (2000).

The upshot of including *DS* within the MS work point, rather than the IS work point or somewhere else, is that data are skewed toward *more* external citations from MS to IS. If the journals *Management Science* and *Operations Research* were used to represent the MS work point instead of *Management Science* and *Decision Sciences*, then, by our reckoning, citations from the MS work point to the IS work point would fall from 514 to 125 over the 1990 to 2001 period. Thus, readers should view Grover et al.'s conclusions as they relate to the MS work point with caution.

The Exclusion of All Non-IS Papers

The main difference between our paper and Grover et al. is how IS papers are defined and how comparisons among academic fields are derived. First, Grover et al. reasonably assume that all papers published in IS journals are IS papers. Yet, they do not extend this logic to other fields, i.e. that all papers published in Marketing journals are Marketing papers. Instead, by a process of qualitative assessment, they allow for the fact that a few papers published in Marketing journals are actually *IS papers*. These IS papers from other disciplines are included in Grover et al.'s sample, while all other papers from these disciplines (i.e. the vast majority) are ignored. Since only papers that are IS-related are considered, citations to IS journals from these papers are bound to be high, and overstated if expressed as proportions. A paper in the journal *Management Science* on wireless number portability would be included in Grover et al.'s sample, due to its connection to an IS topic, but another article in the same issue on innovation strategy would not. Thus, Grover et al. do not capture whether the innovation strategy paper cited any IS journals. Clearly, if *all* papers appearing in *Management Science* were considered, then the proportion of citations to IS journals would be considerably lower than those presented in Table 1 below (Table 1 is a re-creation of Grover et al.'s Table 2).

In our paper, we adopted a different strategy by considering all papers in a discipline. This approach is consistent with the methodology of Pieters and Baumgartner, who examined citation patterns in the Economics and Marketing fields (Pieters and Baumgartner, 2002; Baumgartner and Pieters, 2003). By avoiding possible errors of inclusion or exclusion that occur with sampling-based methods, the population approach has the benefit of being transparent, unbiased, and relatively easy to interpret.
It should be pointed out that Grover et al.'s approach is reasonable *if*, as a field, we are satisfied with only providing external influence in a narrow range of IT-related concepts, and *if* we are satisfied with only being referenced by a very small percentage of articles in non-IS journals. If, however, we expect to make theoretical, methodological, or

practical contributions that go beyond traditional information technology concepts, then we need to consider a more inclusive, holistic approach.

The difference between our approach and that of Grover et al. can be demonstrated by examining Tables 1 and 2 below. Table 2 restates Grover et al.'s Table 2 using *all* articles in non-IS journals rather than just those pertaining to IS topics. The differences in the results between Tables 1 and 2 are substantial. Note that the final column in Tables A and B below is new. This column shows the actual number of articles that were included by us and the approximate number of articles included by Grover et al. for each work point. We computed these figures by dividing the total number of citations by the average number of citations per article for each field. [3] As Table 1 shows, Grover et al. considered relatively few articles within non-IS work points. [4]

Table 1. Grover et al.'s Table 2

Work Points and Associated Reference Points (Grover et al.)

Reference Points	Mean proportion of References to Total references							
Work Points	IS	MS	OS	CS	ECN	MKT	Number of total references	Approx. Number of Articles Sampled
IS	11.53	4.24	3.22	0.59	0.75	1.04	54,700	1116
MS	10.45	9.57	3.01	0.40	2.34	1.70	11,098	347
OS	5.70	3.48	8.24	0.35	0.82	0.70	3,918	55
CS	3.99	2.10	2.78	1.58	0.34	0.00	1,563	36
ECN	0.00	0.60	0.00	0.00	12.88	0.00	357	18
MKT	0.89	2.76	1.29	0.12	1.35	22.89	865	16

Table 2: Grover et al.'s Table 2 Reanalyzed Using Wade et al.'s Data

Work Points and Associated Reference Points (Wade et al.)

Reference Points	Mean proportion of References to Total references							
Work Points	IS	MS	OS	CS	ECN	MKT	Number of total references	Actual Number of Articles Examined
IS	4.39	1.13	0.66	0.11	0.05	0.20	45,252	816
MS	0.82	3.22	0.37	0.02	0.33	0.51	62,362	1954
OS	0.05	0.31	4.52	0.00	0.11	0.17	66,548	937
CS	0.09	0.03	0.02	0.53	0.00	0.00	21,872	508
ECN	0.00	0.05	0.01	0.00	5.65	0.01	68,766	1243
MKT	0.03	0.44	0.42	0.00	0.10	8.79	60,926	3125

[3] Grover et al. do not provide the number of articles considered at each work point. However, they do supply the *total* number of articles considered – 1406. Since the final column in Table 1 adds up to 1588, we have actually overstated the number of articles considered by Grover et al. by about 13%.

[4] The exception is the MS work point with approximately 347 articles, yet we have argued that this number may be inflated due to concerns with the choice of the journal *Decision Sciences* to represent the MS work point.

Grover et al.'s results can be interpreted as follows. From Table 1 above, the number 3.22 is presented as a measure of the proportion of the bibliographies in an IS work point paper that cites an OS work point paper (see shaded cells in Table 1). Further, 5.70 is the measure of the proportion of the bibliographies in an OS work point paper that cites an IS work point paper. Even if the reader is never exactly told what a "proportion" is in this table, it is very reasonable to assume that IS papers are referred to by OS papers more often than OS papers are referred to by IS papers. In fact, a reader could very reasonably conclude that for every citation made to an OS paper by an IS paper, there are 1.75 (5.7/3.22) citations made to an IS paper by an OS paper. This is truly an encouraging finding! Based on these results, Grover et al. conclude that classical reference disciplines, such as OS, draw on IS more than IS draws on classical reference disciplines (see Hypothesis 4a below), thus cementing the IS field's place as an emerging reference discipline.

Grover et al. Hypothesis 4a: On average, dependence of IS on classical reference disciplines is less than the dependence of classical reference disciplines on IS.

Grover et al. can draw these conclusions because of their key assumption that only a limited number of papers in other fields are considered, namely those that are (in its estimation) IS papers. Clearly, this is a very biased sample. Caution must be exercised when extrapolating conclusions drawn from this sample to the general population of IS and non-IS papers. In the case of the OS work point, for example, Grover et al. sampled about 55 IS related papers from OS journals (*AMR*, *AMJ*, *Organization Science*) from a population of more than 1400 total OS papers, or about 4% of total OS papers published between 1990 and 2003. In Table 2 above, we examined all papers published in *two* of the three OS journals (*AMR* and *AMJ*) between 1990 and 2001 (937 papers), and found that for every citation made to an OS paper by an IS paper, there were 0.08 (0.05/0.66 – see shaded cells in Table 2) citations made to an IS paper by an OS paper (this is about a 13 to 1 ratio).

Thus, Grover et al. can validly make statements about the IS field's external influence as it pertains to the basket of IS-related papers appearing in other fields, but not for all papers appearing in other fields. Thus, Grover et al.'s original Hypothesis 4a is not supported. Instead, it should more accurately be stated as follows:

Grover et al. restated Hypothesis 4a: On average, when considering papers that are related to IS topics, dependence of IS on classical reference disciplines is less than the dependence of classical reference disciplines on IS.

The Issue of Method Consistency and Technical Precision

The methodology employed by Grover et al. does not appear to be consistent throughout the paper. One point of confusion is Table 8, in which they present a summary of disciplines referring to IS publications. It is not immediately clear how journals were organized into the disciplines noted in Table 8, or what those journals are. Nor is it clear where the boundaries lie between fields such as IS and E-commerce, or Environmental Science and Agriculture and Engineering, and so on. Some fields, such as Strategic Management and Operations Management, are missing, despite their links to the IS field.

It further appears that the methodology they employed to analyze the data presented in Tables 2 and 7, where only IS papers were considered, was not followed in Table 8. In Table 8, for instance, all papers in marketing journals are considered. In this manner, the analysis conducted in Table 8 is relatively consistent with our method of analysis, and not directly comparable to the analysis presented earlier in Grover et al.'s paper.

The purpose of Grover et al.'s Table 8 and surrounding discussion is to illustrate that citations to IS journals from non-IS journals have increased over time. Indeed, as Grover et al. show, external citations to IS journals increased dramatically from 3 in 1999 to 422 in 2003! By way of comparison, we have plotted our data alongside theirs in Figure 1. Our data show all citations to *MISQ*, *ISR* and *JMIS* from non-IS journals within the *Financial Times* journal set for the years 1996-2001 (2001 being the most recent year from which we have data). In contrast to Grover et al., our data show no real trend over time. We are unable to explain this discrepancy.

In our paper, we show how the rate of citations to IS journals per citable 1rticle (i.e. controlling for the increase in the number of articles available to be cited over time), has actually fallen during the past 12 years (see Wade et al., Figure 3). We also show how a comparable field to IS, International Business, has managed to increase its external citations over time (See Wade et al., Figure 4).

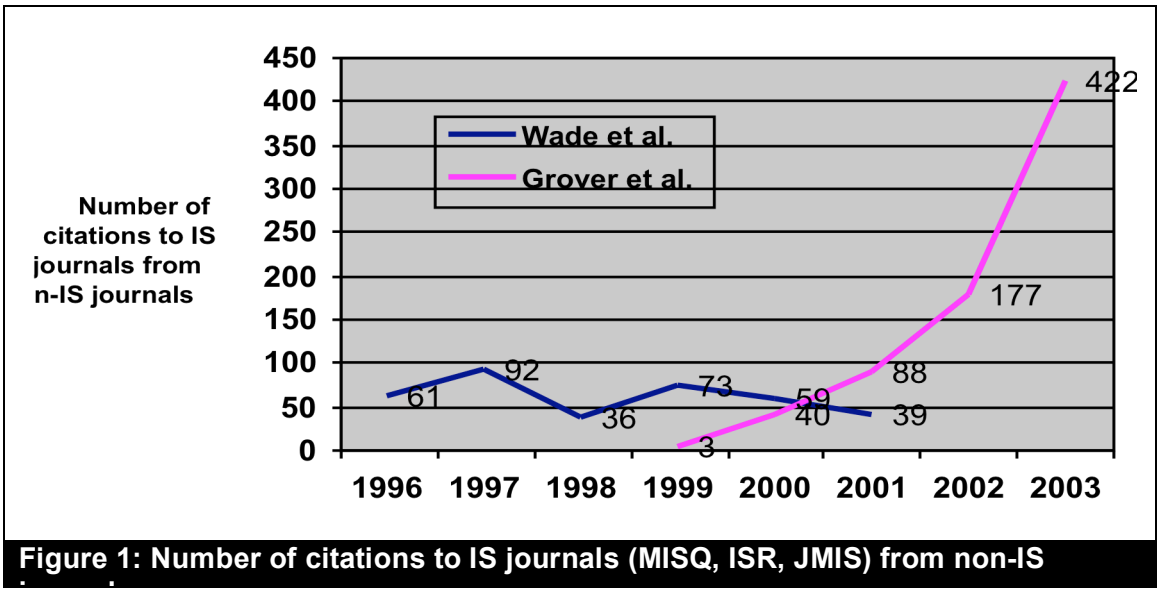

Figure 1: Number of citations to IS journals (MISQ, ISR, JMIS) from non-IS

Summary

In summary, we have outlined how both our paper and Grover et al.'s paper agree on the progress that the IS field has made on its journey to becoming a fully-fledged and mature academic discipline. Our data both point to the conclusion that IS has grown into a field with a strong culture, disciplinary identity, and cumulative traditions. This is certainly something to be proud of. However, our paper and Grover et al.'s paper disagree on the influence that the IS field exerts on other disciplines. In this paper we have shown that Grover et al. have made assumptions and employed approaches that may inflate the external influence of the IS field. Should we really be proud that IS topics

have been examined by 18 Economics papers (of more than 1,200), 55 Organization Science papers (of more than 1400), and 16 Marketing papers (of more than 3,000) over 14 years?

Our view, supported by our data, shows that IS maintains its dubious place close to the end of the intellectual food chain. Thus, far from congratulating ourselves, we propose that the field needs to take genuine and specific steps toward making itself more relevant within the constellation of reference disciplines.

While we accept most of Grover et al.'s conclusions, in particular those regarding the field's development and maturity, we cannot accept their support for Hypothesis 4a, as currently stated. By extension, we do not accept their conclusion that "our field is turning the tables on its reference disciplines and becoming an important intellectual engine for these disciplines as well as others."

Most IS academics we have spoken to are not particularly surprised by our results. They seem to realize, intuitively, that IS is not well cited by other management disciplines. Most are quick to recount stories of being misunderstood by colleagues in other areas, even within their own schools. One common misconception is that IS academics produce largely technical or quantitative research. Colleagues in other fields are often surprised to find out that we produce valuable and relevant organizational and socio-technical work. Other IS researchers have stories of submitting work to non-IS journals and being told to take away or reduce the IS citations, and to instead insert more *recognizable* references from mainstream management journals. In short, most people we have spoken to recognize that a problem exists with the field's lack of external influence. A recent paper by Nerur, et al. (2006) using citation analysis on a slightly different set of journals to ours, came to very similar conclusions.

In our paper, we looked not only at directional citations, but also at second-degree citations to determine the spread of knowledge from the IS field. Once again, our analysis painted a bleak picture of the IS field's extra-disciplinary influence. Hence, we stand by our results, although we had hoped to be persuaded otherwise.

The Way Forward

Our paper is divided into two parts, as suggested by the title. The first part demonstrates why we feel that *Information Systems is not a reference discipline*. Our reading of Grover et al. has not dissuaded us from this view. However, it is the second part – *what we can do about it* – that we believe provides the paper's biggest contribution. Since Grover et al. are more optimistic on the question of the IS field's influence on external disciplines, they quite logically did not see the need to explore avenues for change.

In contrast, we strongly support the need for change. Thus, we direct the reader to section 7 of Wade et al. where we discuss strategies that our authors and editors should follow to enhance the IS field's external influence, and in particular to Table 6, where these ideas are summarized.

References

Baumgartner, H. and Pieters, R. (2003) "The structural influence of marketing journals: A citation analysis of the discipline and its subareas over time." Journal of Marketing, (67), pp. 123-139.

Chua, C., Cao, L., Cousins, K., and Straub, D.W. "Assessing Researcher Production in Information Systems," *Journal of AIS* (3:6, January) 2003, pp 145-215.

Dennis, A., J. Valacich, M. Fuller and C. Schneider (2006) ”Research standards for promotion and tenure in Information Systems.” MIS Quarterly, 30(1) pp. 1-12.

Grover, V., R. Ayyagari, R. Gokhale, J. Lim, and J. Coffey (2006) “A citation analysis of the evolution and state of information systems within a constellation of reference disciplines,” *Journal of AIS*, this issue.

Nerur, S.P, R. Mahapatra, V. Balijepally, and G. Mangalaraj (2006) “Is Information Systems a Reference Discipline?,” Proceedings of the 39th Hawaii International Conference on System Sciences.

Pieters, R. and Baumgartner, H. (2002) "Who Talks to Whom? Intra- and Interdisciplinary Communication of Economics Journals," Journal of Economic Literature, (40), pp. 483-509.

Trieschmann, J., A. Dennis, G. Northcraft, and A. Niemi (2000) “Serving multiple constituencies in the business school: MBA program versus research performance,” *Academy of Management Journal*, 43(6), pp. 1130-1141.

Wade, M., M. Biehl, and H. Kim (2006) “Information systems is not a reference discipline (and what we can do about it),” *Journal of AIS*, this issue.

About the Authors

Markus Biehl is an Assistant Professor of Operations Management at York University's Schulich School of Business. His current publications and consulting activities focus on problems in sustainable manufacturing strategies and (environmentally conscious) supply chain management. He holds a Ph.D. (Management) from the Georgia Institute of Technology. Prior to joining Schulich, Dr. Biehl chaired the Operations Management department at the International University in Germany's Business School.

Henry Kim is an Associate Professor of Information Systems at the Schulich School of Business, York University. He is interested in the next generation of the WWW, the semantic Web, as well as information systems that facilitate data and knowledge for enterprise modeling, knowledge management, and e-commerce. His articles have appeared in journals such as the *Communications of the ACM*, *Internet Research*, *BT Technology Journal*, and *Lecture Notes in Computer Science.* He is on the Editorial Advisory Board for the *Journal of Internet Research*, and the *AIS Special Interest Group on Semantic Web and Information Systems*. He has consulted to industry and researched in laboratories in Canada, US, UK, and Australia. He received a Ph.D. in Industrial Engineering from the University of Toronto.

Michael Wade is an Assistant Professor of Management Information Systems at York University's Schulich School of Business. His research has appeared in journals such as *MIS Quarterly*, the *Journal of Management Information Systems*, and *Communications of the ACM*. He has co-authored one IS and two electronic commerce textbooks. His current research focuses on the strategic use of information systems for sustainable competitive advantage.

Journal of the Association for Information Systems
ISSN: 1536-9323