

# **Relationships among the Academic Business Disciplines: A Multi-Method Citation Analysis**

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## **Relationships among the Academic Business Disciplines: A Multi-Method Citation Analysis**

**Abstract** A great number of papers have been published that compare the quality or impact of academic journals. This article seeks to broaden the debate around journal evaluation by showing how top journals in various academic business disciplines, as defined by the Financial Times list of top research outlets, relate to one other. Using large-scale sociometric analyses on about 140,000 citations we found that the integration of the citation network has increased over time. Moreover, the information flow from Finance and Economics to Management has become stronger and, within Management, a polarization between information generators and users has taken place. We also found that most business academics published in distinct and mostly non-overlapping disciplines. The only exceptions were Finance and Economics as well as Strategic Management and OB/HR. Surprisingly, we also found that the general business journals, which could be assumed to be cited by most other journals across the management disciplines, are not central to the entire field. For instance, they are not complementary at all to Finance and Economics. Instead, Operations Research (OR) and Management Information Systems journals occupy the central space on the perceptual map. This indicates that these disciplines (and OR in particular) are complementary with Management and with Finance and Economics.

**Key Words** Management journals; management disciplines; sociometric analysis; citation analysis; multivariate methods

## INTRODUCTION

In recent years, a series of papers in OMEGA discussed journal evaluation methodologies as well as the value of various academic journals (e.g., [1-6]). The discussion of these methods and the resulting rankings has not been limited to OMEGA but is spread over a large number of journals. A search of the literature revealed that over the last thirty years, Economics and Finance journal rankings have been discussed in sixteen articles each, Accounting journals in ten articles, and Operations Management and Management Science journals in nine articles each, to name a few.

Few, papers, however, have explored the relations among journals. That is, there has not been much research on how journals are qualitatively distinct from, or similar to, one other. The same is true for academic business disciplines. One recent paper analyzed characteristics of Operations Management and Management Science journals rather than attempting another ranking [6]. This is a refreshing development in this literature stream to which we wish to add this paper.

This article seeks to show how 31 top journals in the management disciplines, as defined by the Financial Times (FT) list of top research outlets [7], relate to one other<sup>1</sup>. The purpose of this analysis is to show the interdependencies of the journals and the disciplines they represent. We accomplish this, in part, by comparing citation patterns over two periods of time so that changes over time can be discerned.

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<sup>1</sup> The authors acknowledge that there are high quality journals that do not appear on the FT list. The FT list is used as a representative and externally valid sample of top management journals.

Analyzing the similarities and differences among business management journals and disciplines has several potential applications for academics. When a paper is rejected from a journal because of some shortcomings other than its content, this analysis may aid the author in determining the journal with the next best fit for the article. Understanding the relationships among journals greatly aids in making this decision. Moreover, it will be useful to find out which journals are interdisciplinary in nature and thus provide outlets for publishing cross functional research. Lastly, the analysis of journal similarities allows for statistical inferences regarding the disciplines. How closely related are the management disciplines really? Which journals publish (interdisciplinary) research from which academic disciplines?

Little cross-disciplinary research of this nature has been conducted. We were able to find only a few articles that reviewed journals covering the entire business management field. The first article [8] rated the perceptions of 16 journals based on the survey responses of management chairs. In the second paper [9], the authors established the importance or impact of management journals relative to each other. Two papers [10,11] used citation analysis to measure the impact of management journals. Other articles used perceptual or citation-based impact factors of management journals to establish institutional research productivity and compare the research output of business schools [2,12]. Johnson and Podsakoff [10] investigated the influence of some top-tier management journals and compared various measures of influence statistically. Similarly, Baumgartner and Pieters [13] used citation-based analyses to examine the structural influence of marketing journals on one another. Lastly, Hoffman and Holbrook [14] carried out a co-citation analysis of authors that published in the Journal of Consumer Research. None of these articles, however, investigated the relationships among a broader range of top management journals and their respective disciplines.

In the following section we explain the methodology employed to analyze the journals and management disciplines. We then analyze citation data to explore the relationships among journals on one side and the disciplines on the other. We conclude by assessing the implications and proposing further research.

## **ANALYSIS OF NETWORK STRUCTURES**

### **Citation Analysis**

We conducted a citation analysis of 31 top management journals specified in the Financial Times [7] (see Table 1 for a list of these journals) by counting the citations from each journal to each other journal on the list<sup>2</sup>. We refer to these 31 journals as the FT dataset throughout this paper. Many advantages and disadvantages of using citation analysis have been discussed in the literature. The main advantage is that research can be measured in a timely fashion, independent of personal perceptions [4]. Disadvantages of citation analysis discussed in the literature include conflicting results depending on the approach used, that inappropriate articles are cited, and that authors tend to cite within their networks in order to include possible editors and reviewers [4]. In addition, authors do not necessarily cite only the articles most relevant to their research (“we make some citations because we think our colleagues think they are important and we want to show we know that” [6], and the time lag for citations varies from one journal to the next [1].

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<sup>2</sup> For practical purposes we have excluded 9 of the journals listed in Table 1. The main reason for omitting these journals was that they either did not exist or were not captured by ISI in 1985.

Abbreviation	Journal Name	First Issue
AER	The American Economic Review	1886
AME*	Academy of Management Executive	1987
AMJ	Academy of Management Journal	1948
AMR	Academy of Management Review	1976
AOS	Accounting, Organisations and Society	1976
AR	The Accounting Review	1926
ASQ	Administrative Science Quarterly	1956
CMR	California Management Review	1958
ECON	Econometrica	1934
ETP*	Entrepreneurship Theory and Practice	1976
HBR	Harvard Business Review	1923
HRM	Human Resource Management	1962
IJHRM*	International Journal of Human Resource Management	1990
ISR	Information Systems Research	1990
JAE	Journal of Accounting and Economics	1979
JAP	Journal of Applied Psychology	1916
JAR	Journal of Accounting Research	1963
JASA	Journal of the American Statistical Association	1906
JBE	Journal of Business Ethics	1982
JBV*	Journal of Business Venturing	1985
JCR	Journal of Consumer Research	1974
JF	Journal of Finance	1946
JFE	Journal of Financial Economics	1933
JIBS	Journal of International Business Studies	1970
JM	Journal of Marketing	1936
JOM*	Journal of Operations Management	1980
JMR	Journal of Marketing Research	1936
JPE	Journal of Political Economy	1893
JSBM*	Journal of Small Business Management	1963
LRP	Long Range Planning	1968
MIR*	Management International Review	1961
MISQ	MIS Quarterly	1977
MS	Management Science	1954
OBHDP	Organizational Behavior and Human Decision Processes	1966
OpnsRes	Operations Research	1953
OS*	Organization Science	1990
RFS*	Review of Financial Studies	1988
RJE	The Rand Journal of Economics	1970
SMJ	Strategic Management Journal	1980
SMR	Sloan Management Review	1960

\* Not included in our sample

*Table 1: Financial Times Journals*

Most of these disadvantages apply only when citation analysis is used for ranking a journal's importance. Other problems with citation analysis are addressed by our research methods. Specifically, the issue of citing possible editors and the general tendency to cite articles published in the same journal as the article under investigation (as evident from this paper's

bibliography) is addressed through treating any self-citations as missing data ([15,16]). Moreover, instead of using data from articles published during a short time frame (most studies use a one to three year time period), we used citation counts from articles published between 1985 to 2001 to articles published during the same period. This large data set remedies the issue of varying time lags across journals before articles are cited. In addition, since we counted only citations to articles contained in our data set and we included only journals that have been both in existence and covered by ISI's Web of Science since 1985, a citation bias towards older journals [15] is avoided.

We also addressed another, less significant, shortcoming of citation analysis. Differences in the number of articles published in a journal each year may skew the results in favor of journals with a large number of articles per year [15]. Moreover, in some journals it is customary to have a long bibliography. Combined, these two issues result in a wide range of citation counts. On the high side, the Strategic Management Journal (SMJ) cited almost 7,000 other articles in the FT set, followed by the Academy of Management Journal (AMJ) and the Journal of Finance (JF) with about 6,000 citations, excluding self-citations. In contrast, ISI returned only 41 citations made by the Harvard Business Review (HBR) to articles in other FT journals, followed by the Journal of the American Statistical Society (JASA) with about 400 citations. To remedy this problem, we standardized the citation counts for each journal by dividing the number of citations to other journals in our data set by the total number of citations captured for the journal (excluding self-citations) during the time frame. As a result, for each journal, our data determines the percentage of citations that is attributable to each other journal in the data set, with the attributable citations adding to 100% for each journal.

Using the Web of Science, we obtained the bibliographic and citation data of all articles published between 1985 and 2001 in all of the 31 journals, resulting in about 140,000 citations between the respective articles. To be able to identify changes over time we split the dataset into two seven year periods, one ranging from 1985 to 1991, and one from 1995 to 2001.<sup>3</sup> The gap in the middle makes differences more pronounced and thus helps in identifying trends. In the remainder of the paper the first dataset is referred to as FT91, the second one as FT01.

## Methodology

One way to determine the strength of a relationship between journal A and journal B is through examining the links between them. The more A cites B and B cites A, the stronger the tie between the journals. For example, we can expect the ties between journals within a given management discipline (e.g., Finance) to be stronger than those between journals that belong to a different discipline (e.g., Marketing or Operations Management). A second way of investigating relationships between journals is through comparing the journals' citation *patterns* [17]. If journal A cites, and is cited by, the same journals as journal B, A and B are similar at least in terms of content, and probably also in terms of methodology (particularly if the set of journals referenced also contains methodologically oriented publications).

Based on these two distinct approaches, social networks theory offers many ways of further analyzing relationship data, of which we have chosen only a few to make some important points about the relationships of business management journals to one another. In this paper we use the

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<sup>3</sup> Note that, for ISR, only two years of citations are covered in the FT91 set. Due to the scaling, however, this did not present a problem in the analyses. While carrying out our analyses we carefully observed the results for ISR but did not find any problems.



following measures: network density, a graphical representation of information flow, the presence of cliques, and equivalence.

*Density.* The density of ties is defined as “the proportion of all ties that could be present and actually are” ([18], p. 42), which equals  $k(k-1)$  and, in our case (with  $k = 31$ ) comes to 930 possible combinations. The denser a network, the more ties between the actors and the more closely related the actors across the network. To compute the density of the network, the data must be dichotomized. Hanneman recommends the strength of the average tie as the cutoff value ([18], p. 30) which, in the FT network, is 0.03. This is equivalent to ignoring ties that account for less than 3% of the citations made by, or received from, a particular journal.

*Graphical Display of Information Flow.* A graphical display of information flow between a set of actors represents relationships through arcs (directed information flows) or edges (undirected flows). A wide array of methods for displaying such network data exists. We use spring embedding, a widely used method that places nodes into a two-dimensional grid based on their pairwise geodesic distances [19]. We show information flows between the actors through arcs of various widths, ranging from narrow (medium information flow) to wide (strong information flow). When constructing the network graph we took into account ties with a minimum strength of 3%. To make the network easier to read, however, we chose to not show information flows of less than 5%. The graph is drawn using NetDraw version 1.0 [19], which is distributed with Ucinet [20].

*Cliques.* A topic of enduring interest to academics is which journal really belongs to which discipline. This facet of a network structure can be analyzed by investigating cliques. The analysis of cliques also allows for inferences regarding the ‘social structure’ of the field and the embeddedness of the individuals.

The concept of cliques is based on a bottom-up approach that forms tight groups through connections with strong ties to closely associated actors. A strong tie must fulfill two criteria. First, the tie has to have a minimum strength. Recall that Hanneman states that the strength of the average tie in the network is commonly used to dichotomize the data ([18], p. 30). Since we are interested in close relationships between journals, however, a tie representing only 3% of a journal's citations can be thought of as practically too weak. Thus, for this analysis we dichotomized the network data with what we thought of as a more indicative value: 10%. Second, to be strong the tie must be reciprocated. This means that the data must be symmetrized such that a dichotomous link exists from actor A to actor B as well as from B to A ( $A \leftarrow B \wedge B \leftarrow A$ ). In other words, we take the minimum value of  $A \leftarrow B \in [0,1]$  and  $B \leftarrow A \in [0,1]$ .

A clique is then constructed by grouping any actor that is strongly linked with every other actor in the group. That is, a clique forms a maximal complete sub-graph within the network ([18], p. 80). As a result, we can claim that journals that heavily cite each other (i.e., bi-directionally) must be closely related and members of a clique.

The structure of these relationships may be further investigated by using the counts of how many times a pair of journals is listed in a clique (co-membership matrix). The more often a journal appears in cliques, the more central it is to connecting the various actors in the network. Moreover, the co-membership matrix may be structurally analyzed by hierarchically clustering the resulting correlation matrix. The higher the correlation between the co-membership pattern of two journals, the more similar they are. Thus, not only the direct information of clique membership, but also the structural analysis of clique membership, helps us discern relationships between journals.

*Equivalence.* Lastly, relationships between journals can be examined through measuring the journals' structural equivalence (similarity). Perfect structural equivalence between two actors exists if both actors have the exact same relationship (citation) pattern to all other actors. In this case, the correlation coefficient between the two actors would be  $r=1$  and the actors would share the same network location. The measurement of structural equivalence can be used to group journals into disciplines and find journals that interact between disciplines.

Just replacing a matrix of ties with a matrix of similarities, however, does not make it easy to discern equivalence patterns. Thus, correlation coefficients are typically used as inputs to methods that further process the information, such as (hierarchical) clustering algorithms [16], multidimensional scaling, and factor analysis. Unfortunately, clustering methods are strongly grounded in pairwise comparisons and assume that the underlying data are unidimensional ([18], p. 106). Hence, in this paper we restrict ourselves to the other two methods.

A frequently used approach that is capable of discerning multiple underlying dimensions in the data is principal component analysis ("factor analysis"). Principal component analysis extracts linear components (the variates or factors) of a matrix of similarities (typically a correlation matrix) by determining the Eigenvalues of the matrix. The elements of the Eigenvectors, which are calculated from the Eigenvalues, provide the loading of each variable on each factor [21]. The goal of a factor analysis is to discern underlying multidimensional constructs through explaining as much variance as possible with as few factors as possible. The factors (and loadings of the variables within the factors) may be used to identify similarities and differences among the actors.

We use multidimensional scaling to better visualize these groups. Perceptual maps are constructed based on the coordinates derived through the scaling of the similarities data

(correlation matrix). These maps typically display the position of actors in a two or three dimensional grid. Actors that exhibit similarity in terms of their citation pattern are located in close proximity to each other, and functions that are dissimilar are located further apart along the identified dimensions (e.g., see [22]). Multidimensional scaling is related to factor analysis in that the construct underlying the data is not assumed to be unidimensional. The dimensions are equivalent to the factors identified in a factor analysis. While restricting ourselves to a two-dimensional graphical representation of the data we can apply the higher-dimensional results of the factor analysis to the perceptual map in order to not lose any information.

Having explained the sociometric methods to be used for analyzing the journal data, in the next section we present the results of the analysis.

## **ANALYSIS OF THE CITATION DATA**

### **A Birdseye View: Network Density**

The density of the FT91 network was 0.20, as compared to 0.25 for the FT01 network. In other words, the density increased by 25% over the decade. Given that journals within disciplines are typically well or even fully connected to one another, this finding indicates that authors increasingly digest information from, and disperse information to, disciplines beyond their own. This result is supported by the fact that 45% of the ties in the FT91 set equaled zero while this was the case for only 23% of the ties in the FT01 set. Using this macro view of the network, the impression arises that the management field is becoming more integrated and interdisciplinary.

## Information Flow

Figure 1a shows the information flows in the FT91 network. Its layout suggests that the journals could be roughly divided into two categories: the management journals (e.g., Marketing, Strategy, OR/MIS, HR/OB) on one side and Economics, Finance and Accounting (EFA) on the other side. The information flow (an arrow from A to B means that A cites B) appears to be very strongly interconnected within each of these two categories and loosely connected between them. In particular, information seemed to be generated by economics and finance journals and used within their own disciplines and by Accounting. Two management journals also assimilated this information for the management cluster: Management Science (MS) and Harvard Business Review (HBR). Note that information did not flow from the management cluster to either Finance or Economics. AOS and JASA were the only journals citing management work, but this information was not significantly dispersed into the EFA cluster.

When investigating information flow it is also interesting to find out who generates, digests and transmits, and merely uses this information. These three roles are referred to as sources, transmitters and sinks. To assign these roles we classified the journals as follows. Journals that received more citations than they made (at least 7 for 4 citations – approximately one standard deviation above the mean) were classified as sources, journals on the receiving end (at most 4 received for 7 citations made – about 2/3 of a standard deviation below the mean) were classified as sinks, and all others were labeled as transmitters.

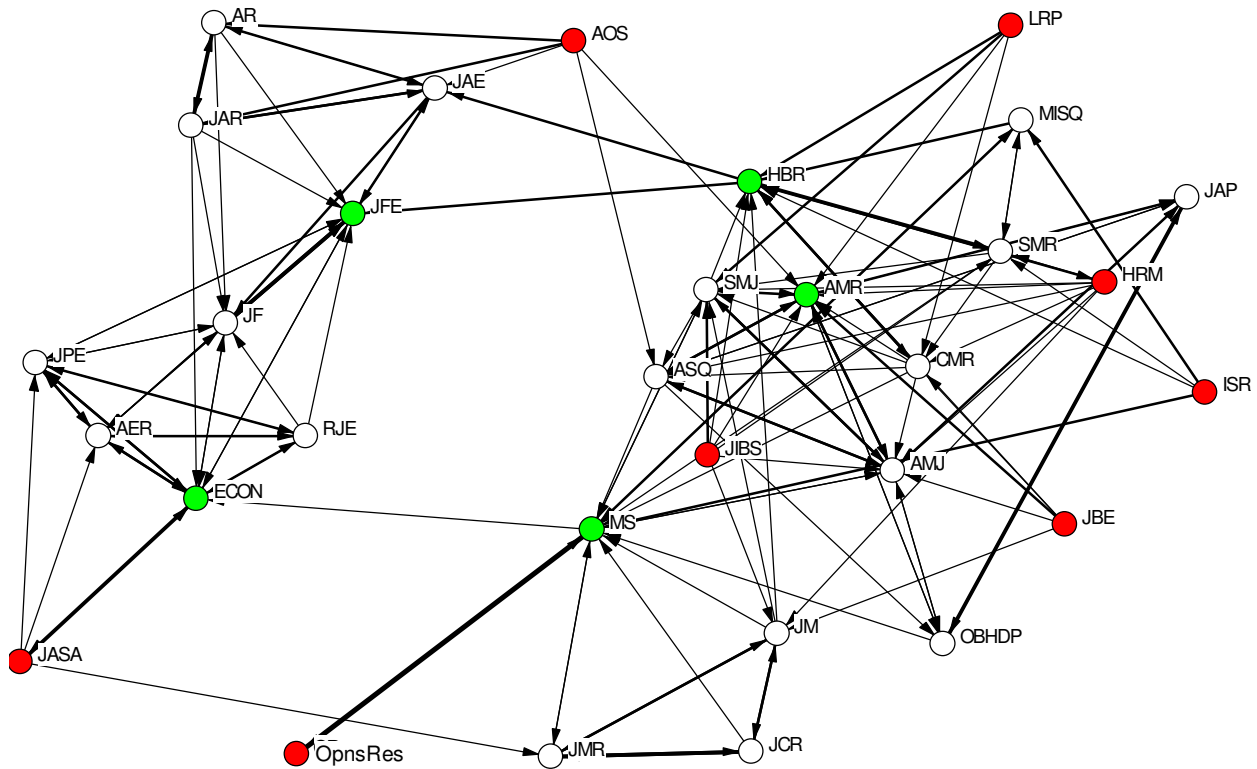


Figure 1a: Citations among Journals, 1985-1991  
 Legend: ● Sink ○ Transmitter ● Source

Using this classification, it becomes apparent that ECON and the JFE were information generators within the EFA cluster while JASA and AOS appeared to be sinks. Note, however, that JASA is a journal focused on methodologies with a drawing well beyond the FT set of journals. Hence, it is possible that, outside the FT set, JASA actually acted as a source (the same holds true for OpnsRes<sup>4</sup> within the management cluster). Within the management cluster, MS, AMR and HBR generated information while LRP, HRM, ISR, JBE and JIBS acted as sinks. All other management journals were transmitters.

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<sup>4</sup> In this paper we refer to the journal Operations Research as OpnsRes, to the discipline as OR.

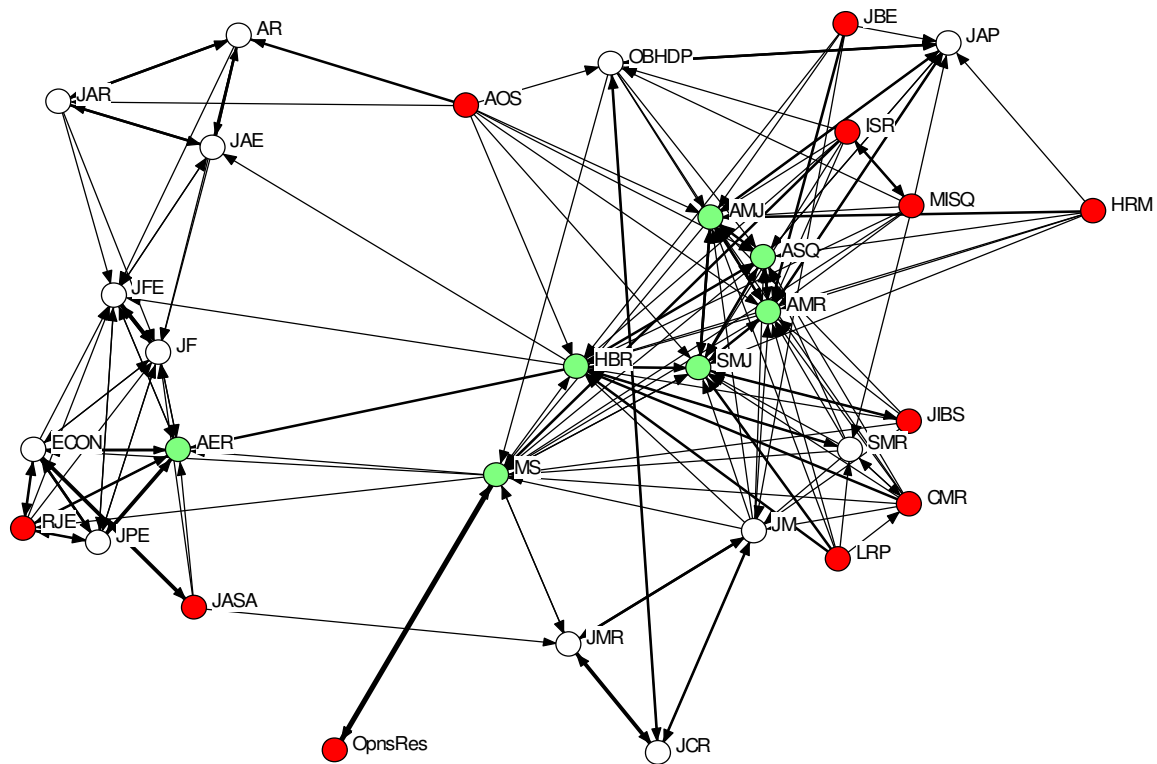


Figure 1b: Citations among Journals, 1995-2001  
 Legend: ● Sink ○ Transmitter ● Source

Comparing the information flow of the FT91 data to the FT01 data signifies a few differences (see Figure 1b). First, the information flow from the EFA cluster to management seems to have intensified. HBR cited a higher proportion of Finance and Economics journals than before, MS cited a higher proportion of Economics journals. This would indicate that information generated by Economics and Finance had become more important to the management disciplines (but not vice versa). Second, there seem to be more arcs among management journals, thus corroborating the findings of the density analysis. Lastly, using the previously defined cutoffs to classify journals as sources, transmitters or sinks, the sources within the EFA cluster had changed from JFE and ECON to AER. RJE had moved from a transmitting position to a sink. In the management cluster the position of journals had become more

polarized, with AMJ and SMJ having graduated to information providers (sources), and MISQ and CMR to sinks.

## **Cliques**

Table 2 shows the results of the cliques analysis performed with Ucinet [20] using the FT91 and FT01 data. For the FT91 data, twelve cliques were identified of which the first three cliques and cliques 7 and 12 represented journals in the Strategic Management and HR/OB areas, cliques 4, 5, 8 and 10 to Economics and Finance, clique 9 to Marketing, and clique 11 to Operations Research. Two more observations can be made. First, all journals within a clique were very tightly connected to one another through strong (and mutual) ties. Hence, if an article was rejected from, say, SMJ, then the author might have considered submitting the paper to AMJ or AMR on the basis that these journals significantly cited one another. Second, some journals appeared in multiple cliques. AMJ and AMR, for example, held memberships in three cliques, AER, JAP and JPE in two. These journals were functioning as bridges between cliques and were more responsible than others for the transmission of information. Thus, it could be inferred that those journals were pivotal to their respective fields.

Table 2 also shows the hierarchical clustering of the journals based on their co-membership pattern. It can be seen that AMR, AMJ, ASQ and SMJ were highly similar. So were JAP and OBHDP, all Economics and Finance journals, MS and OpnsRes, the Marketing journals, three of the accounting journals (AR, JAE, JAR), and CMR and HBR. Journals that did not appear in any clique are shown as not connected or similar to any other journal.



**FT91**

<b>Cliques</b>	<b>Hierarchical Clustering of Equivalence Matrix</b>																																						
1: AMJ AMR ASQ*																												O											
2: AMJ AMR JAP								J								M													B										
3: AMJ AMR SMJ																																							
4: AER ECON JPE								A	C	H	H	I	J	J	J	I	J	J	L	I					A	J	A	C	J	R	J	H	A	A	A	S	S		
5: AER RJE								O	M	B	R	S	A	A	A	B	B	C	J	M	R	S	M	O	S	J	F	E	O	P	J	A	D	M	M	S	M	M	
6: AR JAE JAR								S	R	R	M	R	R	E	R	E	S	R	M	R	P	Q	S	R	A	F	E	R	N	E	E	P	P	R	J	Q	J	R	
7: CMR HBR																																							
8: ECON JASA																																							
9: JCR JM JMR																																							
10: JF JFE JPE	Level	4	7	9	0	1	5	2	4	6	0	7	1	2	4	5	6	8	5	8	9	2	8	3	9	3	7	3	1	6	0	1							
11: MS OpnsRes	3.000	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12: JAP OBHDP	1.000	.	XXX	.	.	XXXXX	.	.	XXXXX	.	.	.	.	.	XXX	XXXXX	.	XXX	XXXXX	.	XXX	XXXXXXXX	.	XXX	XXXXX	.	.												
	0.600	.	XXX	.	.	XXXXX	.	.	.	.	.	XXXXXXXXXX	.	XXX	XXXXX	.	.																						
	0.400	.	XXX	.	.	XXXXX	.	.	.	.	.	XXXXXXXXXX	.	XXX	XXXXX	.	.																						
	0.190	.	XXX	.	.	XXXXX	.	.	.	.	.	XXXXXXXXXX	.	XXX	XXXXX	.	.																						
	0.082	.	XXX	.	.	XXXXX	.	.	.	.	.	XXXXXXXXXX	.	XXX	XXXXX	.	.																						
	0.057	.	XXX	.	.	XXXXX	.	.	.	.	.	XXXXXXXXXX	.	XXX	XXXXX	.	.																						
	0.000	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX																																					

**FT01**

<b>Cliques</b>	<b>Hierarchical Clustering of Equivalence Matrix</b>																																						
1: AMJ AMR ASQ SMJ																																							O
2: AMJ JAP																																						B	
3: AER ECON JPE																																							
4: AR JAE JAR																																							
5: ECON JASA																																							
6: HBR SMR																																							
7: ISR MISQ																																							
8: JCR JM JMR	Level	4	7	0	5	4	2	6	0	8	9	5	2	3	8	4	1	5	6	8	9	7	1	2	3	7	3	0	6	1	9	1							
9: JCR OBHDP	1.000	.	.	.	XXXXX	.	.	.	XXXXX	.	XXX	XXX	.	XXXXX	XXX	XXXXXXXX	XXX																						
10: JF JFE	0.267	.	.	.	XXXXX	.	.	.	XXXXXXXXXX	.	XXX	XXX	.	XXXXX	XXX	XXXXXXXX	XXX																						
11: JF JPE	0.160	.	.	.	XXXXX	.	.	.	XXX	XXX	.	XXXXX	XXX	XXXXXXXX	XXX																								
12: MS OpnsRes	0.089	.	.	.	XXXXX	.	.	.	XXX	XXX	.	XXXXXXXXXX	XXXXXXXX	XXX																									
13: JAP OBHDP	0.012	.	.	.	XXXXX	.	.	.	XXX	XXX	.	XXXXXXXXXX	XXXXXXXX	XXX																									
	0.000	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX																																					

\* Numbers of Changed Cliques Shown in Bold Face

*Table 2: Cliques in the Dichotomized (0.1) and Symmetrized (Min) FT91 and FT01 Datasets*

Comparing these results to those of the FT01 cliques one finds that some cliques had merged, others separated, and yet others appeared for the first time. Within management, cliques 1 and 3 were now combined in clique 1 as a result of the strengthened ties between ASQ and SMJ while the tie between AMR and JAP had weakened. HBR had switched allegiance from CMR to SMR (or vice versa). Marketing obtained an additional cluster through its tie between JCR and OBHDP. In Accounting, AER had 'lost' its tie to JPE, thus giving up its only connection to Economics. Lastly, the tie between JFE and JPE had weakened, resulting in a split

of the JF/JFE/JPE clique into two cliques. Overall, the clustering results indicate that the management field had become slightly more integrated through Marketing joining the HR/OB and Strategic Management cluster. All other fields remained unchanged in principle, with one or the other journal joining or leaving any particular clique.

## **Equivalence**

Recall that equivalence is based not on how strong ties are between pairs of journals but on citation patterns, as established through a measure of similarity. Using correlation analysis the data may be analyzed in three different ways: based on (1) the number of citations received by journals, (2) citations made by journals, or (3) an average of (1) and (2), leading to a symmetrized citation count matrix. The choice depends on the purpose of the analysis. Correlating the number of citations *received* gives a picture of how the journals are perceived by all players in the field. The correlations of the citations *made* by journals give an impression of the journals' perception of others, given its own outlook. This outlook answers the question which journals are the journals most important to the citing journal's discipline. Using a matrix *symmetrized* by averaging the counts from A to B and B to A results in a balanced view that takes into account both types of citation patterns.

The question which journal to submit a rejected paper to next is best answered by investigating the journals' perception of others. After computing the Pearson correlation coefficients between the journals' citation patterns, we constructed Table 3, which answers this question by showing which journals are most highly and significantly correlated with the journal in question (i.e., the one by whom the paper was rejected). Note that the list shown in Table 3 is

quite different from the results obtained through the cliques analysis. Journals that were not embedded into cliques prominently appear on this list. Others that were well embedded (e.g., HBR, MS and OpnsRes) seem to fare worse when compared structurally rather than through the strength of ties. As well, journals listed as most similar to the journal in question were not necessarily members of the clique (e.g., SMR and HBR or MS and OpnsRes). Why are the differences this significant? While the cliques analysis worked on the basis of strong ties, a strong tie is not necessary for a pair of journals to be structurally equivalent. Even journals that were weakly embedded, or not embedded at all, may be very similar to others if their citation patterns match. In contrast, even journals that were strongly embedded (e.g., MS, see cliques and information flows) may end up being structurally very different from the rest of the FT set of journals.

A second insight provided by the structural analysis is that journals have changed their citation patterns over time, as evidenced by the difference in journals listed in the second and third columns of Table 3. For example, SMJ's citation pattern has become more similar to that of AMJ, AMR and ASQ (or vice versa). MISQ's citation pattern has become less similar to the management journals, leaving ISR as its only strongly similar companion. HBR has changed from being similar to AR to being similar to Strategic Management journals. It appears that many journals have agreed upon which journals must be cited more and which ones less within a discipline, a result possibly aided by the proliferation of papers ranking the importance of journals. Only a few journals have not followed this trend.

If Paper was Rejected from ...	In 1991 you should have next tried ...	In 2001 you should have next tried ...
<b>AMJ</b>	<b>AMR, ASQ, SMJ, JIBS, JAP</b>	<b>AMR, ASQ, SMJ, JIBS, HRM</b>
<b>AER</b>	<b>RJE, JPE, ECON, JASA</b>	<b>JPE, RJE, ECON, JASA</b>
<b>AMR</b>	<b>AMJ, ASQ, SMJ, JAP, OBHDP</b>	<b>AMJ, ASQ, SMJ, JIBS, HRM</b>
<b>AOS</b>	<b>AR, JAR, JAE</b>	<b>JAE, JAR, AR</b>
<b>AR</b>	<b>JAR, JAE, AOS</b>	<b>JAR, JAE, AOS</b>
<b>ASQ</b>	<b>AMR, AMJ, JAP, SMJ, OBHDP</b>	<b>AMJ, AMR, SMJ, HRM, JIBS</b>
<b>CMR</b>	<b>SMR, HRM, LRP, MISQ, SMJ</b>	<b>SMJ, LRP, HBR, HRM, AMR</b>
<b>ECON</b>	<b>AER, RJE, JPE, JASA</b>	<b>RJE, JPE, AER, JASA</b>
<b>HBR*</b>	JAR	AMJ, LRP, <i>CMR, AMR, JIBS</i>
<b>HRM</b>	<b>CMR, SMR, LRP, MISQ, SMJ</b>	<b>ASQ, SMJ, AMR, JAP, AMJ</b>
<b>ISR</b>	<b>MISQ</b>	<b>MISQ</b>
<b>JAE</b>	<b>AR, JAR, JF, AOS</b>	<b>AR, JAR, AOS</b>
<b>JAP</b>	<b>OBHDP, ASQ, JBE, SMJ, AMR</b>	HRM, ASQ, OBHDP, <i>SMJ, JBE</i>
<b>JAR</b>	<b>AR, JAE, HBR, AOS</b>	<b>AR, JAE, AOS</b>
<b>JASA</b>	<b>ECON, JPE, RJE, AER</b>	ECON, RJE, JPE, <i>AER</i>
<b>JBE</b>	SMJ, JIBS, ASQ, JAP, HRM	HRM, <i>JIBS, SMJ, JAP, ASQ</i>
<b>JCR</b>	<b>JMR, JM</b>	JM, JMR
<b>JF</b>	<b>JFE, JAE</b>	<b>JFE</b>
<b>JFE</b>	<b>JF, JPE</b>	<b>JF</b>
<b>JIBS</b>	SMJ, LRP, AMJ, JBE, HRM	<b>AMJ, ASQ, AMR, SMJ, LRP</b>
<b>JM</b>	<b>JMR, JCR</b>	<b>JMR, JCR</b>
<b>JMR</b>	<b>JCR, JM</b>	<b>JM, JCR</b>
<b>JPE</b>	<b>RJE, AER, ECON, JASA, JFE</b>	<b>RJE, AMR, ECON, JASA</b>
<b>LRP</b>	<b>CMR, SMR, HRM, JIBS, MISQ</b>	<b>CMR, SMR, JIBS, HBR, AMJ</b>
<b>MISQ</b>	<b>ISR, SMR, CMR, HRM, OpnsRes</b>	<b>ISR, <i>OpnsRes</i></b>
<b>MS</b>		
<b>OBHDP</b>	<b>JAP, ASQ, AMR, AMJ</b>	<b>JAP, HRM</b>
<b>OpnsRes</b>	MISQ	<i>MISQ</i>
<b>RJE</b>	<b>JPE, AER, ECON, JASA</b>	<b>JPE, AER, ECON, JASA</b>
<b>SMJ</b>	JIBS, ASQ, AMJ, JBE, AMR	<b>AMR, ASQ, AMJ, JIBS, HRM</b>
<b>SMR</b>	<b>CMR, HRM, LRP, MISQ</b>	<b>CMR, LRP, HRM</b>

**Notes:** **AMJ:**  $r \geq 0.8$  **AMJ:**  $r \geq 0.6$  **AMJ:**  $r < 0.6$ ;  
Ordered according to Pearson correlation coefficients with  $r \geq 0.47$  ( $\alpha \leq 0.01$ ); at most five journals listed.  
\* Correlations may be unreliable due to low number of citations made by HBR.

Table 3: Structurally Similar Journals based on the Self-Perception of Journals

The next step in analyzing the journals' relationships was to take a more balanced look at the journals' structural equivalence. Using the similarities matrix based on the symmetrized data set we conducted an exploratory principal component (factor) analysis. The factor analysis was run in SPSS version 12 using principal components as the extraction method and the (orthogonal) varimax rotation. The number of factors was determined by investigating the scree plots as a guide for making the usual tradeoff between the variance explained and the number of factors

used (e.g., see [21]). For both datasets a set of five factors was deemed optimal. The five factors explained more than 80% of the total variance and, starting with the sixth factor, little additional variance was explained (i.e., eigenvalues close to or below 1). The factor loadings were very strong, with several loading above 0.8 in each component. Moreover, all communalities were above 0.6, thus making the sample size and the number of variables irrelevant [23,24].

The perceptual maps of the datasets, used to better visualize the results of the factor analysis, were generated based on multidimensional scaling with the ProxScal algorithm [25] implemented in SPSS. Instead of using the default simplex method to determine an initial configuration, we ran 50 random starts. This method produced results superior to those generated with the simplex method. Although perceptual mapping may be done along any number of dimensions, Figure 2 shows the results for a two-dimensional mapping for the FT01 data. The two-dimensional map was selected because it provided a very good fit to the data (normalized raw stress: 0.074; [25]) and the results were relatively easy to interpret. The FT91 map looked largely similar (the differences are discussed below) and is not shown.

Adding the results of the factor analysis to the map in the form of clusters showed that the clusters could, on the whole, be easily displayed, thus cross-validating the mapping results. In determining the membership of journals to clusters we used loadings of 0.4 and above ([21], p. 441).

The results for the FT01 dataset indicated that most areas were structurally different from one another. The only exceptions were journals in the Strategic Management area, which interfaced with HR/OB. This result is reinforced by the cliques analysis, which took a strong ties approach to the information flow. In contrast, Figure 1, which showed the information flow

between journals, indicated that journals within *any* management (EFA) discipline shared information at least occasionally among themselves.

Comparing the FT01 dataset to the FT91 dataset we found that this focus on disciplines was not always as strong, except for Marketing. While there were fewer journals that interfaced between Strategic Management and HR/OB (only SMJ, JIBS and JBE), MISQ fell into both the Strategic Management and OR/MIS clusters. Similarly, JAE was true to its name by falling into the Accounting as well as the Economics/Finance cluster.

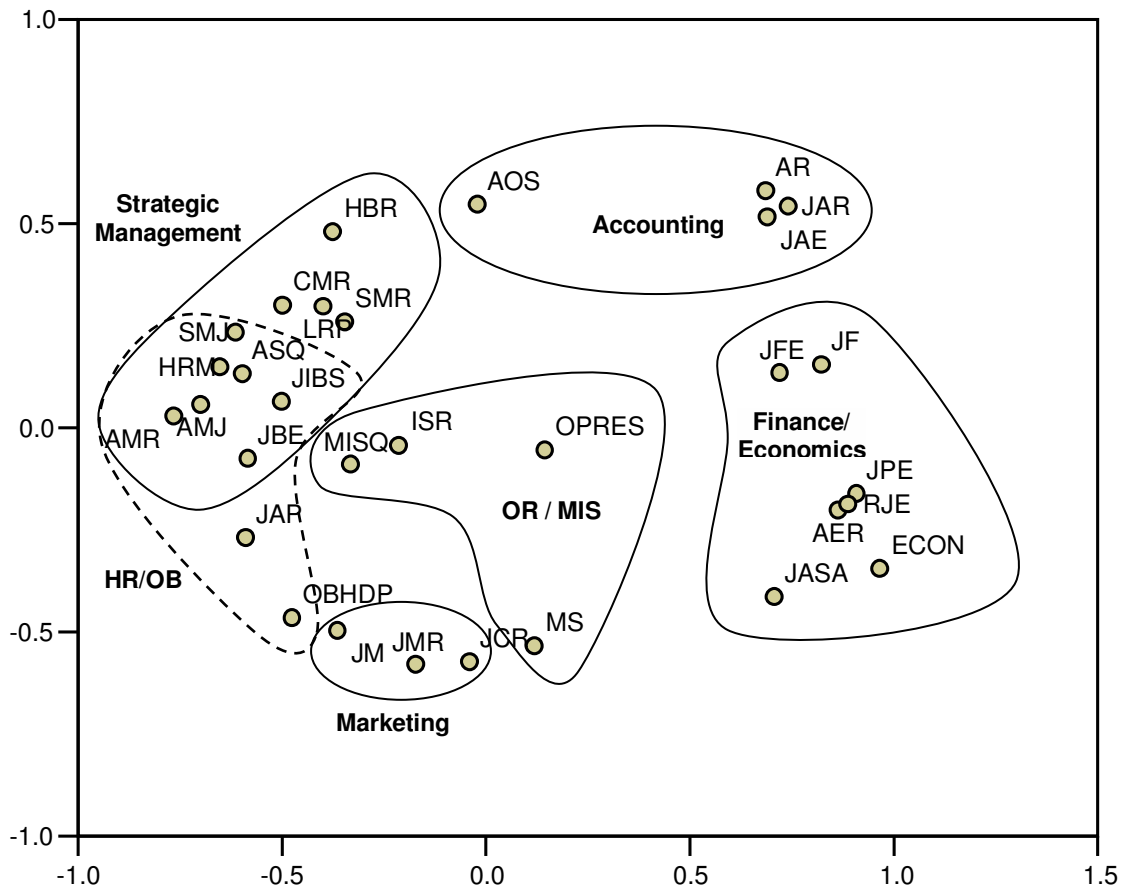


Figure 2: Structural Equivalence of Journals based on Perceptual Map and Factor Analysis Results for FT01 Dataset

Differences in terms of positioning have occurred as well. Over the decade under investigation, AOS has moved significantly towards the management side of the map.

Previously, it was clearly visible that it was an Accounting journal. In contrast, the remaining Accounting journals have moved much close together, forming a very tight clique. The Finance journals (JFE in particular) have inched away from the Accounting journals, probably because of the now missing tie to JAE.

On the management side, OBHDP had moved away from the Strategic Management journals (AMJ, ASQ) and, during 1995 to 2001, was in close proximity to the Marketing cluster. This result agrees with the cliques analysis which indicated the lack of a strong tie between JCR and OBHDP during 1985-91, whereas the tie was present during the FT01 time frame. Finally, HBR moved closer towards the other Strategic Management journals, away from its fairly lonely position far above the journals that are now its peers. This finding is corroborated through the results shown in Table 3.

## **DISCUSSION AND FURTHER RESEARCH**

Some of the results of the analyses were predictable, some were remarkable, and some were counter-intuitive. In the remainder of this section, we discuss those results and how they pertain to academic work within the management disciplines.

### **Disciplines: The Choice between Interaction and Solitude**

One predictable result to emerge from the study was the large number of journal clusters. The five factors in the principal component analysis clearly identified six categories of journals. This finding seems to indicate that most business academics tend to publish in distinct and mostly non-overlapping disciplines, a result that is largely corroborated by the cliques analysis. The

disciplines' solitude has become more pronounced over time and is counter-intuitive due to the drive for more interdisciplinary research visible in today's academic community. The only disciplines (as represented by departments within business schools) joined in clusters were Economics and Finance as well as Operations Research (OR) and Management Information Systems (MIS). Moreover, some management journals (e.g., AMJ, AMR, SMJ, etc.) serve as outlets to both HR/OB and Strategic Management researchers.

Why is there overlap in some disciplines but not in others? Finance heavily relies on Economics principles and methods, particularly in the sub-discipline of investment (e.g., asset valuation or risk management). Many Finance academics are also trained Economists. Thus, Finance keeps drawing upon the Economics literature and vice versa, to integrate new thoughts into the respective mainstream literature. Note, however, that Finance's connection with Economics has weakened over time. JFE has lost its strong tie to JPE. JF's structural equivalence with JAE and JFE's with JPE disappeared, leaving JF and JFE similar only to one another.

There are multiple reasons why OR and MIS share a cluster. Most simply, three of the four journals in the cluster (ISR, MS, and OpRes) are published by the Institute for Management Science and Operations Research (INFORMS). These three journals are fairly quantitative or analytical in nature and, hence, attract similar types of articles. MISQ has a close relationship with ISR and, thus, also inhabits this cluster. Note, however, that on the perceptual map MISQ is located closer to the management journals than ISR, which speaks to the looser connection with OR and the tighter relationship with management and strategy and HR/OB in particular. Second, OR (or rather Operations Management) was one of the first disciplines to be concerned with enterprise information systems. This started with materials requirements planning systems and



continued with MRP's successor, enterprise resource planning (ERP) systems. Many of the first MIS researchers had previously worked in Operations Research [26]. This historic link between OR and MIS can be seen to be weakening, however, to the point that in the future the two disciplines may be separated from one another. Already, the MIS journals were members of a clique different from the one of the OR journals. The unexpected structural similarity between MISQ and OpnsRes is also on the way towards insignificance. It existed mainly because both journals had cited MS very heavily (FT91: MISQ: 26%; OpnsRes: 85%), thus creating an outlier to which the correlation analysis reacted sensitively.

The overlap between Strategic Management and HR/OB journals is very natural. It is caused by the fact that topics tightly integrate and cannot be easily separated into one or another discipline (also see the discussion in the next section). Thus, it seems likely that a further integration will occur (which we might verify in a follow-up paper in about ten years).

The remaining disciplines are heading towards a type of institutional isolation. Marketing, while sometimes borrowing from OB and Psychology, exhibits a very tight cluster by itself. JM, while citing MS, SMJ and HBR, has no strong link to these journals. Only recently has JCR established a strong link with OBHDP (and dropped the weak link with MS). But the similarity between JM and JMR on one side and JCR on the other has diminished over time. Among JM and JMR, only JMR has a strong link to another discipline. This link, however, is due to its being published by INFORMS, the society of management scientists and operations researchers.

Accounting, despite AOS's partial reliance on management literature for thoughts (hence its position between mainstream Accounting journals and Management), has no real interaction with other disciplines. While JAE had a strong link with JF and JAR one with HBR between

1985 and 1991, those links had disappeared during the FT01 timeframe, leaving Accounting with a significant inward focus.

In conclusion, our analyses supported the notion of largely discipline-focused publishing within the management domain, a result supported by Goldman [27]. We also found evidence that this trend is increasing in significance. While we train business students to think in an interdisciplinary manner, and ask them to take into account cross-disciplinary perspectives when analyzing case studies, it must be recognized that the teaching side of academic work is quite different from the research side. Ph.D. students at North American business schools are trained to focus on a single chosen discipline. Similarly, tenure is often easier to obtain by establishing a fairly focused research stream and taking advantage of economies of scale in terms of the resulting papers and networking efforts. Those stimuli clearly favor a focus on one's own discipline while publishing in a variety of cross-disciplinary journals is often seen in a negative light. There are a number of dangers inherent in this perspective, two of which deserve mention. First, tight research clusters tend to become self-perpetuating and insulated from other research communities and management practice [28]. The producers of research within a tight cluster also become the main consumers of that research, resulting in a minimal contribution to outside the cluster, as evident most strongly in Marketing and Accounting. The second danger is related to this insularity. Tight clusters tend to be characterized by high levels of knowledge redundancy, as suggested by strength of ties theory [29]. High knowledge redundancy, in turn, results in a lack of new ideas and insights, and inhibits the quality and usefulness of the research [30].

## Indicators for Interdisciplinarity

The locations of some journals on the perceptual map (Figure 2) indicate that they might offer publishing opportunities for academics from different disciplines or areas. First, the perceptual map showed that JASA, located in the Economics cluster, was somewhat separated from the mainstream Economics journals. While this result is not counter-intuitive, it signifies JASA's role as a methodology-oriented journal, even though many of its articles use an economic motivations for the development of methods. A check of the authorship of articles published in JASA revealed that a mix of academics from Statistics and Economics contributed to the journal, with a bias towards statisticians. JASA therefore serves as an interface between Economics and Statistics, a discipline usually not regarded as a management discipline but most frequently associated with Mathematics and Industrial Engineering.

Second, AOS, an Accounting journal, was far removed from the three other mainstream Accounting journals (Figure 2). Instead, AOS was closer to Strategic Management journals such as HBR, CMR and SMR. This focus has the potential of making AOS an interface journal between Accounting, Strategic Management and OB/HR, and offering a research outlet for those academic disciplines. For this to occur, however, AOS would have to become more relevant to those other areas, as evidenced by *mutually* cited research. Indeed, the structural analysis indicates that AOS is currently far from similar to those and most other management journals.

OBHDP and JAP, two journals in the OB/HR cluster, were located between the Marketing cluster and the mainstream OB/HR journals and, at least during 1995-2001, shared strong direct or indirect ties with Marketing. Therefore, OBHDP and JAP held interface functions between OB/HR and Marketing. Goldman [27] also found that, apart from journals located within the field, journals from the area of psychology are cited frequently by both disciplines. Psychology

journals, however, are unlikely to share bidirectional ties with OB/HR or Marketing, thus putting them into a position not unlike that of AOS.

The MIS journals' position in the middle of the map suggests that they were about equally important to all other business journals. Figure 1 reveals, however, that their position was because the journals cited sources across various management disciplines, rather than being cited themselves. In other words, while MIS researchers cited research from Marketing, OB/HR and Strategy, the latter disciplines did not cite the MIS journals in their research.

Lastly, a similar situation exists for the OR journals. OpnsRes, one of the two flagship OR journals, has, within the FT set, a strong link only with MS. MS itself is structurally dissimilar to all other business journals and shares a clique only with OpnsRes. Figure 1 reveals, however, that MS is solidly embedded, citing and being cited by a host of other business journals. In this respect, MS is unlike the other members in its cluster. In fact, the citation pattern would indicate that MS is interdisciplinary and offers, at least in terms of topics, opportunities for researchers from across various disciplines.

The only journals that appear to be solidly interdisciplinary are the ones that share clusters with HR/OB and Strategic Management. For example, the two Academy of Management journals (AMJ and AMR) were focused on articles dealing with OB and HR management issues [31,32]. More recently, AMJ and AMR have devoted about 20% to 25% of their articles to policy or strategy issues [31], thus moving the journals into the interface between these clusters. AMJ and AMR also share strong links with journals from both clusters (e.g., JAP and SMR), thus making them some of the very few really interdisciplinary research outlets.

In conclusion, despite the finding that management academics tend to publish within their functional silos, we were able to identify a few journals that offered joint publication opportunities both between management disciplines and between Economics and Statistics.

## **Strategic Management versus Management Information Systems**

A surprising result of the analysis was that the Strategic Management journals (in particular CMR, HBR, SMR) were located in a corner of the perceptual map shown in Figure 2. We would have expected that, since these journals are cited by a wide variety of business journals, they would have been located in the middle of the map [22]. Drawing a circle around the group of Strategic Management journals with a radius that included only journals with positive correlation coefficients, we found that the mainstream strategy and MIS journals as well as HRM, JBE and OR were contained within the circle. The other Marketing and OR journals as well as AOS had mildly negative correlations with CMR, HBR and SMR, the Economics and Finance journals strongly negative correlations. This is in line with all the other results presented in this paper which indicate that the research done in disciplines concerned with a firm's financial framework (i.e., Economics, Finance, and Accounting) was quite distinct from the remaining disciplines. Moreover, the United Kingdom's Research Assessment Exercise groups the disciplines into three fields: Economics and Econometrics, Accounting and Finance, and Business Management [33].

The reason for this rather striking difference needs to be explored in future research that may investigate the historic context, methods, and topics of the disciplines. It is possible that the answer may lie in the reference disciplines drawn upon by each area. Finance, Economics and Accounting tend to draw on Mathematics as a reference discipline. In contrast, Strategic

Management and OB/HR are more likely to draw upon Industrial Psychology, Sociology and Micro-Economics. Those disciplines in the middle radius, such as OR and Marketing may draw from all of the above reference disciplines.

Recall that the MIS journals and OpnsRes occupied the center of the perceptual map. This was because the MIS journals cited a variety of journals across all management disciplines. As a result, while ISR correlated significantly ( $\alpha \leq 0.01$ ) only with MISQ, and MISQ with ISR and OpnsRes (FT01), most remaining correlations were either mildly positive or mildly negative. Since other journals exhibited stronger positive or negative correlations to other journals, this made ISR and MISQ the ideal candidates for the map's center. This finding may also indicate that MIS can be viewed as an interdisciplinary area. Research streams in the area treat human factors, the organizational impact of information technology, the optimization of systems, and strategic implications of designing and using information technology, as signified by the journals listed as similar to MISQ for 1985-91. Hence, while almost none of the MIS journals' correlation coefficients with other management disciplines were significant, most of them were positive.

A caveat pointed out above, however, is that MIS's interdisciplinarity did not lead to other journals to significantly cite either ISR or MISQ (or OpnsRes). For example, consider Marketing's relation to MIS. One could argue that Marketing would interface with MIS through the area of e-Business. However, only 7% of MISQ's citations (3% of ISR's citations) were to the three marketing journals, of which none cited either MISQ or ISR (both were sinks in FT01). This may indicate that, while MIS researchers drew upon Marketing, Strategy and HR/OB issues, Marketing, Strategy and HR/OB researchers were not concerned with MIS issues.

## Further Research and Contributions

Despite the insights gained from the multi-method approach taken in this paper, the data could also be analyzed in additional ways. Citation counts of to-from relationships are egocentric in nature. While egocentric analysis is the standard in bibliometrics as well as citation-based journal ranking approaches, insights might be gained from two additional types of analysis. For example, a content analysis and methods analysis might provide an alternative way of establishing similarities of journals and the management disciplines (e.g., see Reisman and Kirschnik [34] for an example of content analysis of OR flagship journals). Due to the qualitative data raised in this type of analysis, the results might be even more detailed than the ones presented in this paper.

The contributions of this paper, however, are manifold. This study provides a novel and interesting look at business journals and discipline interdependencies using analytical techniques not previously used for this purpose. To the knowledge of the authors, this is the first paper to use multiple sociometric methods to analyze academic business journals. Moreover, it is the first paper that investigates the relationships among business journals, rather than providing rankings of journals, authors, or academic institutions.

Analyzing the similarities and differences among journals and disciplines has several potential applications for academics. When a paper is rejected from a journal because of some shortcomings other than its content, the analysis presented here may aid the author in determining the journal with the next best fit for the article (see Tables 2 and 3; Figure 2). Moreover, we discussed journals that perform interface functions between management disciplines. Those journals may provide outlets for authors to publish interdisciplinary research.

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