

**THE INTELLECTUAL FOUNDATION OF THE *JOURNAL OF BUSINESS LOGISTICS*  
AND ITS EVOLUTION BETWEEN 1978 AND 2007**

by

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**INTRODUCTION**

In 1978, the first issue of the *Journal of Business Logistics (JBL)* was published. The reason for starting this journal was the need for “a journal in the area of business logistics ... which encompasses all of these [logistical] activities and allows a forum for interdisciplinary treatment of current research and research issues” (La Londe 1978, p. v). During its first 30 years of existence, 615 articles (including book reviews and editorials) were published in *JBL*. *JBL* is recognized within the community (by both scholars and practitioners) as a leading journal in the field of logistics and supply chain management (Carter 2002; Emmelhainz and Stock 1989; Fawcett, Vellenga, and Truitt 1995; Gibson and Hanna 2003; Kumar and Kwon 2004; Menachof et al. 2007) and it is also the prime research outlet of one of the largest American organizations on logistics and supply chain management, the *Council of Supply Chain Management Professionals* (formerly the *Council of Logistics Management*).

Since 1978, the field of logistics has experienced considerable development (Ballou 2007; Farris 1997; Kent and Flint 1997; Miyazaki, Phillips, and Phillips 1999; Poist 1986), especially with the advent of “supply chain management” in both business practice (Houlihan 1985, 1988; Jones and Riley 1985; Oliver and Webber 1982; Stevens 1989) and academic research (Cooper and Ellram 1993; Ellram 1991; Ellram and Cooper 1990, 1993; Scott and Westbrook 1991). Yet, with the increasing popularity of the notion supply chain management and its strong ties to or blending with logistics (Cooper, Lambert, and Pagh 1997), the domain and scope of research in the field(s) has become increasingly blurred (Arlbjørn and Halldórsson 2002; Burgess Singh, and Koroglu 2006; Frankel et al. 2008; Hakansson and Persson 2004; Harland 1996; Mentzer, Stank, and Esper 2008; New 1997; New and Payne 1995). At large, this has led to a disintegration and fragmentation of the core findings in research on logistics and supply chain management (Bechtel and Jayaram 1997; Chen and Paulraj 2004; Cousins, Lawson, and Squire 2006; Croom, Romano, and Giannakis 2000; Zsidisin et al. 2007).

Many researchers have studied and investigated the research in the field in order to clarify its domain and scope (Cooper, Lambert, and Pagh 1997; Frankel et al. 2008; Gibson, Mentzer, and Cook 2005; Larson, Poist, and Halldórsson 2007; Mentzer et al. 2001; Mentzer, Stank, and Esper 2008; New 1997), to discuss its epistemological

assumptions and research methodologies (Gammelgaard 2004; Halldórsson and Aastrup 2003; Kovács and Spens 2007; Mears-Young and Jackson 1997; Mentzer and Kahn 1995; Näslund 2002), and to reveal its evolution (Ballou 2007; Farris 1997; Kent and Flint 1997; Langley 1986; Poist 1986, 1989; Soni and Kodali 2008). While these efforts have essentially looked at the *nature* of research on logistics and supply chain management, none of the previous research has yet studied the knowledge repository on which the scientific research community draws; that is, its intellectual foundation. Studying the intellectual foundation of research provides an unbiased and comprehensive picture of the development, dissemination, and utilization of knowledge (Garfield 1979; Hoffman and Holbrook 1993; Smith 1981).

Therefore, it is our objective to explore the current state of research on logistics and supply chain management as manifested in *JBL* by identifying and analyzing the intellectual base of the *Journal*, its structure, and its evolution. The “intellectual base” is determined by those articles that a scientific community in a field has recognized by way of citations (Fitzpatrick and Wallace 2006; Persson 1999).

By studying *JBL*'s intellectual foundation, or the structure of the intellectual base, we intend to identify those publications which received the most citations by papers published in *JBL*. We will display their interrelationships and elucidate the permanence and change of influential literature over time. Furthermore, the emergence and dominance of publications representing lines of thoughts will be revealed, including extra-disciplinary works on which researchers regularly draw (White and McCain 1998). Thereby, we will enable both practitioners and researchers to judge whether or not current research in *JBL* addresses issues relevant to them.

Since the identified clusters are constituted by a number of highly influential publications that are closely associated with each other, our results will enable researchers and practitioners in the field to judge whether or not current research draws on the appropriate conceptual and methodological literature to further advance knowledge in the respective research area, as well as in the field in general. Similarly, the identification of the most influential publications and their affiliation with subject areas may support educators, new researchers and potential authors in selecting appropriate literature in accordance to their field of research.

For the purpose of this paper, we examine the following questions:

1. What are the most-frequently cited articles and journals in *JBL* (i.e., its intellectual base)?
2. How are these articles associated with each other and can distinct groups of cited literature be identified?
3. How has the intellectual foundation evolved over time, and did thematic constellations and journal citations change over time?

To answer these research questions, we conducted an empirical study based on bibliometric techniques (cf. Appendix 1), which are unbiased, un-intrusive, and comprehensive methods (Garfield 1979; Smith 1981) to study the “development, dissemination, and utilization of knowledge in any academic field” (Hoffman and Holbrook 1993, p. 505). A mere literature review or content analysis of publications would not be sufficient for answering the research questions. The range of possibly influential or prominent publications on past and current (and subsequent) research could neither be covered fully, nor could their effective impact be assessed. Bibliometrics, however, offers approaches by which publications can be identified that have had a major impact on past and current research. Moreover, it enables the researcher to identify publications that have been considered as similar with regards to content or contribution to the field (cf. Appendix 1).

Bibliometric investigations of scientific disciplines have successfully been carried out in many research fields, including: consumer research (Hoffman and Holbrook 1993); strategic management (Nerur, Rasheed, and Natarajan 2008; Ramos-Rodríguez and Ruíz-Navarro 2004); international management (Acedo and Casillas 2005); information science (Culnan 1986, 1987; Culnan and Swanson 1986; Eom, Lee, and Kim 1993; Persson 1994; White and McCain 1998); organizational behavior research (Culnan, O'Reilly, and Chatman 1990); relationship marketing (Cooper, Gardner, and Pullins 1997); management accounting research (Lindquist and Smith 2009); and human resource management (Fernandez-Alles and Ramos-Rodríguez 2009).

For logistics and supply chain management, only Charvet, Cooper, and Gardner (2008) have applied bibliometric analysis to investigate the intellectual structure of supply chain management. The authors analyzed a sample of the 33 most-cited articles published between 1995 and 2004 out of 1,467 documents published between 1985 and 2005, and matched a keyword search on "supply chain management" in EBSCO's *Business Source Complete*. In the field of operations management, Pilkington and Meredith (2009) analyzed approximately 75,000 citations made in all the published articles in the *Journal of Operations Management (JOM)*, the *International Journal of Operations & Production Management (IJOPM)*, and *Production & Operations Management (POM)*, since these publications were founded in 1980 (*IJOPM* and *JOM*) and 1992 (*POM*) until 2006.

Our study, where we have chosen to examine all research articles published in the *Journal of Business Logistics* from 1978 through 2007, differs from Charvet, Cooper, and Gardner's (2008) and Pilkington and Meredith's (2009) investigations in a number of respects. We analyze the intellectual foundation of research on logistics/supply chain management as perceived by researchers that have published in *JBL*. Thus, our investigation focuses on the heritage of *JBL*'s logistics/supply chain management knowledge. In comparison, Charvet, Cooper, and Gardner (2008) analyzed the intellectual structure of a pre-defined set of 33 articles on supply chain management published between 1995 and 2004; and Pilkington and Meredith's study focused on three operations management journals. Furthermore, our article examines the evolution of the intellectual foundation of research published in *JBL* by means of a longitudinal study, covering 30 years of research. Whereas, Pilkington and Meredith similarly analyzed the evolution of the intellectual foundation of operations management between 1980 and 2006 for the *JOM* and *IJOPM*, and between 1992 and 2006 for the *POM*, the study by Charvet, Cooper, and Gardner (2008) only provides a snapshot in time, covering research published between 1995 and 2004.

Citation and co-citation analysis of a single journal is not an exception. For example, Ramos-Rodríguez and Ruíz-Navarro (2004), Fernandez-Alles and Ramos-Rodríguez (2009), Lindquist and Smith (2009), and Smith (2009), examined the intellectual structure of a single journal. Ramos-Rodríguez and Ruíz-Navarro conducted a bibliometric study of articles published between 1980 and 2000 in the *Strategic Management Journal*; Fernandez-Alles and Ramos-Rodríguez focused on *Human Resource Management*, 1985–2005; Lindquist and Smith conducted a content and citation analysis of articles published in the *Journal of Management Accounting Research* between 1989 and 2008; and Smith analyzed the *Archives of Environmental Health* over a period of 30 years. Taking these studies as reference points, our study provides one of the longest periods of bibliometric analysis, thus giving a useful basis for understanding the direction of *JBL* being a journal with a reputation as a leader among logistics and supply chain management journals. This view is endorsed within the community by both scholars and practitioners (Carter 2002; Fawcett, Vellenga, and Truitt 1995; Gibson and Hanna 2003; Kumar and Kwon 2004; Menachof et al. 2007). Furthermore, the *Journal's* entire content is available in databases of the type required for applying bibliometric analysis.

The remainder of the article is organized as follows. We first describe and discuss our research design and methodology in detail. Then, we explain and discuss the results of our study—we identify the 36 most-frequently cited articles and the top 20 journals; we explain the structure of the articles, identifying seven major subject areas; we investigate the changes in citations given to the most frequently-cited articles and journals throughout three decades; and last, we present the evolution of the intellectual foundation of *JBL*. To conclude the article, we present a summary and discussion of the conclusions drawn from our investigation, indicating limitations and further research opportunities.

## METHODOLOGY

### Data Collection

In order to conduct the bibliometric analysis, we exported the bibliographic records of all 615 articles by 511 authors published in *JBL*, from Vol. 1, Issue 1 (1978) to Vol. 28, Issue 2 (2007). Of these, 118 articles did not contain any citations (e.g., book reviews or editorials). For the remaining 497 articles, we obtained the bibliographic information of all articles cited, as provided in BSC's 'cited references' feature (12,807 records), which lists all documents cited in an article.

Using a self-developed computer script, all the articles and citations were imported into a custom database, including a logical link between citing and cited document. The title of each article or book was used as the unique identifier for the respective article; the author's last name and first initial of their first name as the unique identifier for authors; and the capitalized letters of journal names (e.g., 'JBL' for *Journal of Business Logistics*) as the unique identifier for journals. By ignoring the year of publication for book citations, we ensured that references made to books with multiple editions were not discriminated against; consequently, we refer only to a single edition of a book (always the first cited edition). Moreover, we ensured that multiple citations to a single document in one citing document were not counted, because today's reference sections (and thus BSC's "cited references" feature) list a cited document only once. The 76 citations without title information (e.g., personal communication) were excluded from our analysis.

Due to citation and spelling errors in the BSC dataset, we imported titles with an 85 % match in words as a single record. Titles of records that matched more than one title or "false positives" were edited manually. We then examined all article titles with a citation frequency greater than two (1,446) and all book titles (1,570) for duplicates and edited the bibliographic records accordingly. Similarly, we edited the list of all cited journals. The spelling of authors' names was not revised.

After editing approximately 5 % of the records' information, a total of 12,677 article citations citing 7,858 documents; 23,358 author citations citing 7,601 authors; and 8,887 journal citations citing 667 journals, were included in the analysis.

### Research Design

To answer the research questions, we conducted our investigation in three stages:

1. First, we computed the citation frequencies of all articles cited in *JBL* in order to identify the most-cited publications (intellectual base; research question one). In addition to analyzing the whole sample period of 30 years, we also divided our sample into three equal, consecutive 10-year sub-periods: 1978–1987; 1988–1997; and 1998–2007; and computed the citation frequencies within those periods for each cited document.
2. Second, we performed a co-citation analysis based on the most-cited documents of the entire sample period (intellectual structure; research question two) and analyzed the changes in citations received of those publications from the first to the second, and from the second to the third sub-period.
3. Third, we conducted a co-citation analysis of the most-cited publications and journals in each decade in order to explore the evolution of the intellectual base and the changes in *JBL*'s intellectual structure (research question three).

The first stage—identifying those articles to be included in the co-citation analysis—is the most crucial, because this document set defines the scholarly landscape being mapped. If the chosen documents do not capture the full range of variability in subject specializations, methodologies, political orientations, etc., these aspects of the structure cannot be determined (McCain 1990). Two generic approaches exist: Either the set is compiled based on the investigator's personal knowledge, some study, or similar criteria involving subjective judgment (McCain 1990); or the set is determined by screening and filtering a large database, selecting only those authors/documents that are cited and/or co-cited most frequently (Eom 2003; Garfield 1980). With regard to the latter approach, it is important that the citations/co-citations in the database are representative for the research area under investigation—in our study all articles published in *JBL*. Since our investigation is rather explorative in nature, we opted for the second approach, which is commonly employed in similar studies (Acedo and Casillas 2005; Charvet, Cooper, and Gardner 2008; Pilkington and Fitzgerald 2006; Ramos-Rodríguez and Ruíz-Navarro 2004).

In accordance with Ramos-Rodríguez and Ruíz-Navarro (2004), we determined the number of documents to be analyzed for each period by means of Kruskal's *stress*, an indicator of the goodness of fit of a multidimensional scaled (MDS) representation of the data (Hair et al. 2009). Thus, the citation threshold—the minimum number of citations a document has to receive in order to be included in the analysis—was chosen to maximize the sample size

while allowing for a fair representation (*stress* less than 20 %) of the documents in two dimensions (Kruskal 1964a, 1964b).

Table 1 shows the citation thresholds, resulting sample sizes, the portion of overall citations in the sample, and the *stress* for each period. Although the number of articles included in the citation and co-citation analysis is rather small (between six and ten percent of all citations given are represented), the most frequently cited works can be interpreted as symbols that represent specific and important ideas in the field (Small 1977).

TABLE 1

**CITATION THRESHOLD, SAMPLE SIZE AND ITS PORTION OF OVERALL CITATIONS IN THE SAMPLE, AND *STRESS* FOR EACH TIME PERIOD INVESTIGATED IN THE FIRST STUDY**

Year	Citation Threshold	Citations	Citations Analyzed	% of Total Citations	Publications Cited	Publications Analyzed	% of Total Publications	<i>stress</i>
1978–1987	4	1,475	142	9.6	1,215	26	2.14	0.168
1988–1997	6	3,606	365	10.1	2,658	38	1.43	0.170
1998–2007	12	7,464	491	6.6	4,746	30	0.63	0.189
1978–2007	15	12,545	837	6.7	7,857	36	0.46	0.197

#### Data Analysis

In accordance with Eom (2003), McCain (1990), White and Griffith (1981) and White & McCain (1998), we arranged the co-citation frequencies of the sampled documents in symmetrical matrices, replacing the diagonal values with the highest off-diagonal co-citation count of the respective document. Pearson's  $r$  was used to measure the similarity between each pair of documents, because it "registers the *likeliness in shape* of their co-citations count profiles over all other [documents] in the set" (White and McCain 1998, p. 331); that is, it "eliminates scale effects due to the relative citedness of documents ... and instead measures the degree to which co-citations with documents ... follow a similar profile or pattern" (White and Griffith 1981, p. 165). If two documents are both co-cited frequently with certain third documents and seldom co-cited with certain other, they are highly correlated (i.e., the value of Pearson's  $r$  will be high) (Ahlgren, Jarneving, and Rousseau 2003). However, since Pearson's correlation coefficient measures the linear relatedness between the two variables (or documents), some bibliometricians regard this common practice as problematic (Ahlgren, Jarneving, and Rousseau 2003).<sup>1</sup> However, by not only relying on multidimensional scaling (MDS) and cluster analysis, but also on factor analysis, "the underlying structure despite the assumptions made about normality in the distribution" (Leydesdorff and Vaughan 2006, p. 1624) of the co-citation data can be revealed. Moreover, each of these multivariate data analysis methods offers slightly different insights to the data.

Accordingly, we analyzed the correlation matrices using multidimensional scaling (MDS), cluster analysis, and factor analysis. MDS was performed using SPSS's PROXSCAL routine. The correlations were interpreted as similarities and treated as non-metric data, because "vector separation [measured by Pearson's  $r$ ] and distance are not *linearly* related, so conversion between the two types of measure is necessary in metric scaling;" however, because "the correlation coefficient is a monotonic transformation of distance, it may be used directly in the basic non-metric MDS distance model" (Coxon 1982, p. 17). We specified an ordinal transformation of the proximities provided by the correlation matrices, opting to untie observations. Therefore, the rank order of the documents according to their correlation, not the actual correlation, are considered significant information and the MDS algorithm searches for a configuration of points, such as to reflect the distances as closely as possible to the rank

<sup>1</sup> For a current discussion on this issue, see for example: Ahlgren, Jarneving, and Rousseau (2003); Ahlgren, Jarneving, and Rousseau (2004); Bensman (2004); Gmür (2003); Leydesdorff (2005); Leydesdorff and Vaughan (2006); van Eck and Waltman (2008); Waltman and van Eck (2007); and White (2003).

order of the data. As a result, multidimensional scaling represents the similarity (or dissimilarity) data in two (or more) dimensions. In co-citation analysis, documents with similar co-citation profiles (measured by Pearson's  $r$ ) tend to be positioned nearer to each other than works with dissimilar co-citation profiles (McCain 1990); i.e., the closer two documents are positioned, the more they are considered to be similar. Thus, agglomerations of documents can be interpreted as intellectual groupings or specific subject areas. However, since MDS does not clearly reveal any "boundaries" of the agglomerations, the results of cluster and factor analyses can be indicated on a map.

In comparison to MDS, cluster analysis reveals natural groups or clusters of observations. Therefore, the affiliation of documents to subject groups can be identified more easily by means of interpreting the dendrograms. However, the results do not need to be clear in terms of the best number of clusters representing the data set, which also requires the researcher to additionally analyze the data by means of other quantitative analyses (here MDS and factor analysis) and/or qualitative assessments (here reviewing the documents). Analogous to the MDS (and factor) analysis, the correlation coefficients (Pearson's  $r$ ) served as the measure of similarity between the documents for the cluster analysis. Concerning the clustering method employed, we opted for the hierarchical agglomerative clustering procedure, primarily using the complete-linkage algorithm (McCain 1990).

The last multivariate data analysis technique employed was factor analysis. It reduces the number of variables (here, documents) and thereby uncovers hidden constructs (factors) that explain the data. In co-citation analysis, these factors are interpreted as "specialties" (or subject areas) and the factor loadings of each document as "contributions" to the specialty (White and McCain 1998). In comparison to the rather discrete grouping of cluster routines, factor analysis can also reveal a work's contributions to more than one specialty (McCain 1990). Moreover, "by rotating the matrix, factor analysis enables us to retrieve the underlying structure despite the assumptions made about normality in the distribution" (Leydesdorff and Vaughan 2006, p. 1624). Therefore, "a higher-dimensional and quantitative understanding of the structures underlying [the multidimensionally scaled] geometrical representations" (Leydesdorff and Vaughan 2006, p. 1619) can be obtained. The factor analysis was conducted using principal component analysis with varimax rotation and Kaiser normalization, extracting all factors with an eigenvalue larger than one or, where possible, the number of factors suggested by the elbow-criterion (Hair et al. 2009). The factors were extracted from the respective correlation matrix, which the FACTOR routine in SPSS calculates based on the raw co-citation matrix. All three multivariate analyses were based on the correlation coefficients between the documents included in the co-citation analysis.

Although being related, each of these methods offers slightly different insights. As stated above, multidimensional scaling represents similarity or dissimilarity data in two (or more) dimensions. In co-citation analysis, documents with similar co-citation profiles (derived from Pearson's  $r$ ) tend to be positioned nearer to each other than works with dissimilar co-citation profiles (McCain 1990). By inspecting the maps visually, agglomerations of documents can be interpreted as a group of subject-related documents. Whereas the resulting MDS maps do not reveal clear affiliations of documents to subject groups, both the cluster and factor analysis indicate groups or clusters of documents more clearly. However, the results of the cluster analysis do not provide for unambiguous information concerning the best number of clusters—the researcher has to determine the number of clusters most representative for their data set (Hair et al. 2009). A more objective indication concerning the best number groups (or clusters) is provided by the factor analysis by extracting all factors with an eigenvalue larger than one or by using the elbow-criteria. Moreover, the factor analysis does not group the observations discrete as the cluster analysis does, but reveals whether or not a work has contributed to more than one specialty or subject area.

We then used the results of all three methods for interpreting the affiliations and positions of the documents on the MDS maps. In addition, we narratively synthesized the documents (Denyer and Tranfield 2006) in order to validate the resulting subject-groups or to identify the most appropriate affiliation for documents that were grouped differently by the different methods employed (Miles and Huberman 1984). In line with the recommendation from Hill, Thompson, and Williams (1997), three researchers independently examined the data and then discussed their construal of the findings together until the team reached a consensus on the best interpretation of the results.

In the following section, only the MDS maps indicating the identified subject groups are presented. Whenever the results of the three methods were not consistent, we indicate differences and provide alternative interpretations. The results of the cluster and factor analyses can be found in the Appendix.

## RESULTS AND DISCUSSION

### General Overview

In this section we describe and discuss the results of the citation and the co-citation analysis of 12,545 bibliographic references made by 511 authors in 497 articles published in the *Journal of Business Logistics* from its founding in 1978 through to 2007. In order to highlight changes in the intellectual structure, we divided the 30 years into three decades (1978–1987, 1988–1997, and 1997–2007) and analyzed the intellectual foundation of each decade separately.

In accordance with our research questions, we first present the intellectual base of *JBL* and its structure. Then, the changes in citing these works during the three decades are discussed, revealing initial insights into the transformations that have taken place in the intellectual base of *JBL*. Last, we explore the intellectual structure of the leading papers and journals in each decade, analyzing the transformations that have occurred in greater detail.

### A Static View on the Intellectual Base of *JBL* between 1978–2007

Table 2 shows the 36 most frequently cited works in *JBL* arranged in the order of the number of citations received between 1978 and 2007. The table also includes the absolute citations received and the percentage of articles citing the work listed for each period.

Of the 36 most-cited publications, 16 were published as books and 20 as articles in journals. Eight articles stem from marketing-related journals (*JMR*, *JM*, and *JAMS*) and 10 from journals concerned with logistics (*JBL*, *IJLM*, and *IJPD&LM*). In addition to four textbooks on logistics/supply chain management, Porter's (1980, 1985) books on strategic management and two books on research methodologies (Hair et al. 1995; Nunnally and Bernstein 1978) are among the most frequently cited publications.

The use of marketing and strategic management literature in *JBL* is confirmed by the distribution of citations given to journals as shown in Table 3. Although most references were made to *JBL*, the *Journal of Marketing*, *Journal of Marketing Research*, and *Journal of the Academy of Marketing Science* rank high among the 20 most-cited journals. Also, management journals such as the *Harvard Business Review* and the *Strategic Management Journal* rank among the top 20. Journals with an operations research or operations management focus are represented by *Management Science* (ranking third), *Decision Sciences*, and *Operations Research*.

Based on the co-citation analysis, Figure 1 shows the position of the 36 works on a two-dimensional MDS map, representing the intellectual structure of *JBL*. As stated above, documents with similar co-citation profiles tend to be positioned nearer to each other than works with dissimilar co-citation profiles. The size of the points is represented proportional to the citation frequency. Supported by the results of the cluster and factor analysis (Appendices 2 and 3), we identified seven groups related to different subject areas. The groups are summarized in Table 4 and are illustrated on the map.

At the right-hand side of the map, the most distinct group is formed by Maister (1976), Silver and Peterson (1979), Zinn, Levy, and Bowersox (1989), and Law and Kelton (1982). Their research focus is on mathematical inventory models. The papers by Maister, and Zinn, Levy and Bowersox, discuss the relationship between aggregate safety stock and the number of stocking locations, that is, the "square root law." They are supplemented by Silver and Peterson's *Decision Systems for Inventory Management and Production Planning* and Law and Kelton's *Simulation Modeling and Analysis* books. The group represents the operations research stream in *JBL*'s intellectual base.

Ballou's (1973) textbook on business logistics and supply chain management links this group to a second agglomeration of documents in the centre of the map. Here, the textbooks on logistics management by Bowersox, Closs, and Helferich (1974), Coyle, Bardi, and Langley (1976), and Stock and Lambert (1987) are more prominent. Aside from ranking among the top five most influential works, these textbooks are positioned at the heart of the map. They appear to be standard references for research published in *JBL*.

TABLE 2

ABSOLUTE AND RELATIVE CITATION FREQUENCIES OF THE 36 MOST-CITED PUBLICATIONS IN *JBL*, 1978–2007; *N* = NUMBER OF ARTICLES PUBLISHED IN EACH PERIOD; *C* = ABSOLUTE CITATION COUNTS; *c* = RELATIVE CITATION COUNTS

Cited Publication	Source	1978–2007		1978–1987		1988–1997		1998–2007	
		<i>N</i> = 497	<i>C</i> <i>c</i>	<i>N</i> = 110	<i>C</i> <i>c</i>	<i>N</i> = 207	<i>C</i> <i>c</i>	<i>N</i> = 180	<i>C</i> <i>c</i>
Armstrong and Overton (1977)	<i>JMR</i>	46	9.3 %	3	2.7 %	7	3.4 %	36	20.0 %
Stock and Lambert (1987)	Book	44	8.9 %	1	0.9 %	22	10.6 %	21	11.7 %
Bowersox, Closs, and Helferich (1974)	Book	44	8.9 %	13	11.8 %	14	6.8 %	17	9.4 %
Coyle, Bardi, and Langley (1976)	Book	35	7.0 %	3	2.7 %	17	8.2 %	15	8.3 %
Bowersox (1989)	Book	35	7.0 %	0	n/a	24	11.6 %	11	6.1 %
Porter (1985)	Book	33	6.6 %	2	1.8 %	16	7.7 %	15	8.3 %
Nunnally and Bernstein (1978)	Book	32	6.4 %	0	n/a	15	7.3 %	17	9.4 %
Hair et al. (1995)	Book	30	6.0 %	3	2.7 %	3	1.5 %	24	13.3 %
Bowersox et al. (1995)	Book	27	5.4 %	0	n/a	3	1.5 %	24	13.3 %
La Londe and Zinszer (1976)	Book	26	5.2 %	13	11.8 %	9	4.4 %	4	2.2 %
Ballou (1973)	Book	25	5.0 %	4	3.6 %	10	4.8 %	11	6.1 %
Morgan and Hunt (1994)	<i>JM</i>	24	4.8 %	0	n/a	0	n/a	24	13.3 %
La Londe and Cooper (1989)	Book	23	4.6 %	0	n/a	17	8.2 %	6	3.3 %
La Londe, Cooper, and Noordewier (1988)	Book	23	4.6 %	1	0.9 %	16	7.7 %	6	3.3 %
Porter (1980)	Book	21	4.2 %	0	n/a	9	4.4 %	12	6.7 %
Zinn, Levy, and Bowersox (1989)	<i>JBL</i>	21	4.2 %	0	n/a	10	4.8 %	11	6.1 %
Mentzer and Kahn (1995)	<i>JBL</i>	20	4.0 %	0	n/a	3	1.5 %	17	9.4 %
Innis and La Londe (1994)	<i>JBL</i>	20	4.0 %	0	n/a	5	2.4 %	15	8.3 %
Lambert and Harrington (1990)	<i>JBL</i>	20	4.0 %	0	n/a	12	5.8 %	8	4.4 %
Churchill (1979)	<i>JMR</i>	19	3.8 %	0	n/a	2	1.0 %	17	9.4 %
Gerbing and Anderson (1988)	<i>JMR</i>	19	3.8 %	0	n/a	3	1.5 %	16	8.9 %
Silver and Peterson (1979)	Book	19	3.8 %	4	3.6 %	11	5.3 %	4	2.2 %
Cooper, Lambert, and Pagh (1997)	<i>IJLM</i>	18	3.6 %	0	n/a	0	n/a	18	10.0 %
Fornell and Larcker (1981)	<i>JMR</i>	18	3.6 %	0	n/a	0	n/a	18	10.0 %
Dwyer, Schurr, and Oh (1987)	<i>JM</i>	18	3.6 %	0	n/a	7	3.4 %	11	6.1 %
Mentzer and Flint (1997)	<i>JBL</i>	17	3.4 %	0	n/a	0	n/a	17	9.4 %
Mentzer, Gomes and Krapfel (1989)	<i>JAMS</i>	17	3.4 %	0	n/a	5	2.4 %	12	6.7 %
Ellram and Cooper (1990)	<i>IJLM</i>	17	3.4 %	0	n/a	8	3.9 %	9	5.0 %
Novack, Langley, and Rinehart (1995)	Book	17	3.4 %	0	n/a	8	3.9 %	9	5.0 %
Sterling and Lambert (1987)	<i>JBL</i>	17	3.4 %	0	n/a	11	5.3 %	6	3.3 %
Day (1994)	<i>JM</i>	16	3.2 %	0	n/a	0	n/a	16	8.9 %
Bowersox (1990)	<i>HBR</i>	16	3.2 %	0	n/a	8	3.9 %	8	4.4 %
Mentzer et al. (2001)	<i>JBL</i>	15	3.0 %	0	n/a	0	n/a	15	8.3 %
Law and Kelton (1982)	Book	15	3.0 %	0	n/a	6	2.9 %	9	5.0 %
Maister (1976)	<i>IJPD&amp;LM</i>	15	3.0 %	0	n/a	6	2.9 %	9	5.0 %
Stalk, Evans, and Shulman (1992)	<i>HBR</i>	15	3.0 %	0	n/a	7	3.4 %	8	4.4 %



TABLE 3

ABSOLUTE AND RELATIVE CITATION FREQUENCIES OF THE 20 MOST-CITED JOURNALS IN JBL, 1978-2007;

C = ABSOLUTE CITATION COUNTS; c = RELATIVE CITATION COUNTS

Cited Journal	1978-2007		1978-1987		1988-1997		1998-2007	
	C	c	C	c	C	c	C	c
<i>Journal of Business Logistics (JBL)</i>	1,279	14.4 %	55	6.5 %	374	16.1 %	850	14.9 %
<i>Journal of Marketing (JM)</i>	563	6.4 %	35	4.2 %	84	3.6 %	444	7.8 %
<i>International Journal of Physical Distribution &amp; Logistics Management (IJD&amp;LM)</i>	518	5.9 %	32	3.8 %	155	6.7 %	331	5.8 %
<i>Management Science (MS)</i>	361	4.1 %	38	4.5 %	99	4.3 %	224	3.9 %
<i>Harvard Business Review (HBR)</i>	358	4.0 %	47	5.6 %	110	4.7 %	201	3.5 %
<i>Journal of Marketing Research (JMR)</i>	340	3.8 %	24	2.9 %	61	2.6 %	255	4.5 %
<i>The International Journal of Logistics Management (IJLM)</i>	212	2.4 %	0	0.0 %	34	1.5 %	178	3.1 %
<i>Transportation Journal (TJ)</i>	204	2.3 %	28	3.3 %	69	3.0 %	107	1.9 %
<i>Strategic Management Journal (SMJ)</i>	171	1.9 %	1	0.1 %	12	0.5 %	158	2.8 %
<i>Journal of the Academy of Marketing Science (JAMS)</i>	130	1.5 %	1	0.1 %	14	0.6 %	115	2.0 %
<i>Journal of Operations Management (JOM)</i>	127	1.4 %	2	0.2 %	27	1.2 %	98	1.7 %
<i>Academy of Management Journal (AMJ)</i>	125	1.4 %	2	0.2 %	25	1.1 %	98	1.7 %
<i>Sloan Management Review (SMR)</i>	122	1.4 %	9	1.1 %	25	1.1 %	88	1.5 %
<i>Decision Sciences (DS)</i>	120	1.4 %	14	1.7 %	40	1.7 %	66	1.2 %
<i>Operations Research (OR)</i>	117	1.3 %	31	3.7 %	30	1.3 %	56	1.0 %
<i>Logistics and Transportation Review (LTR)</i>	110	1.2 %	23	2.7 %	38	1.6 %	49	0.9 %
<i>Journal of Purchasing and Materials Management (JPMM)</i>	103	1.2 %	14	1.7 %	45	1.9 %	44	0.8 %
<i>Academy of Management Review (AMR)</i>	89	1.0 %	1	0.1 %	19	0.8 %	69	1.2 %
<i>Production and Inventory Management (PIM)</i>	86	1.0 %	11	1.3 %	34	1.5 %	41	0.7 %
<i>European Journal of Operational Research (EJOR)</i>	85	1.0 %	2	0.2 %	28	1.2 %	55	1.0 %
<i>Other Journal Citations</i>	3,634	41.0 %	470	56.0 %	995	42.9 %	2,169	38.1 %
<b>Total Citations to Journals</b>	<b>8,854</b>	<b>100 %</b>	<b>840</b>	<b>100 %</b>	<b>2,318</b>	<b>100 %</b>	<b>5,696</b>	<b>100 %</b>

Scattered around those textbooks, a third subject group can be identified, where La Londe, Cooper, and Noordewier's (1988) and La Londe and Zinszer's (1976) books on customer service have received the most citations. These are accompanied by four publications on customer service and value creation in logistics (Innis and La Londe 1994; Mentzer, Gomes, and Krapfel 1989; Novack, Lloyd, and Rinehart 1995; Sterling and Lambert 1987).

The group of articles on customer service—in which a marketing perspective and survey research predominates—is associated closely with a fourth group of publications whose common trait is the focus on research methodologies and research frameworks for logistics. The *JMR* article "Estimating Nonresponse Bias in Mail Surveys" by Armstrong and Overton (1977) is cited most often in this group, followed by Hair et al.'s (1995) *Multivariate Data Analysis* and Nunnally and Bernstein's (1978) *Psychometric Theory*. Complemented by four articles—three of them published in marketing journals—as well as Mentzer and Kahn's (1995) and Mentzer and Flint's (1997) articles on research in logistics, they form the methodological base of research in *JBL*. Thus, most impulses for empirical research in the *Journal* come from marketing.



FIGURE 1  
THE INTELLECTUAL STRUCTURE OF JBL, 1978–2007

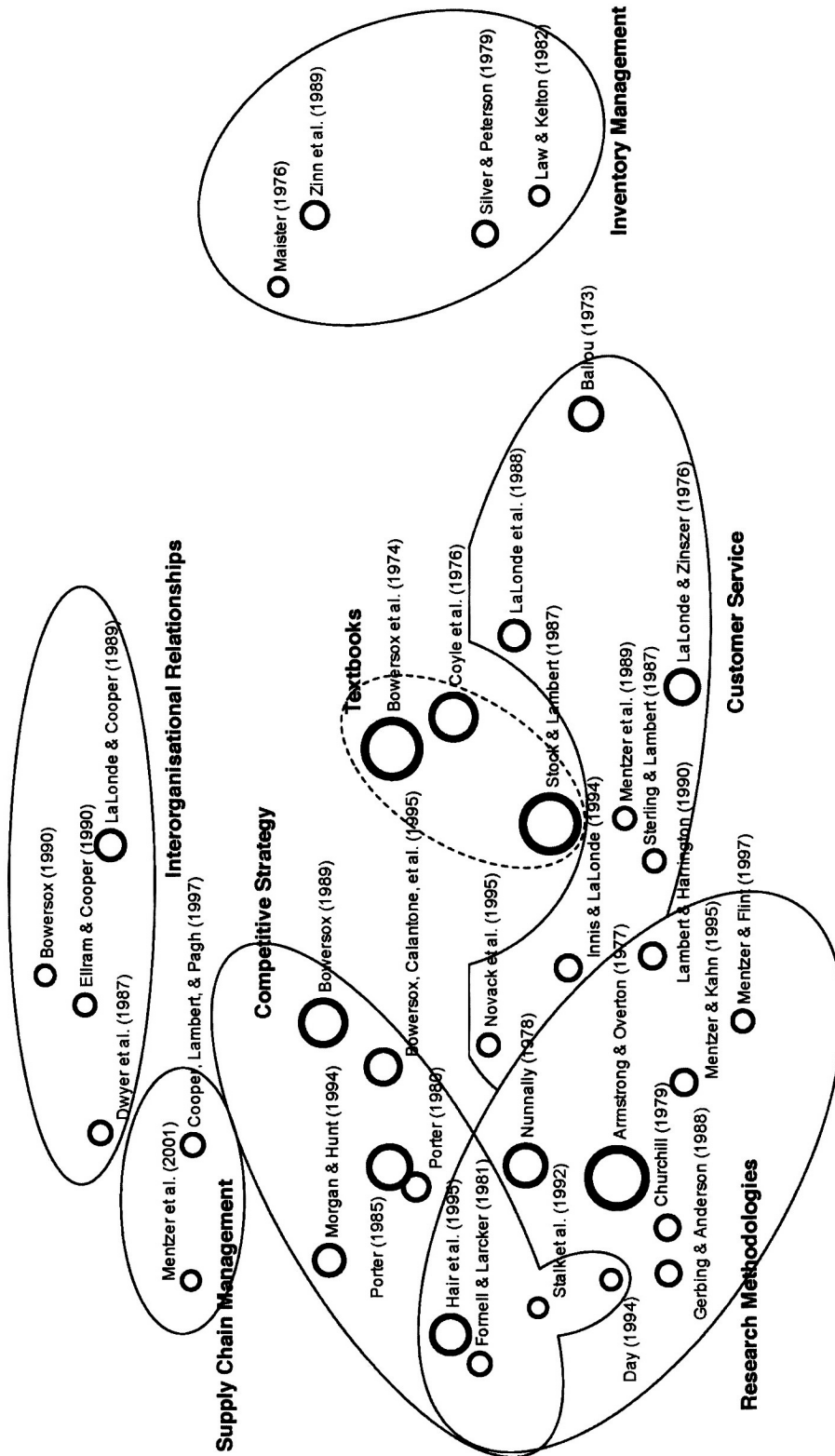


TABLE 4

**THE INTELLECTUAL FOUNDATION OF *JBL*, 1978–2007:  
SUBJECT AREAS AND CONTRIBUTING WORKS**

Subject Area	Contributing Works
Inventory Management	Law and Kelton (1982); Maister (1976); Silver and Peterson (1979); Zinn, Levy, and Bowersox (1989)
Textbooks	Ballou (1973); Bowersox, Closs, and Helfferich (1974); Coyle, Bardi, and Langley (1976); Stock and Lambert (1987)
Customer Service	La Londe and Zinszer (1976); La Londe, Cooper, and Noordewier (1988); Innis and La Londe (1994); Mentzer, Gomes and Krapfel (1989); Novack, Langley, and Rinehart (1995); Sterling and Lambert (1987)
Competitive Strategy	Bowersox (1989); Bowersox et al. (1995); Morgan and Hunt (1994); Porter (1980, 1985); Stalk, Evans, and Shulman (1992)
Supply Chain Management	Cooper, Lambert, and Pagh (1997); Mentzer et al. (2001)
Methodology	Armstrong and Overton (1977); Churchill (1979); Day (1994); Fornell and Larcker (1981); Gerbing and Anderson (1988); Hair et al. (1995); Lambert and Harrington (1990); Mentzer and Kahn (1995); Mentzer and Flint (1997); Nunnally and Bernstein (1978)
Inter-organisational Relationships	Bowersox (1990); Dwyer, Schurr, and Oh. (1987); Ellram and Cooper (1990); La Londe and Cooper (1989)

It is worth noting that this group is dominated by works concerned with quantitative methods; papers discussing qualitative methods are not featured. Yin's (1985) book on case study research is the forerunner of works on qualitative research in *JBL* receiving eleven citations only—four less than the citation threshold for our analysis. It is followed closely by McCracken's (1988) *The Long Interview* and Strauss and Corbin's (1990) *Basics of Qualitative Research*, each receiving 10 citations. Ellram's (1996) article on the use of the case study methodology in logistics received only eight citations and Eisenhardt's (1989) article on theory building from case studies received only five citations.

Another observation worth noting is the indicated intersection of the methodological group with a fifth group on competitive strategy in logistics. Although the articles on capabilities-based competition by Stalk, Evans, and Shulman (1992) and Day (1994) seem to belong to the methodological works in the MDS map, their papers actually address strategic issues. This is reflected by the factor and cluster analysis, which groups them with the works of Porter (1980, 1985). On the map, Stalk, Evans, and Shulman, and Day are "cut off" by Hair et al. (1995) and Fornell and Larcker (1981). This would suggest that the methods discussed in Hair et al. and Fornell and Larcker are associated particularly with studies related to logistics strategy. However, neither the cluster, nor the factor analysis, explicitly confirms this. In addition to Porter's monographs, Bowersox's (1989) book on competitive positioning and Bowersox et al.'s (1995) Council of Logistics Management report, *World Class Logistics*, make up the standard literature for research related to competitive strategy in *JBL*.

According to the MDS map, Morgan and Hunt's (1994) article on commitment-trust theory in relationship-marketing supplements the latter group on strategic issues. However, in the factor and cluster analysis, their work has strong ties with Mentzer and Kahn's (1995) and Mentzer and Flint's (1997) methodological papers, as well as with Cooper, Lambert, and Pagh's (1997) and Mentzer et al.'s (2001) works on defining supply chain management. Whereas the association of Morgan and Hunt's article with the group on strategic issues and on research in logistics cannot be interpreted readily, their relationship with the definitional works by Cooper, Lambert, and Pagh, and Mentzer et al. is explainable since the latter note that supply chain management is often about relationships. Interestingly, an inspection of the works citing Morgan and Hunt reveals that their work is referred to in the context

of relationship/collaboration, information technology, capability-based competition, customer service, etc. At large, this suggests that research related with supply chain management is often about, or related to, relationship management; also the first academic publications on supply chain management by Ellram and Cooper (1990).

More readily interpretable are the strong ties—supposed by the factor and cluster analysis—between the sixth group formed by Cooper, Lambert, and Pagh's (1997) and Mentzer et al.'s (2001) works on defining supply chain management, and Mentzer and Kahn (1995) and Mentzer and Flint (1997). Whereas the latter are concerned with the scope of research in logistics, the former extend and delimit research on logistics in the context of supply chain management. Still, regarding content, Mentzer and Kahn, and Mentzer and Flint address methodological issues whereas the works on SCM definitions are rather conceptual in nature. Thus, the disconnected positions on the MDS can be explained as readily as their strong ties, as supposed by the factor and cluster analysis.

The last group identified by the co-citation analysis addresses interorganizational relationships. It is located next to the definitional works on supply chain management. La Londe and Cooper's (1989) book on partnerships in the context of customer service takes the lead in terms of citation frequency. The *Journal of Marketing* article by Dwyer, Schurr, and Oh (1987) describing a framework for developing buyer-seller relationships; the *IJLM* paper by Ellram and Cooper (1990) discussing supply chain management and partnership relations; and the *HBR* publication by Bowersox (1990) on melding operations of two or more organizations, complete this seventh and last literature stream in the intellectual base of *JBL*.

#### **A Dynamic View on the Intellectual Base of *JBL***

In order to reveal the citation changes of the 36 most-cited publications (see Table 2), of the subject groups identified (see Table 4), and of the 20 most-cited journals (see Table 3) over three decades and, thus, to obtain an initial dynamic picture of the transformations that have taken place in the intellectual base of *JBL*, we analyzed the changes in relative citations (Ramos-Rodríguez and Ruíz-Navarro 2004).

Figure 2 shows the percentage change of citation for each of the 36 most-cited publications, measured as citations received relative to the number of articles published. The works are sorted by their subject group and their cumulative change in citations received. Figure 3 depicts the percentage change of citations to each subject group relative to the total citations given in the respective decade, sorted by the cumulative change in citations. The white bar shows the relative citation gain or loss from the first decade (1978–1987) to the second decade (1988–1997); the grey bar the relative difference from the second decade (1988–1997) to the third decade (1998–2007).

Four distinct patterns can be identified (White and McCain 1998): (1) A work increases its contribution in terms of citation from the first to second and second to third sub-period, indicating a trend of generally gaining importance in research; (2) a work gains from the first to the second decade, but loses from the second to the third, indicating that the work has reached and passed its maximum importance; (3) a work's citation declines over all three periods; or (4) a work begins to lose citations only to gain later.

The group of works related to quantitative research methods has, by far, gained the most throughout all decades. This situation indicates that *JBL* is publishing more quantitative empirical research. Although all the works in this group were able to gain citation shares, Armstrong and Overton's (1977) paper on non-response bias in mail surveys stands out. It is interesting that references made to their paper increased from the second to the third decade, whereas the usage of Lambert and Harrington's (1990) paper—also addressing the problem of non-response bias—declined slightly.

The works related to competitive strategy, interorganizational relationships, and inventory management did altogether gain in importance. Although Figure 3 suggests that their rise stems from the sharp increase of citations received in the second decade, while peaking off in the third decade, Figure 2 indicates a steady increase in impact of the individual works. The only exceptions are Bowersox's (1989) industry report on competitive positioning for the 1990's and Silver and Peterson's (1979) book on decision systems for inventory management and production planning.

FIGURE 2

CUMULATIVE CHANGES IN IMPACT OF THE 36 MOST-CITED PUBLICATIONS IN *JBL* FROM THE FIRST TO THE SECOND AND THE SECOND TO THE THIRD PERIOD

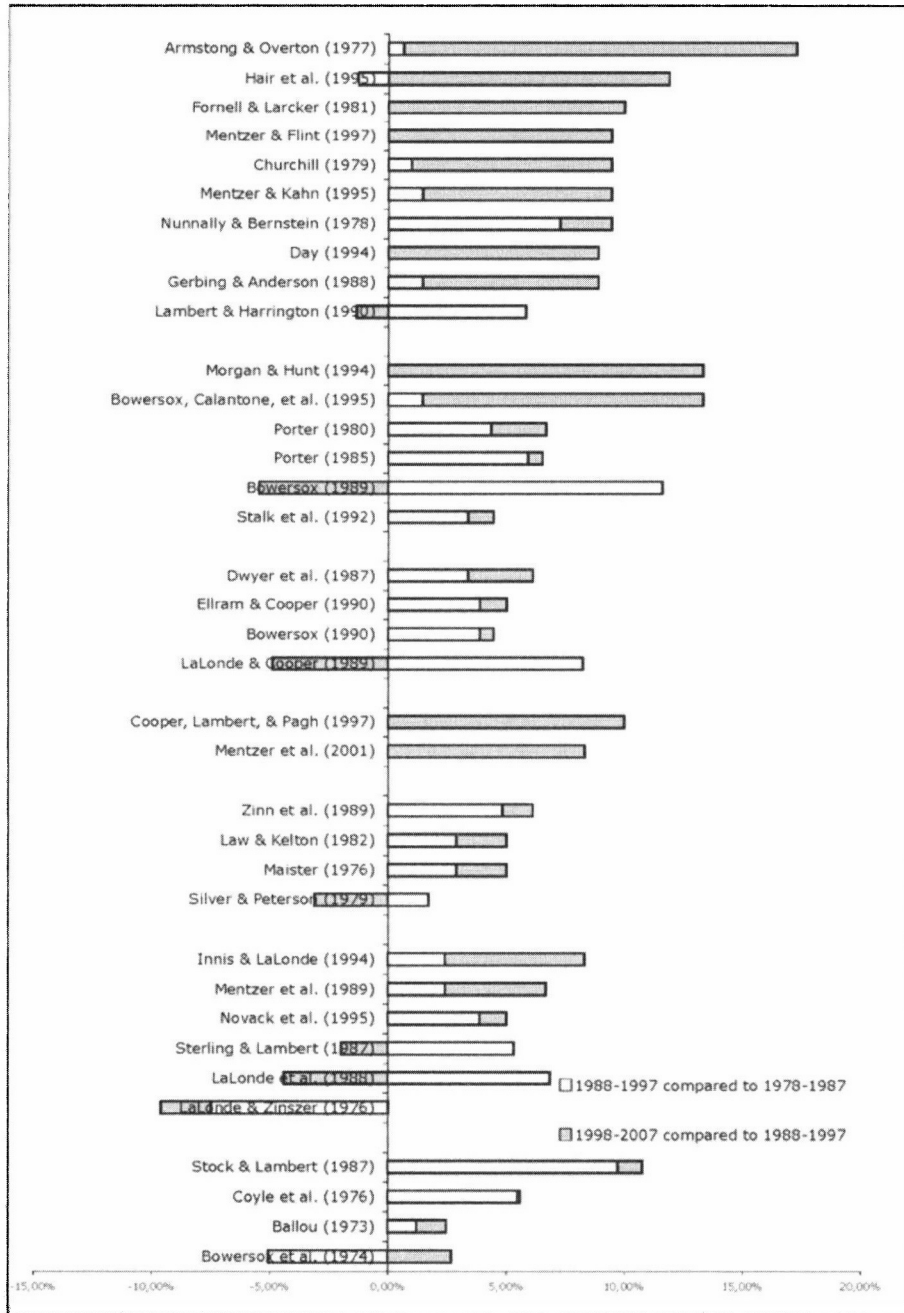
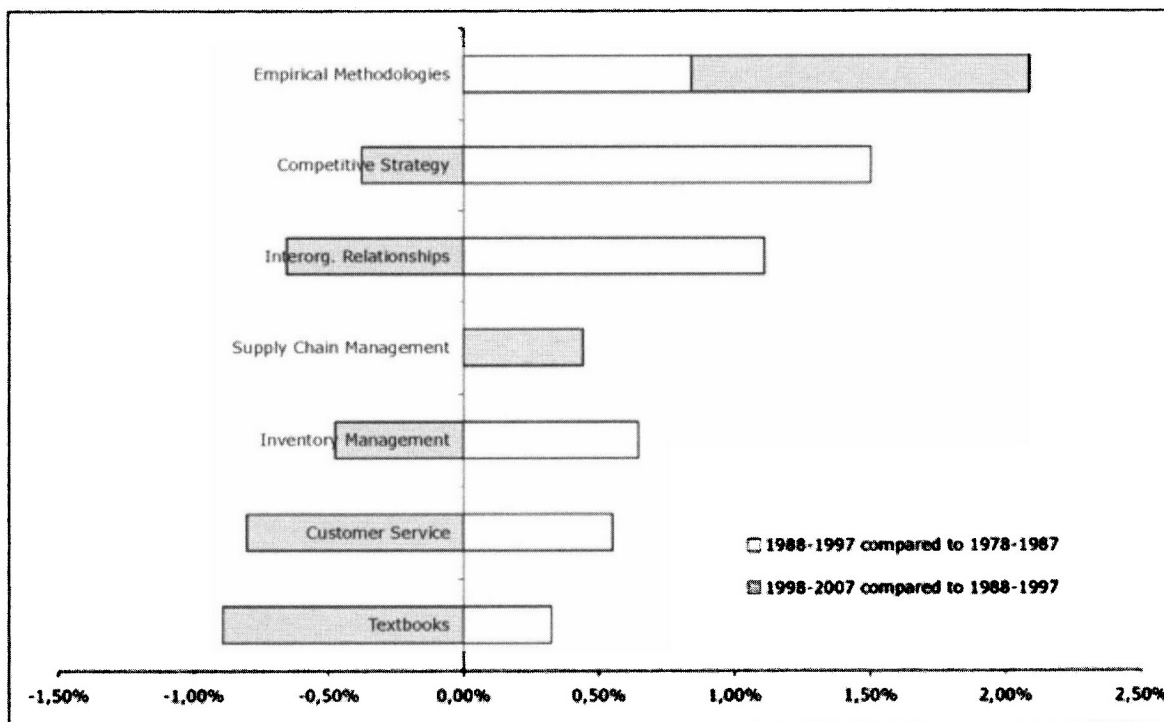


FIGURE 3

**CUMULATIVE CHANGES IN IMPACT OF THE IDENTIFIED SUBJECT GROUPS IN *JBL* FROM THE FIRST TO THE SECOND AND THE SECOND TO THE THIRD DECADE**



La Londe's books suffered a sharp decrease in citations, which might be due to the declining number of articles published on customer service related research. Although the articles by Innis and La Londe (1994) and Mentzer, Gomes, and Krapfel (1989) have gained contribution at large, the book by Novack, Langley, and Rinehart (1995) and the article by Sterling and Lambert (1987) lost ground in the third decade.

The rise of the supply chain management concept is apparent with the publications by Cooper, Lambert, and Pagh (1997) and Mentzer et al. (2001) that made it into the 36 most-cited publications in *JBL*, although they were the most recent works. Moreover, both rank among the top 10 works in gaining impact from the second to the third decade.

The four textbooks on logistics/supply chain management slightly lost stake in *JBL*, mostly because they were not able to prevail the reference lists of articles published between 1998 and 2007 as much as between 1988 and 1997. This might be due to the fact that the fundamentals of logistics and supply chain management have diffused and have been discussed in various articles that are more readily available (e.g., by electronic means). Another reason could be that it has become less acceptable to reference textbooks. At large, citations to books have declined compared to citations given to journals, especially from the second to the third period. Whereas overall citations have doubled, citations to books have increased by a third only; citations to journals have more than doubled (see Table 3).

Table 3 shows the citation changes of the 20 most-cited journals. Journals related to management (e.g., *SMJ*, *AMJ*, and *SMR*; *HBR* being the only exception) and marketing (e.g., *JAMS*, *JM*, and *JMR*) have increased their citation share, whereas journals related to production and operations management (e.g., *DS*, *EJOR*, *MS*) have lost citation shares, both especially from the second to the third decade. Interestingly, journals related to logistics (e.g., *JBL* and *IJPD&LM*) and purchasing/materials management (*IJPM*) have lost relative citations from the second to

the third decade, too; the only exception is *IJLM* which gained relative citations overall. However, this might be due to the fact that it started in 1990 and did not exist in the first decade.

The comparative citation analyses of the 36 most-cited publications and 20 most-cited journals reflect the major changes that have occurred in the intellectual base of *JBL*. Quantitative empirical research gains importance during both the first and the second decade. Research into supply chain management evolves between 1998 and 2007 with considerations related to competitive strategy and interorganizational relationships becoming more influential, though losing some impact during the second decade—possibly due to a merging of these with research on supply chain management. References made to research on customer service and inventory management declined, especially in the last decade under investigation.

By investigating the intellectual structure of the most-cited publications in each decade, the next section reveals further insights into the transformations that have taken place in the intellectual base of *JBL*.

### The Evolution of the Intellectual Structure of *JBL*

In order to observe changes in the intellectual structure of *JBL* during its 30 years of existence, we mapped the most-cited publications of each decade. This gives more detailed information about the constellation of research topics in each decade. As stated above, we included as many works as could be mapped well (Kruskal's stress less than 20 %) with SPSS's multidimensional scaling algorithm PROXSCAL (see Table 1). For the first decade, 26 works being cited at least four times; for the second period, 38 works being cited at least six times; and for the third period, 30 works being cited at least 12 times were included in our analysis. The publications are summarized in Table 5, ranked according to the number of citations received.

Some important observations can instantly be made. The only work that prevails in each decade is Bowersox, Closs, and Helderich's (1974) textbook on logistics management<sup>2</sup>. The textbook by Ballou (1973) is present only in the first and second decades; the textbooks by Coyle, Bardi, and Langley (1976) and Stock and Lambert (1987) only in the second and third decades. La Londe and Zinszer's (1976) book on customer service and Silver and Peterson's (1979) book on decision systems for inventory management and production planning only rank among the most frequently cited works in the first two decades. The methodological works by Armstrong and Overton (1977) and Nunnally and Bernstein (1978), as well as Porter's (1980, 1985) books on competitive strategy, are considered among the most-referenced publications in *JBL* in the last two decades only<sup>3</sup>.

Figure 4 shows the position of the 26 most-cited publications between 1978 and 1987 on a two dimensional MDS map.

The intellectual structure, as depicted in the map, is rather scattered, with, at first glance, only two distinct groups. At the lower left-hand side of the map, Cooper (1983), Masters (1980), and Jackson (1981, 1985) form a dense gathering of *JBL* publications on freight consolidation. Facing this group at the lower right-hand side of the map, a second distinct gathering on physical distribution from a service-related perspective is led by La Londe and Zinszer's (1976) book on customer service, accompanied by Stephenson and Willett (1968), Hutchinson and Stolle (1968), Perreault and Russ (1974, 1976), and Gilmour et al. (1976). These two groups are related with articles linked to freight consolidation and shipments (Dixon 1976; Newbourne and Barrett 1972) and quantitative analysis of distribution systems (Clarke and Wright 1964; Geoffrion and Graves 1974) on a horizontal axis.

In the middle of the map, a belt of publications related to inventory management is formed by Brown (1967), Blumenfeld et al. (1985), Hadley and Whitin (1963), Silver and Peterson (1979), as well as Lambert's (1975) book on inventory carrying costs. The latter does not methodologically, nor otherwise, share anything with the former works. This group is supplemented by the textbooks on logistics management by Bowersox, Closs, and Helderich (1974) and physical distribution management by Lambert and Stock (1982), although they belong to the group of

<sup>2</sup> The reference to this textbook is always indicated as Bowersox et al.'s (1974), even though authors may cite the 1989 or 1995 issues of the textbook.

<sup>3</sup> As in the case of Stock and Lambert (1987), Porter's (1980, 1985) books were not available in the first decade.

textbooks positioned in the upper part of the map in terms of content. However, their central position in the map suggests that they are also associated with the works on both freight consolidation and physical distribution in the lower part, which is partially suggested by the results of the cluster and factor analysis (see Appendices 4 and 5).

TABLE 5

**EVOLUTION OF JBL'S INTELLECTUAL FOUNDATION: THE MOST-CITED PUBLICATIONS IN EACH DECADE AND THEIR ABSOLUTE AND RELATIVE CITATION FREQUENCY; N = NUMBER OF ARTICLES PUBLISHED IN EACH PERIOD; C = ABSOLUTE CITATION COUNTS; c = RELATIVE CITATION COUNTS**

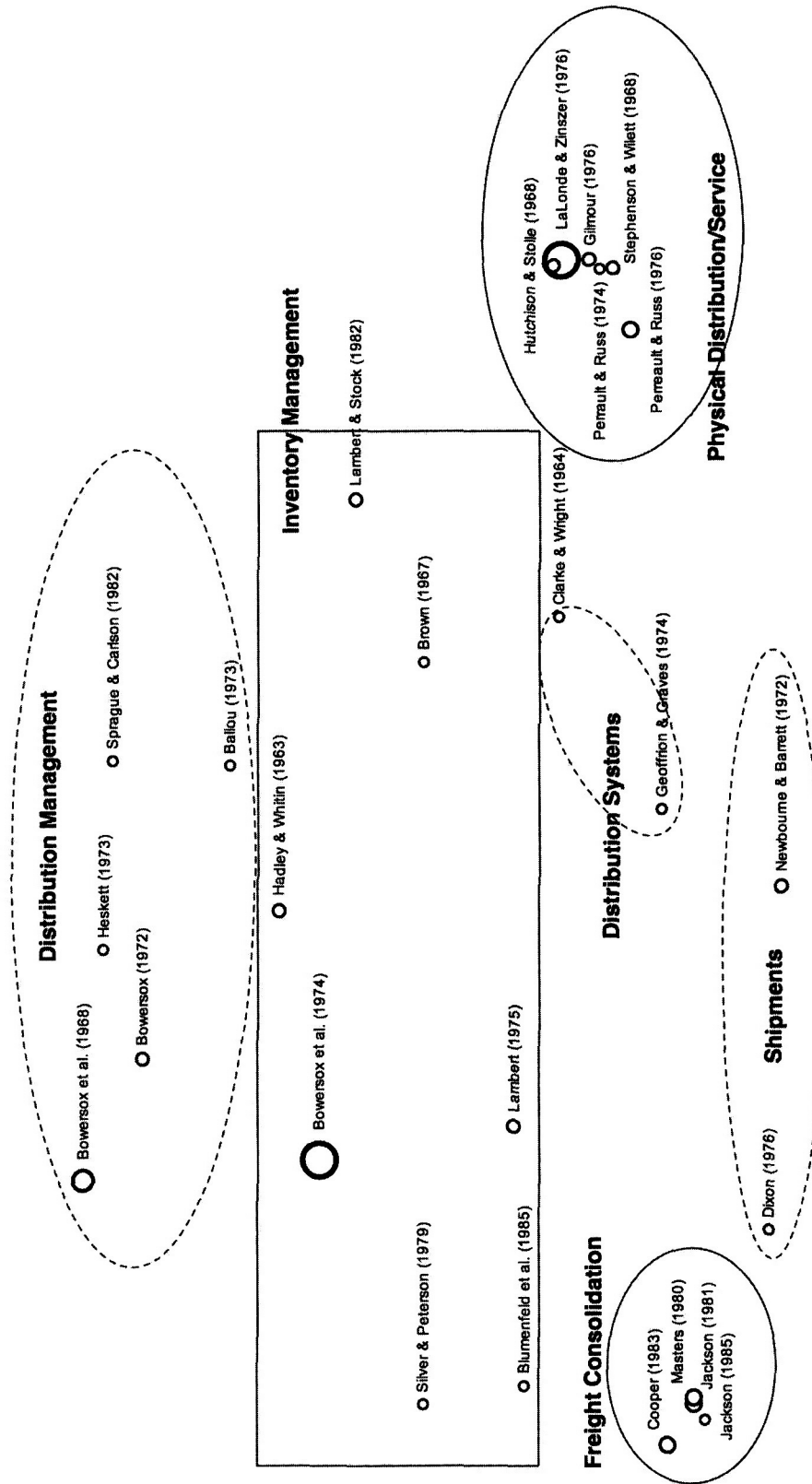
1978–1987 (N=110)			1988–1997 (N = 207)			1998–2007 (N = 180)		
<i>Cited Publication</i>	<i>C</i>	<i>c</i>	<i>Cited Publication</i>	<i>C</i>	<i>c</i>	<i>Cited Publication</i>	<i>C</i>	<i>c</i>
Bowersox, Closs, and Helferich (1974)	13	11.8%	Bowersox (1989)	24	11.6 %	Armstrong and Overton (1977)	36	20.0%
La Londe and Zinszer (1976)	13	11.8%	Stock and Lambert (1987)	22	10.6 %	Bowersox et al. (1995)	24	13.3%
Bowersox, Smykay, and La Londe (1968)	8	7.3%	Coyle, Bardi, and Langley (1976)	17	8.2 %	Hair et al. (1995)	24	13.3%
Cooper (1983)	6	5.5%	La Londe and Cooper (1989)	17	8.2 %	Morgan and Hunt (1994)	24	13.3%
Jackson (1981)	6	5.5%	La Londe, Cooper, and Noordewier (1988)	16	7.7 %	Stock and Lambert (1987)	21	11.7%
Masters (1980)	6	5.5%	Porter (1985)	16	7.7 %	Cooper, Lambert, and Pagh (1997)	18	10.0%
Perreault and Russ (1976)	6	5.5%	Nunnally and Bernstein (1978)	15	7.2 %	Fornell and Larcker (1981)	18	10.0%
Bowersox (1972)	5	4.5%	Bowersox, Closs, and Helferich (1974)	14	6.8 %	Bowersox, Closs, and Helferich (1974)	17	9.4%
Gilmour et al. (1976)	5	4.5%	Lambert and Harrington (1990)	12	5.8 %	Churchill (1979)	17	9.4%
Hadley and Whitin (1963)	5	4.5%	Silver and Peterson (1979)	11	5.3 %	Mentzer and Kahn (1995)	17	9.4%
Hutchinson and Stolle (1968)	5	4.5%	Sterling and Lambert (1987)	11	5.3 %	Mentzer and Flint (1997)	17	9.4%
Lambert (1975)	5	4.5%	Ballou (1973)	10	4.8 %	Nunnally and Bernstein (1978)	17	9.4%
Lambert and Stock (1982)	5	4.5%	Zinn, Levy, and Bowersox (1989)	10	4.8 %	Day (1994)	16	8.9%
Newbourne and Barrett (1972)	5	4.5%	La Londe and Zinszer (1976)	9	4.3 %	Gerbing and Anderson (1988)	16	8.9%
Stephenson and Willett (1968)	5	4.5%	Porter (1980)	9	4.3 %	Coyle, Bardi, and Langley (1976)	15	8.3%
Ballou (1973)	4	3.6%	Bowersox (1990)	8	3.9 %	Innis and La Londe (1994)	15	8.3%
Blumenfeld et al. (1985)	4	3.6%	Dobler, Lee, and Burt (1990)	8	3.9 %	Mentzer et al. (2001)	15	8.3%
Brown (1967)	4	3.6%	Ellram and Cooper (1990)	8	3.9 %	Porter (1985)	15	8.3%



TABLE 5 (cont.)

Clarke and Wright (1964)	4	3.6%	Mentzer and Krishnan (1985)	8	3.9 %	Cooper et al. (1997)	13	7.2%
Dixon (1976)	4	3.6%	Novack, Langley, and Rinehart (1995)	8	3.9 %	Daugherty, Stank, and Ellinger (1998)	13	7.2%
Geoffrion and Graves (1974)	4	3.6%	Armstrong and Overton (1977)	7	3.4 %	Ganesan (1994)	13	7.2%
Heskett (1973)	4	3.6%	Byrne and Markham (1991)	7	3.4 %	Garver and Mentzer (1999)	13	7.2%
Jackson (1983)	4	3.6%	Dwyer, Schurr, and Oh (1987)	7	3.4 %	Stank, Keller, and Daugherty (2001)	13	7.2%
Perreault and Russ (1974)	4	3.6%	Stalk, Evans, and Shulman (1992)	7	3.4 %	Anderson and Gerbing (1988)	12	6.7%
Silver and Peterson (1979)	4	3.6%	Baumol and Vinod (1970)	6	2.9 %	Bienstock, Mentzer, and Bird (1997)	12	6.7 %
Sprague and Carlson (1982)	4	3.6%	Cooper, Innis, and Dickson (1992)	6	2.9 %	Bowersox, Closs, and Stank (1999)	12	6.7 %
						Bowersox, Mentzer, and Speh (1995)	12	6.7 %
			Dillman (1978)	6	2.9 %	Dillman (2000)	12	6.7 %
			Eppen (1979)	6	2.9 %			
			Eppen and Martin (1988)	6	2.9 %	Mentzer, Gomes, and Krapfel (1989)	12	6.7 %
			Heskett (1977)	6	2.9 %	Porter (1980)	12	6.7 %
			Jackson (1983)	6	2.9 %			
			Kotler (1988)	6	2.9 %			
			Lau (1989)	6	2.9 %			
			Law and Kelton (1982)	6	2.9 %			
			Maister (1976)	6	2.9 %			
			McGinnis and Kohn (1990)	6	2.9 %			
			Stalk (1988)	6	2.9 %			
			Zeithaml, Berry, and Prasuraman (1988)	6	2.9 %			

FIGURE 4  
THE INTELLECTUAL STRUCTURE OF JBL, 1978-1987



Positioned in the upper part of the map are publications on physical distribution in general and include the textbooks on business logistics and physical distribution by Bowersox, Smykay, and La Londe (1968) and Ballou (1973); Sprague and Carlson's (1982) book on decision support systems; Bowersox's (1972) article on distribution operations; and Heskett's (1973) article on changes in distributions.

The map indicates three distinct subject groups on physical distribution. The analysis suggests that the intellectual base of the first decade of research in *JBL* is dominated by inventory-related publications and a broad discussion of physical distribution, either from an operational- or service-oriented point of view. This picture is confirmed by the fact that logistics-related journals are by far the most-cited sources (eight out of 16 journal citations), in addition to 10 book citations, of which four are textbooks in logistics and four are related to inventory management.

In the second decade, the intellectual structure, as depicted in Figure 5, appears more differentiated compared to the first decade (Figure 4).

Publications contributing to research on inventory models gather at the right side of the map. They are split up into two groups with a slightly different research focus. At the top, the works by Eppen (1979), Maister (1976) and Zinn, Levy, and Bowersox (1989) are concerned with centralization vs. decentralization of inventories, whereas the group below—characterized by Eppen and Martin (1988), Lau (1989), and Mentzer and Krishnan (1985)—addresses the assumption of a normal distribution of demand and lead times. The research stream is supported by the textbook on logistics management by Ballou (1973), Silver and Peterson's (1979) book on decision systems for inventory management, and Law and Kelton's (1982) book on simulation modeling.

Whereas in the first decade the intellectual base of *JBL* had a strong presence of publications on physical distribution, the intellectual base of the second decade features only Baumol and Vinod's (1970) *Management Science* paper on choices of transportation modes and total transportation demand. Positioned at the center of the map are Jackson's (1983) article on the implications of just-in-time production for logistics managers and Bowersox, Closs, and Helferich's (1974) textbook on logistical management. Whilst Bowersox, Closs, and Helferich's book appears central to research in *JBL*, other logistical textbooks featured (Coyle, Bardi, and Langley, 1976; Stock and Lambert 1987) are associated closer with the research stream on customer service.

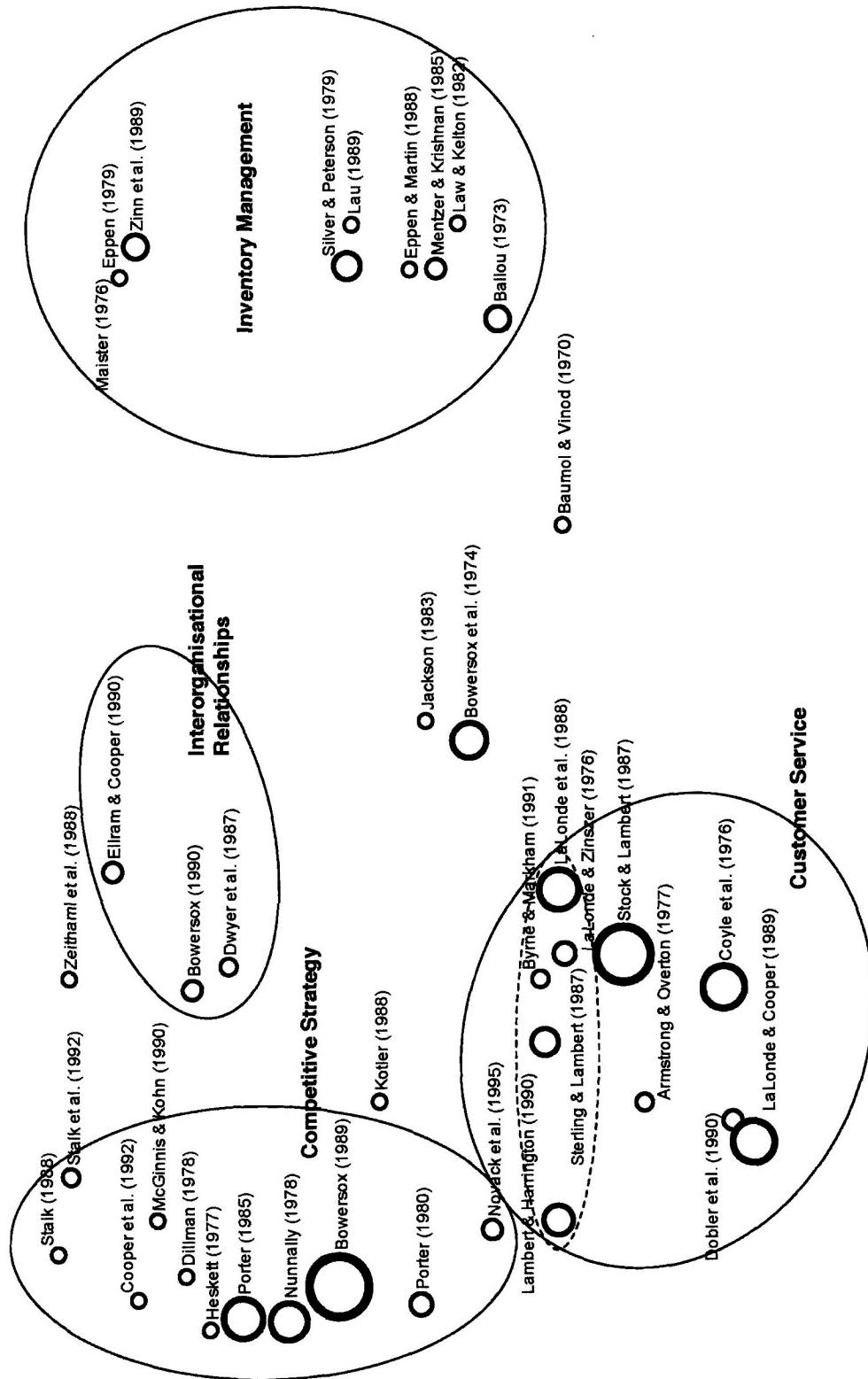
While in the first decade customer service was mostly seen in combination with physical distribution, strategic considerations and empirical research prevailed in this subject area in the second decade. This situation becomes apparent with increasing references made to Armstrong and Overton's (1977) and Lambert and Harrington's (1990) articles on non-response bias in mail surveys; and, concerning managerial aspects, with La Londe's (1988, 1989) works and Sterling and Lambert's (1987) article on customer service strategies.

The growing number of cited papers on empirical research and competitive strategy manifests itself further in the third group at the left-hand side of the map. Here, the leading works are Bowersox's (1989) report on competitive positioning in logistics and Porter's (1985) book *Competitive Advantage*, which characterize the group clearly. Concerning methodology, Nunnally and Bernstein's (1978) *Psychometric Theory* and Dillman's (1978) book on survey design are featured.

With Ellram and Cooper's (1990) *IJLM* article, the term "Supply Chain Management" appears for the first time in a title of the intellectual base—here in the context of interorganizational relationships. To that effect, Ellram and Cooper's paper is associated with Bowersox's (1990) *HBR* article on strategic alliances in logistics and Dwyer et al.'s (1987) *JM* paper on buyer-seller relationships. La Londe and Cooper's (1989) book on customer service and partnerships also contributes to this research area, if the results of the factor analysis (see Appendix 7) are taken into account.

Left without distinct affiliations, due to inconsistencies between the results of the MDS, the cluster, and the factor analysis (see Appendices 6 and 7), is the article "Communication and Control Processes in the Delivery of Service Quality," by Zeithaml, Berry, and Parasuraman (1988) and the book *Marketing Management* by Kotler (1988).

FIGURE 5  
THE INTELLECTUAL STRUCTURE OF JBL, 1988-1997



All in all, research on physical distribution and freight consolidation has lost ground in the research carried out between 1988 and 1997 in comparison to the first decade. Whereas the former can be related to the name change from physical distribution to logistics, the latter can be essentially considered a solved problem in the second decade. In this decade, research into competitive strategy and interorganizational relations evolved and gained influence. Research on customer service and inventory management remained influential, although inventory management seems to have become a side issue. Thus, the intellectual structure of research in *JBL* between 1988 and 1997 is roughly divided into subjects related to marketing and strategic management, dominating the left and middle of the map, and the more traditional logistic topics (inventory management) as side issues on the right of the map. This overall trend may be attributed to the increasing popularity of third-party logistics in the marketplace.

The trend observed in the transformation of the intellectual structure from the first to the second decade is continued in the third decade (see Figure 6).

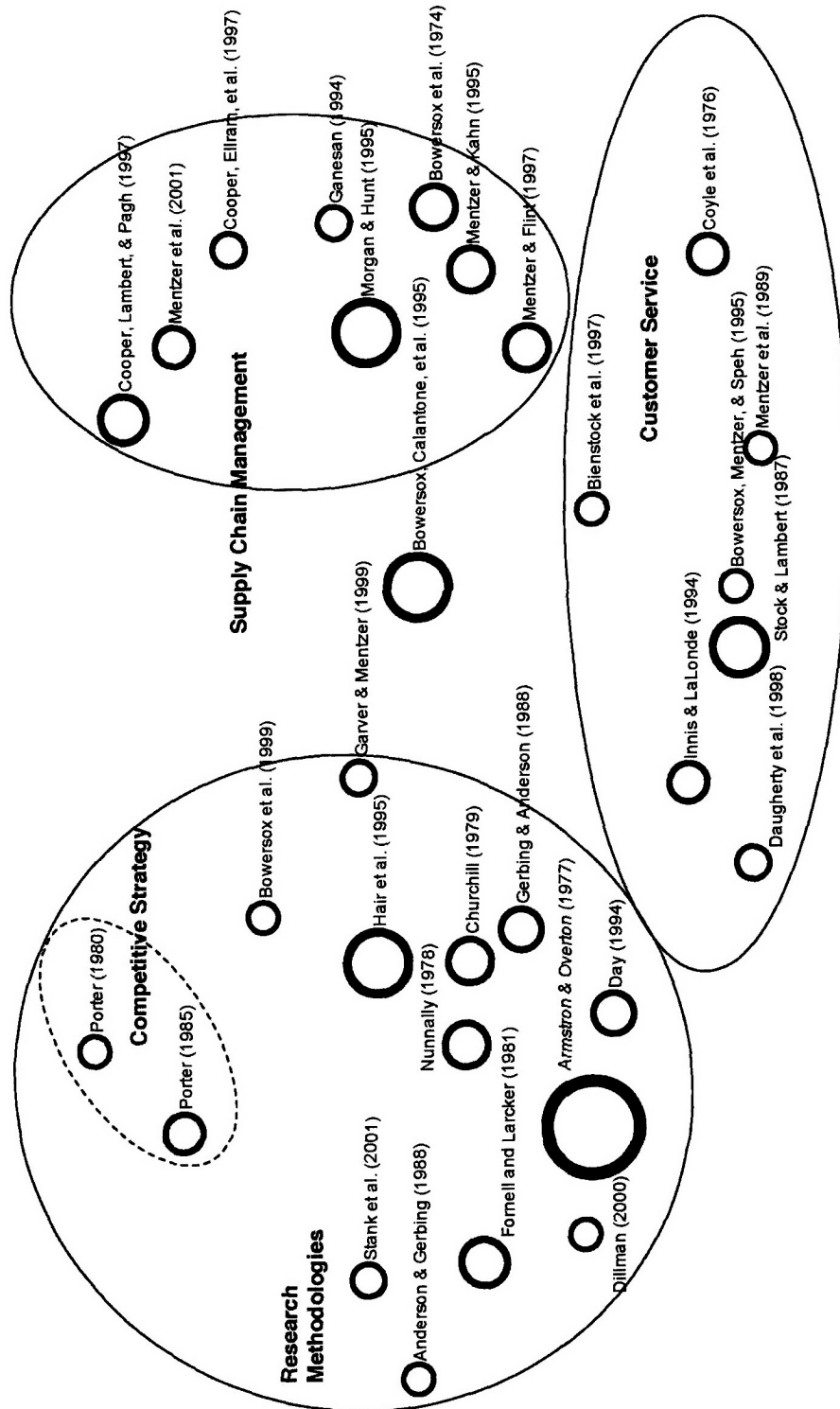
Papers concerned with inventory management are not featured anymore and only Zinn, Levy, and Bowersox's (1989) *JBL* paper on the "square root law" would represent this research stream if the citation threshold was lowered to eleven. Instead, the intellectual base of *JBL* is dominated by methodological works concerned with quantitative empirical research on the one hand—indicating an increased amount of survey research being published—and publications concerned with the conception of supply chain management on the other. Three large groups can be identified on the MDS map and in the cluster analysis (see Appendix 8).

- Related to research on business integration/collaboration issues (Bowersox, Closs, and Stank 1999; Day 1994; Stank, Keller, and Daugherty 2001) or strategy (Porter, 1980, 1985), publications in the last decade of *JBL* draw heavily on methodological works concerned with large-scale empirical socio-scientific research (Armstrong and Overton 1977; Churchill 1979; Fornell and Larcker 1981; Hair et al. 1995).
- Conceptual research on supply chain management is presented by a second fraction on the right-hand side of the map. Strong ties with the literature stream on interorganizational relationship is apparent. Morgan and Hunt's (1994) contribution on commitment-trust theory, Ganesan's (1994) paper on buyer-seller relationships, and Cooper et al.'s (1997) article on alliances are associated with this area. Also, the discussions by Mentzer and Kahn (1995) and Mentzer and Flint (1997) on the scope of research in logistics contribute to this group. Similarly, the works on supply chain management by Cooper, Lambert, and Pagh (1997) and Mentzer et al. (2001) are featured.
- The only research area that persisted throughout all three decades is related to customer service. Although the publications contributing most to this group in the third decade have not been featured in the second, the textbooks by Stock and Lambert (1987) and Coyle, Bardi, and Langley (1976) still complement this research stream.

The only publication that cannot be clearly associated with any of the above subject groups is Bowersox et al.'s (1995) research on *World Class Logistics*, since the results of the cluster and factor analyses are inconsistent (see Appendices 8 and 9). The factor analysis suggests an association with the major logistics textbooks; the cluster analysis points towards a close association with Bowersox, Closs, and Helderich's (1974) textbook, as well as with publications on supply chain management. These associations may be due to the strategy components in Bowersox et al.'s report.

In comparison to the intellectual structure of the preceding two decades, methodological and empirical works have gained enormously between 1998 and 2007. The only 'traditional' subject that prevailed is related to customer service. The multivariate analyses conducted suggest that subject areas addressing competitive strategy and partnerships have either merged into the group investigating business collaborations empirically or into the group on conceptual issues related to supply chain management.

FIGURE 6  
THE INTELLECTUAL STRUCTURE OF JBL, 1998-2007



## CONCLUSION

The knowledge repository on which a scientific research community develops is largely revealed in the citations that researchers make in their writings (Ramos-Rodríguez and Ruiz-Navarro 2004). They are the only eternal and “objective” indicators available that can be used to study the flow of information to, within, and from, scientific disciplines (Paisley 1984, cited by Hoffmann and Holbrook 1993). Studying these acknowledgements of intellectual heritage is key to exploring and understanding the origins and transformations of knowledge utilized in a discipline—its intellectual foundation.

Previous assessments of research on logistics and supply chains have essentially looked at the *nature* of research in the field; none has yet studied the development, dissemination, and utilization of knowledge as reflected in the bibliographies of publications. Therefore, this study has employed an objective approach by analyzing over 12,000 citations made in nearly 500 publications in the *Journal of Business Logistics*—one of the leading journals in the field—by using bibliometric techniques. Our study gives a picture of the intellectual foundation of *JBL*, which means that it does not reflect the base and structure of logistics in general.

Our research questions can be answered as follows:

- A citation analysis of all the articles published in *JBL* between 1978 and 2007 revealed that logistics, marketing, and strategic management journals exert the strongest impact in terms of being used for citations. However, textbooks on logistics/supply chain management and publications on research methods are also called upon frequently. The textbooks by Ballou (1973), Bowersox, Closs, and Helferich (1974), Coyle, Bardi, and Langley (1976) and Stock and Lambert (1987) appear to be the diffused readings on logistics and supply chain management; Porter’s (1980, 1985) works on industrial economics, as well as Bowersox (1989) and Bowersox et al. (1995) are the standard works for logistics research related to competitive advantage and strategy in *JBL*; and Armstrong and Overton (1977), Nunnally and Bernstein (1978) and Hair et al. (1995) are the publications of reference with respect to research methodologies in this journal.
- Referring to the structure of the intellectual base of *JBL*, we were able to identify six citation clusters/themes (research questions 2 and 3): physical distribution; inventory models; customer service; interorganizational relationships; competitive strategy; and empirical methodologies for socio-scientific research. The use of physical distribution related literature—possibly due to the name change into logistics—and inventory management has declined over the three decades under study; papers on competitive strategy (with Porter’s works being a major driver) and publications concerned with empirical methods gained importance during the last two decades. This result indicates a shift in *JBL* from an operational focus to a strategic focus; prioritizing managerial issues. Works related to research in interorganizational relationships became strong in the second decade and merged with research on supply chain management in the last decade. This finding suggests that a shift towards more relational and institutional research into logistics (management) took place, which has been typically linked with the notion of supply chain management since the 1990’s. It is, therefore, unsurprising that conceptual research on supply chain management (Cooper, Lambert, and Pagh 1997; Mentzer et al. 2001) dominated the intellectual base of *JBL* in the last decade, in addition to publications on quantitative empirical methods (Armstrong and Overton 1977; Hair et al. 1995; Nunnally and Bernstein 1978). Works concerned with customer service pervaded in all three decades. Although their citation usage declined slightly between 1998 and 2007, this gives yet another indication of *JBL*’s stronger focus on management-related issues. Table 6 summarizes the findings of our investigation by highlighting the transformation in subject areas that the intellectual base has undergone.

- Exploring the citation transformation over three decades (research question 3), we find that publications from marketing (related to research methods and theory) became more frequently cited, especially in the last decade (1998–2007). Already evident in the first decade, the discussion on physical distribution was partially impacted by marketing concepts. Most methodical contributions featured in the last decade were published in marketing journals, indicating that empirical research methods employed in marketing increasingly determine empirical logistics research. On the whole, research on operations seems to have cleared the way for publications concerned with strategy and organizations; the usage of socio-scientific methods increased.

TABLE 6

**CONTRIBUTION OF SUBJECT AREAS IN THE INTELLECTUAL FOUNDATION OF *JBL* IN COMPARISON; ‘++’ = STRONG CONTRIBUTION; ‘+’ = WEAK CONTRIBUTION**

Related Subject Area	Contribution		
	1978–1987	1988–1997	1998–2007
Physical Distribution	++		
Inventory Management	++	+	
Customer Service	++	++	+
Interorg. Relationship		++	+
Competitive Strategy		++	++
Empirical Methodologies		+	++

In general, the results of our study are in line with Charvet, Cooper, and Gardner (2008) findings. However, it is noteworthy that in both Charvet, Cooper, and Gardner’s (2008) and our analysis, publications on operations research or operations management are positioned (and clustered) in a comparatively larger distance from the publications on logistics and interorganizational relationships. This finding clearly suggests a divide in research on logistics and supply chain management into a camp focusing on managerial issues and a camp focusing on operational issues.

Insights from this study can be used in order to understand the direction of *JBL*. Based on the usage of specific literature, we can observe that the influence of quantitative empirical methods is growing within the intellectual base of *JBL*. At the same time the heritage of physical distribution and inventory management is somehow diminishing within the intellectual base. Nevertheless, there is no evidence for methodological triangulation—literature on qualitative empirical research is not included in the most prominent sources—and our findings show that the integration of empiricism and modeling seems to be still an unresolved topic. Exploring the links between topics and integrating research methodologies might be a valuable direction to go. Similar conclusions were drawn by Pilkington and Meredith (2009) for their field of investigation in operations management. A brief review of the *JBL*-titles in 2008 and 2009, which were not included in the presented analysis, makes the ongoing shift in topics even more obvious.

To substantiate and detail such claims, further studies should be conducted that resolve, if possible, the present study’s limitations. These may relate to the representativeness of the citation data used and to the interpretation of the analytical results.



The citation data collected for the study on the intellectual foundation of the *Journal of Business Logistics* and its evolution is complete, since it covers all cited references of the 497 articles published in *JBL*, Vol. 1, Issue 1 (1978) to Vol. 28, Issue 2 (2007). Since our study focused on the intellectual foundation of *JBL* only, the representativeness of the citation data analyzed and, thus, our results are naturally limited to logistics and supply chain management research published in *JBL*. Still, as outlined above, our findings agree with the results of Charvet, Cooper, and Gardner (2008) with regards to the basic structure of current research in the field. In order to derive more representative and detailed conclusions regarding the overall intellectual foundation of research on logistics and supply chain management, we suggest that future research should analyze more journals related to the field by means of bibliometric techniques. Additionally, investigations into the similarities and differences of the intellectual foundations of journals or groups of journals contributing to research in the field might disclose valuable insights regarding further subject areas, as well as related methodologies or research approaches.

With regard to our co-citation analyses, only a small fraction of all works cited were included, since we had to set the citation threshold quite high to generate MDS maps with an acceptable goodness of fit, according to Kruskal (1964a, 1964b). As a consequence, only the most frequently cited works were included and only the most influential subject areas were revealed—they can be interpreted as symbols that represent specific and important ideas in the field (Small 1977).

Setting the threshold lower to include more publications could have revealed further, but less influential subject areas, which would have been at the cost of lower comprehensiveness and consistency of the analysis. For example, setting the threshold for the analysis in the final decade (1998–2007) to 11 instead of 12, would include another eight articles. More traditional textbooks (Ballou 1973) and articles from other decades like Zinn, Levy, and Bowersox (1989) would be included. But also more articles related to marketing (Dwyer, Schurr, and Oh 1987) and empirical methods (Bollen 1998) would evolve. This trend is intensified if 46 publications, all cited at least 10 times, are taken into consideration. Concerning qualitative empirical research methods, the works by Yin (1985), McCracken (1988) and Strauss and Corbin (1990) would enter the analysis—among 64 works—if the threshold would be lowered to nine; e.g., Ellram (1996) and Eisenhardt (1989) received only eight and four citations respectively.

Finally, our interpretation of the intellectual foundations presented is limited to the insights gained by the citation and co-citation analyses. That is, we do make assumptions or render judgments concerning “underlying factors.” For example, one could argue that the intellectual foundation of research published in *JBL* naturally leans towards marketing because its founders and many of its contributing authors have an academic marketing background. This, however, was not of interest to us since we were investigating *JBL*’s intellectual foundation as it is—the authors publish their research in *JBL* because they wanted it to be published there and because they were accepted for publication. And if most of *JBL*’s contributors are influenced by marketing and therefore cite literature from marketing, this would be reflected in the intellectual base. Moreover, remarks on the underlying factors are only relevant if we were comparing different journals with the intention to explain or explore their differences. Nevertheless, we would still encourage further research to address these issues, by (1) comparing and explaining differences in the intellectual foundations of journals, or (2) by focusing on the *oeuvres* of authors and analyzing their structure, using either author co-citation analysis or by coupling the citations made by authors bibliographically.

In spite of these limitations, we hope that our article benefits researchers, educators, and practitioners in the field by providing an overview of the most influential publications to research published in *JBL*, their interrelationships, and their evolution. Our findings should enable those interested in research on logistics and supply chain management to identify suitable key readings and to judge whether or not research has drawn on appropriate conceptual and methodological literature to advance the knowledge in the respective research area or in the field at large.

## APPENDIX 1

## INSIGHTS INTO BIBLIOMETRICS

In general, bibliometrics is the “application of mathematics and statistical methods to books and other media of communication,” in order to “shed light on the processes of written communication and of the nature and course of development of a discipline (in so far as this is displayed through written communication), by means of counting and analyzing the various facets of written communication” (Pritchard 1969, pp. 348–349). In this sense, bibliometrics can be understood as “the quantitative study of literatures as they are reflected in bibliographies” (White and McCain 1989, as cited in Osareh 1996a, p. 150).

Citation analysis assumes that citations given to documents reflect the use of that document by the citing author. The implication being that the author is assumed to refer to all—or at least the most important—documents used; and that the documents cited were indeed used. Moreover, it is assumed that the citations equally reflect the merit (quality and/or significance) of those documents cited (Smith 1981). However, the motivations for making citations (or, even worse, for not citing) are not necessarily due to intellectual linkages (Garfield 1977; Osareh 1996b ;Smith 1981)—a citation “does not necessarily fully and faithfully reflect usage” (Smith 1981, p. 87). Relevant works may not be cited because the author was not aware of the relevant document(s), could not obtain or comprehend them, or simply omitted to acknowledge them. Moreover, publications presenting important ideas will not necessarily continue to be cited as regularly. “Once an idea is sufficiently widely known, citing the original version may become unnecessary” (Smith 1981, p. 93). This becomes apparent in our analysis of the evolution of *JBL*’s intellectual foundation. Over time, citations to the major textbooks on logistics/supply chain management decreased, especially between 1998 and 2007. On the other hand, recently published works tend to be cited less frequently because they have not been exposed to the scientific community, compared to works that have been available for a longer period of time. However, since our objective is to identify the most influential works in past and present research in *JBL*, the more recent works certainly would not have had the time to be cited as much as older works.

Another problem related to citation practices are self-citations, which could be deducted from the citation frequencies of articles. This, however, implies that all self-citations are not due to intellectual linkages or any other justified reason for citing. Furthermore, articles with a large number of authors would be discriminated since every citation made by any of the authors would be considered a self-citation, even if the citing article was written again together with other authors. In addition, self-citations are usually considered equally distributed among authors in bibliometric studies (Culnan and Swanson 1986; Pilkington and Meredith 2009; White and Griffith 1981). Therefore, we do not control for self-citations.

Bibliometric studies either analyze the *oeuvre* or complete works of authors, that is, citations given to authors (Bayer, Smart, and McLaughlin 1990; Culnan 1987; Hoffman and Holbrook 1993; McCain 1990; White and Griffith 1981; White and McCain 1998) or citations given to single documents/works (Pilkington and Liston-Heyes 1999; Ramos-Rodríguez and Ruíz-Navarro 2004; Small 1973; Small and Griffith 1974). Although both approaches are closely related in their assumptions and techniques (McCain 1990), the analysis of document citations is a more suitable and fine-grained approach for exploring the intellectual base of a discipline (Gmür 2003; Pilkington and Fitzgerald 2006). The unit of analysis is a single work, not an aggregation of works. For this reason, our analysis is based on documents.

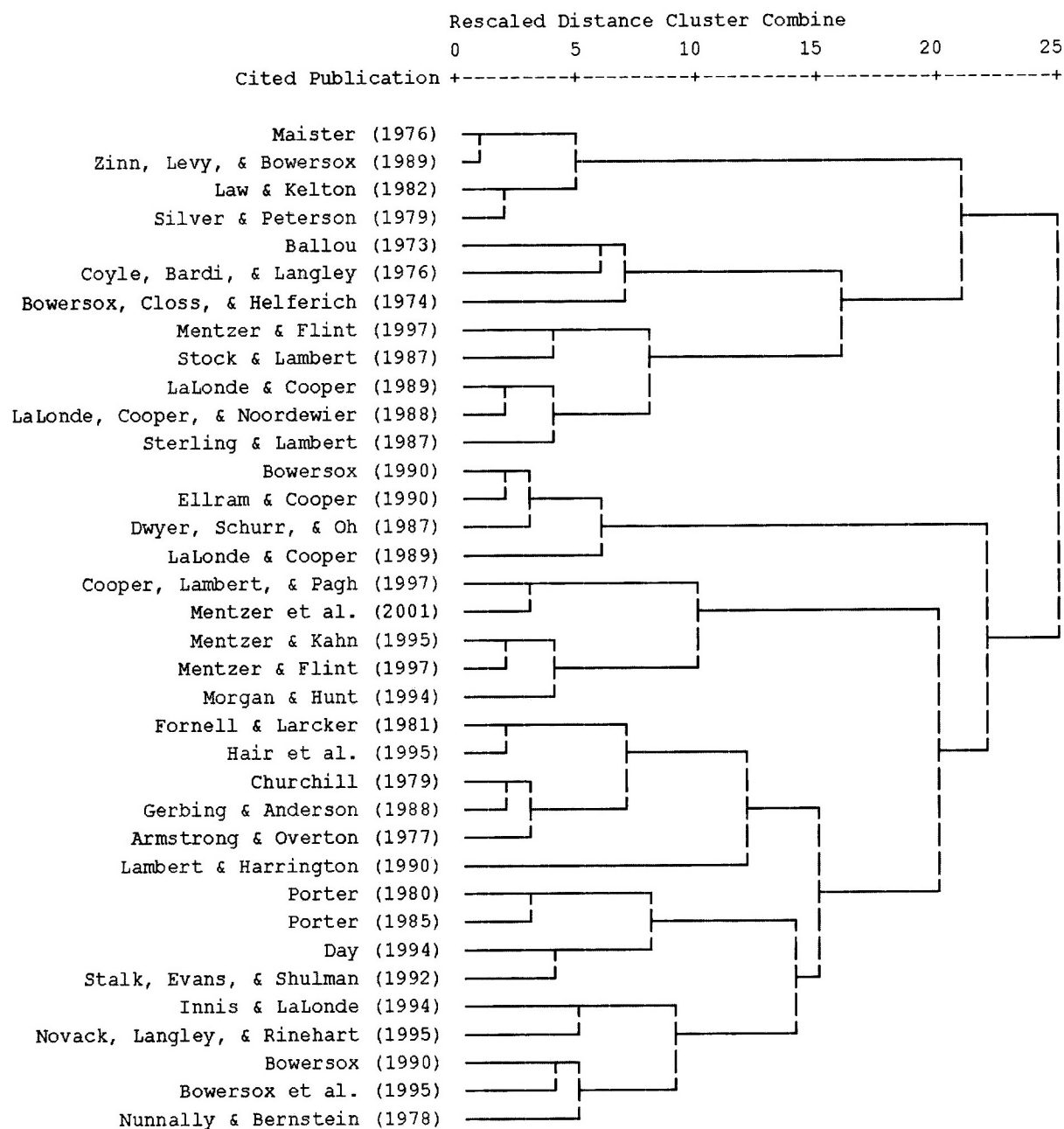
Citation analysis can be classified into two basic methods (Baker 1990; Eom 2003): (1) the study of citation counts; and (2) the study of relationships between cited or citing documents reflecting intellectual linkages. *Citation counts* are analyzed to determine “how many citations have been received by a given document or set of documents over a period of time from a particular set of citing documents” (Smith 1981, p. 85). Citation counts are often used for evaluative purposes (evaluative bibliometrics); that is, to assess the performance of authors, institutions, journals, etc. by means of rankings (Baker 1990) or impact factors (Smith 1981). The study of relationships between cited or citing document is performed by *bibliographic coupling* and/or *co-citation coupling/analysis*. Both approaches are based on the assumption that citations or references can be interpreted as artifacts of (formal or written) scholarly communication (Garfield 1979; Lievrouw 1990; Small 1978). A citation implies that “a relationship between a part or the whole of the cited document and a part of the whole of the citing document” (Smith 1981, p. 83) exists:

If document A cites document B, they are likely to have something in common in terms of specialization. It is also likely that A and B belong to the same field of research if they both cite, or are cited together by, other documents. From these statements it follows that the more references two documents have in common, or the more often they are co-cited, the more similar they are. Then, if we cluster articles on the basis of their similarity, we would find the structure of science, at least a representation of its cognitive organization. (Persson 1994, p. 31)

*Bibliographic coupling* (Kessler 1963, 1965) clusters citing articles in accordance to the number of shared references, whereas *co-citation coupling* (Small 1973; Small and Griffith 1974) measures the frequency with which two documents are cited together (Osareh 1996a). The co-citation strength indicates the degree of relationship or association between papers as perceived by the population of citing authors (Small and Griffith 1974); relationships in bibliographic coupling are established by the authors themselves (Baker 1990; Garfield 1980; Smith 1981). Co-citation coupling is considered the dynamic alternative to bibliographic coupling. The citations given to a (predefined) set of documents may vary over time, whereas the citations made by the (predefined) set of documents do not change. Since co-citation analysis represents judgments made by a population of citing authors concerning the relationship degree of past works, it is used to investigate the intellectual structure of a discipline. Bibliographic coupling, on the other hand, is used to investigate “research fronts” because it analyses the relationships intrinsic to a given set of documents (Jarneving 2005; Persson 1994).

APPENDIX 2

DENDROGRAM OF THE 36 MOST-CITED PUBLICATIONS IN *JBL*, 1978–2007, USING COMPLETE-LINKAGE AS HIERARCHICAL CLUSTERING ALGORITHM



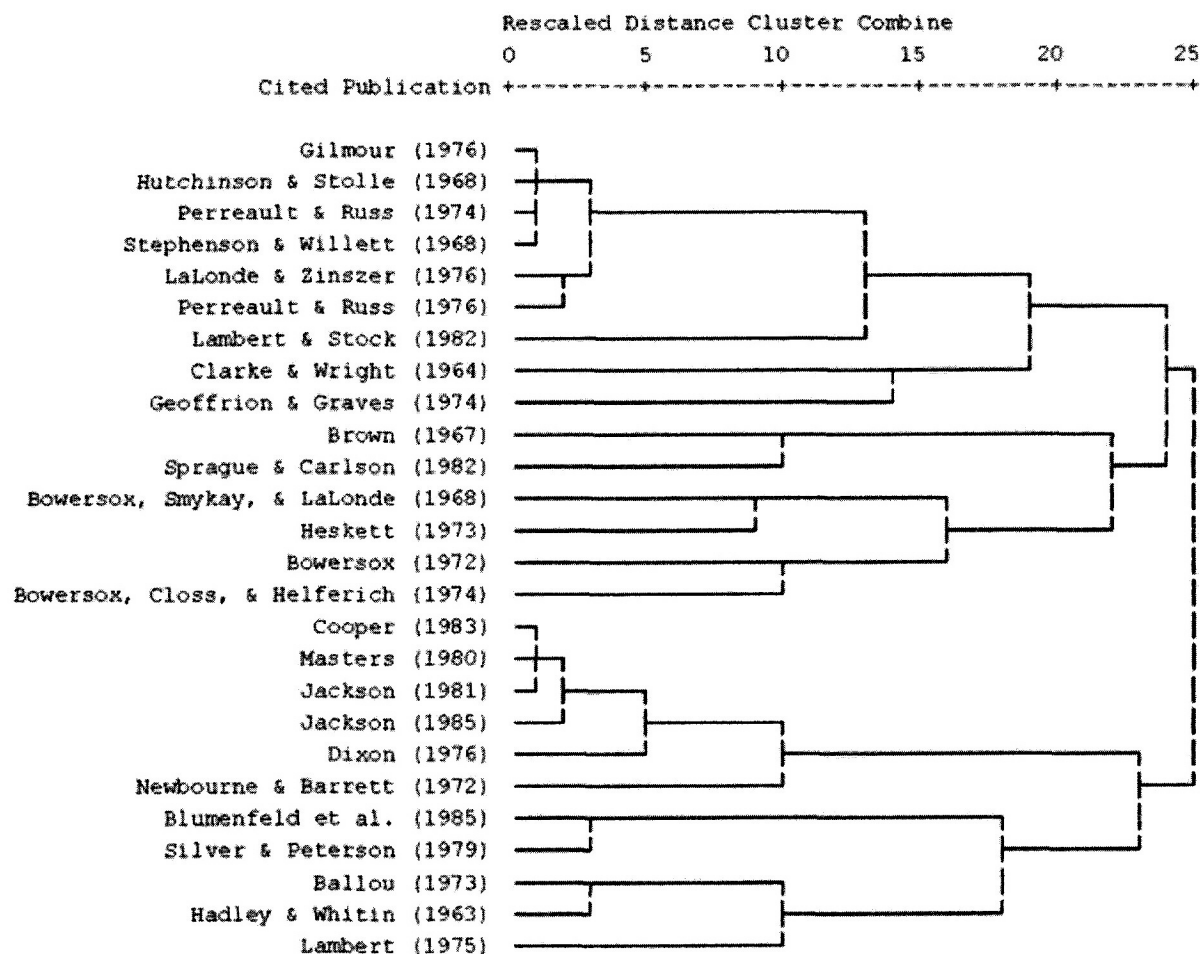
APPENDIX 3

FACTOR ANALYSIS OF THE 36 MOST-CITED PUBLICATIONS IN *JBL*, 1978–2007; LOADINGS HIGHER THAN 0.4 ARE INDICATED

Cited Publication	Factor						
	1	2	3	4	5	6	7
Gerbing and Anderson (1988)	<b>0.904</b>						
Hair et al. (1995)	<b>0.902</b>						
Fornell and Larcker (1981)	<b>0.839</b>						
Armstrong and Overton (1977)	<b>0.794</b>						
Churchill (1979)	<b>0.769</b>						
Day (1994)	<b>0.704</b>				0.540		
Nunnally and Bernstein (1978)	<b>0.557</b>	0.507			0.420		
Lambert and Harrington (1990)	<b>0.469</b>						
Sterling and Lambert (1987)		<b>0.908</b>					
LaLonde, Cooper, and Noordewier (1988)		<b>0.804</b>					
LaLonde and Zinszer (1976)		<b>0.799</b>					
Innis and LaLonde (1994)		<b>0.728</b>			0.554		
Mentzer, Gomes, and Krapfel (1989)		<b>0.717</b>					
Novack, Langley, and Rinehart (1995)		<b>0.692</b>					
Mentzer and Kahn (1995)			<b>0.885</b>				
Morgan and Hunt (1994)			<b>0.842</b>				
Mentzer et al. (2001)			<b>0.837</b>				
Mentzer and Flint (1997)			<b>0.797</b>				
Cooper, Lambert, and Pagh (1997)			<b>0.755</b>				
Ellram and Cooper (1990)				<b>0.935</b>			
Bowersox (1990)				<b>0.922</b>			
Dwyer, Schurr, and Oh (1987)				<b>0.852</b>			
LaLonde and Cooper (1989)				<b>0.79</b>			
Bowersox et al. (1995)		0.469		<b>0.561</b>	0.432		
Porter (1985)					<b>0.935</b>		
Porter (1980)					<b>0.845</b>		
Stalk, Evans, and Shulman (1992)					<b>0.801</b>		
Bowersox (1989)				0.554	<b>0.602</b>		
Maister (1976)						<b>-0.863</b>	
Zinn, Levy, and Bowersox (1989)						<b>-0.804</b>	
Law and Kelton (1982)						<b>-0.742</b>	
Silver and Peterson (1979)						<b>-0.66</b>	
Coyle, Bardi, and Langley (1976)							<b>0.905</b>
Ballou (1973)							<b>0.78</b>
Bowersox, Closs, and Helferich (1974)			0.402				<b>0.706</b>
Stock and Lambert (1987)		0.628					<b>0.679</b>



## APPENDIX 4

DENDROGRAM OF THE 26 MOST-CITED PUBLICATIONS IN *JBL*, 1978-1987, USING COMPLETE-LINKAGE AS HIERARCHICAL CLUSTERING ALGORITHM

APPENDIX 5

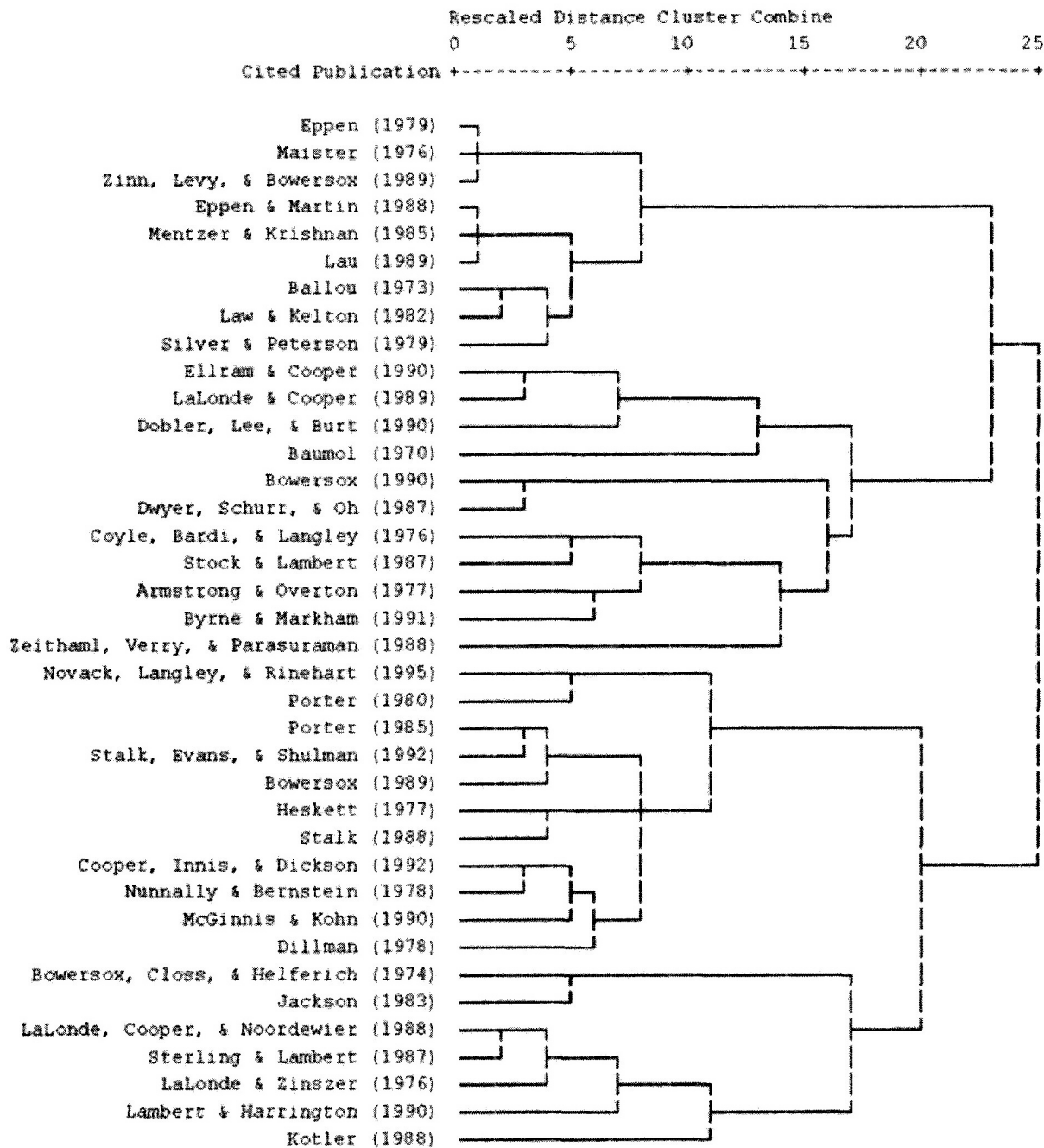
FACTOR ANALYSIS OF THE 26 MOST-CITED PUBLICATIONS IN *JBL*, 1978–1987; LOADINGS HIGHER THAN 0.4 ARE INDICATED

Cited Publication	Factor						
	1	2	3	4	5	6	7
Gilmour et al. (1976)	<b>0.968</b>						
Stephenson and Willett (1968)	<b>0.96</b>						
Hutchinson and Stolle (1968)	<b>0.959</b>						
Perreault and Russ (1974)	<b>0.942</b>						
LaLonde and Zinszer (1976)	<b>0.927</b>						
Perreault and Russ (1976)	<b>0.894</b>						
Lambert and Stock (1982)	<b>0.571</b>		0.431		0.504		
Masters (1980)		<b>0.969</b>					
Cooper (1983)		<b>0.958</b>					
Jackson (1981)		<b>0.932</b>					
Jackson (1985)		<b>0.916</b>					
Dixon (1976)		<b>0.85</b>					
Ballou (1973)			<b>0.86</b>				
Hadley and Whitin (1963)			<b>0.856</b>				
Lambert (1975)			<b>0.771</b>				
Blumenfeld et al. (1985)				<b>0.874</b>			
Silver and Peterson (1979)				<b>0.834</b>			
Bowersox, Closs, and Helferich (1974)					<b>0.795</b>		
Bowersox (1972)					<b>0.768</b>		
Heskett (1973)					<b>0.548</b>		
Sprague and Carlson (1982)						<b>0.752</b>	
Brown (1967)						<b>0.742</b>	
Bowersox, Smykay, and LaLonde (1968)				-0.438		<b>-0.569</b>	
Geoffrion and Graves (1974)							<b>0.916</b>
Newbourne and Barrett (1972)		0.538		0.41			<b>0.563</b>
Clarke and Wright (1964)							<b>0.519</b>



APPENDIX 6

DENDROGRAM OF THE 38 MOST-CITED PUBLICATIONS IN *JBL*, 1988-1997, USING COMPLETE-LINKAGE AS HIERARCHICAL CLUSTERING ALGORITHM





APPENDIX 7

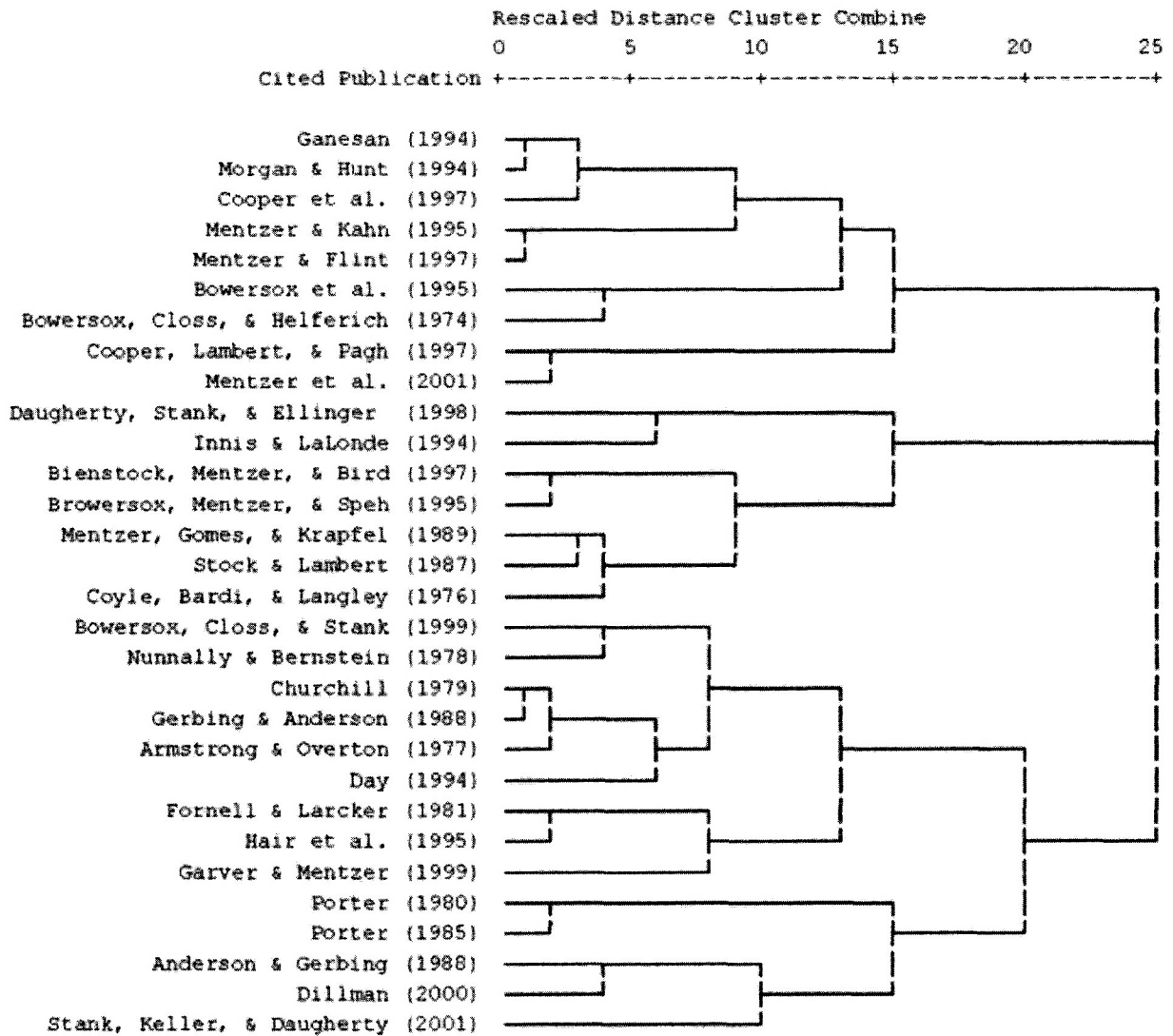
FACTOR ANALYSIS OF THE 38 MOST-CITED PUBLICATIONS IN *JBL*, 1988–1997; LOADINGS HIGHER THAN 0.4 ARE INDICATED

Cited Publication	Factor								
	1	2	3	4	5	6	7	8	9
Nunnally and Bernstein (1978)	<b>0.881</b>								
Stalk (1988)	<b>0.861</b>								
Dillman (1978)	<b>0.82</b>								
Cooper, Innis, and Dickson (1992)	<b>0.813</b>								
McGinnis and Kohn (1990)	<b>0.79</b>								
Stalk, Evans, and Shulman (1992)	<b>0.776</b>							0.45	
Heskett (1977)	<b>0.755</b>								0.401
Porter (1985)	<b>0.746</b>							0.463	
Bowersox (1989)	<b>0.738</b>								
Porter (1980)	<b>0.657</b>						0.454		
Novack, Langley, and Rinehart (1995)	<b>0.538</b>		0.479				0.458		
Mentzer and Krishnan (1985)		<b>0.885</b>							
Eppen and Martin (1988)		<b>0.864</b>							
Law and Kelton (1982)		<b>0.861</b>							
Lau (1989)		<b>0.828</b>							
Ballou (1973)		<b>0.767</b>							
Baumol (1970)		<b>0.679</b>					0.423		
Silver and Peterson (1979)		<b>0.671</b>			0.453				
LaLonde, Cooper, and Noordewier (1988)			<b>0.948</b>						
Sterling and Lambert (1987)			<b>0.938</b>						
LaLonde and Zinszer (1976)			<b>0.863</b>						
Lambert and Harrington (1990)			<b>0.618</b>			0.457			
Byrne and Markham (1991)			<b>0.6</b>					0.445	
Bowersox (1990)				<b>0.952</b>					
Dwyer, Schurr, and Oh (1987)				<b>0.838</b>					
Ellram and Cooper (1990)				<b>0.828</b>					
LaLonde and Cooper (1989)				<b>0.695</b>			0.476		
Maister (1976)					<b>0.867</b>				
Eppen (1979)					<b>0.867</b>				
Zinn, Levy, and Bowersox (1989)		0.416			<b>0.815</b>				
Jackson (1983)						<b>0.907</b>			
Bowersox, Closs, and Helferich (1974)						<b>0.861</b>			
Stock and Lambert (1987)			0.572			<b>0.632</b>			
Dobler, Lee, and Burt (1990)							<b>0.829</b>		
Armstrong and Overton (1977)			0.529				<b>0.588</b>		
Coyle, Bardi, and Langley (1976)						0.492	<b>0.533</b>		0.424
Zeithaml, Berry, and Parasuraman (1988)								<b>0.78</b>	
Kotler (1988)									<b>0.839</b>



APPENDIX 8

DENDROGRAM OF THE 30 MOST-CITED PUBLICATIONS IN *JBL*, 1998–2007, USING COMPLETE-LINKAGE AS HIERARCHICAL CLUSTERING ALGORITHM



APPENDIX 9

FACTOR ANALYSIS OF THE 30 MOST-CITED PUBLICATIONS IN *JBL*, 1998–2007; LOADINGS HIGHER THAN 0.4 ARE INDICATED

Cited Publication	Factor					
	1	2	3	4	5	6
Hair et al. (1995)	<b>0.922</b>					
Churchill (1979)	<b>0.878</b>					
Gerbing and Anderson (1988)	<b>0.872</b>					
Armstrong and Overton (1977)	<b>0.791</b>					
Nunnally and Bernstein (1978)	<b>0.785</b>					
Garver and Mentzer (1999)	<b>0.736</b>	0.448				
Fornell and Larcker (1981)	<b>0.696</b>					
Bowersox, Closs, and Stank (1999)	<b>0.686</b>		-0.414			
Ganesan (1994)		<b>0.893</b>				
Morgan and Hunt (1994)		<b>0.880</b>				
Mentzer and Kahn (1995)		<b>0.862</b>				
Mentzer and Flint (1997)		<b>0.776</b>				
Cooper, Lambert, and Pagh (1997)		<b>0.739</b>		0.490		
Mentzer et al. (2001)		<b>0.665</b>		0.452		
Stock and Lambert (1987)			<b>0.888</b>			
Mentzer, Gomes, and Krapfel (1989)			<b>0.755</b>			0.446
Innis and LaLonde (1994)			<b>0.721</b>		0.478	
Coyle, Bardi, and Langley (1976)			<b>0.691</b>			
Bowersox, Closs, and Helferich (1974)		0.473	<b>0.601</b>	0.508		
Bowersox et al. (1995)			<b>0.559</b>	0.478		
Cooper, Lambert, and Pagh (1997)		0.409		<b>0.715</b>		
Dillman (2000)				<b>-0.688</b>		
Anderson and Gerbing (1988)	0.494			<b>-0.607</b>		
Porter (1985)					<b>0.912</b>	
Porter (1980)					<b>0.841</b>	
Stank, Keller, and Daugherty (2001)					<b>0.586</b>	
Bowersox, Mentzer, and Speh (1995)						<b>0.866</b>
Daugherty, Stank, and Ellinger (1998)				-0.418		<b>0.688</b>
Day (1994)	0.523					<b>0.602</b>
Bienstock, Mentzer, and Bird (1997)		0.448				<b>0.597</b>

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63      **“The Intellectual Foundation of the *Journal of Business Logistics* and its Evolution between 1978 and 2007”**

*Christoph Georgi, Inga-Lena Darkow, and Herbert Kotzab*

Many logistics and supply chain management researchers have so far studied the nature of logistics and supply chain management research in terms of its domain and scope, its epistemological assumptions, and its evolution. However, the knowledge repository on which the scientific research community draws, that is, its intellectual foundation, has not yet been studied. Studying the intellectual foundation of research provides an unbiased and comprehensive picture of the development, dissemination, and utilization of its knowledge. In this article, we identify the most contributive works—in terms of citations received—that have been used in 497 articles published in the *Journal of Business Logistics (JBL)* between 1978 and 2007. By means of citation and co-citation analysis, the intellectual structure of research in *JBL* is revealed and transformations therein are explored. Overall, the most frequently-cited literature can be classified into six themes: physical distribution; inventory models; customer service; interorganizational relationships; competitive strategy; and empirical methodologies for socio-scientific research. Furthermore, we determined a development in citation frequencies to these themes: literature related to physical distribution and inventory management declined over the three decades under study, whereas literature related to competitive strategy and empirical methods gained in importance. This development indicates a shift from an operational focus to a prioritization of managerial issues. Moreover, our results demonstrate a shift towards more relational and institutional research in logistics (management), which has been typically linked with the notion of supply chain management since the 1990's.

**Key Words:** Bibliometric maps; Citation analysis; Evolution; Intellectual foundation; *Journal of Business Logistics*

111      **“Individual and Environmental Impacts on Supply Chain Inventory Management: An Experimental Investigation of Information Availability and Procedural Rationality”**

*Russell Haines, Jill R. Hough, and Douglas Haines*

Some strategies for mitigating ordering inefficiencies in supply chains advise sharing information among decision-makers. However, there has been little consideration of how individual perceptions intervene in the use of available information in decision-making processes. This article reports the results of an experiment in which participants were instructed to minimize inventory holding and backlog costs for their supply chains as a whole. The analysis suggests that additional information affects supply chain inventory management costs only when rational decision-making processes are followed. Decreased costs are observed when rational decision-making is applied with backlog information. In contrast, increased costs are observed when consumer demand information is available.

**Key Words:** Bullwhip effect; Individual perceptions; Information availability; Inventory management; Laboratory experiment