SUPPLY CHAIN MANAGEMENT: A MULTIDISCIPLINARY CONTENT

ANALYSIS OF VERTICAL RELATIONS BETWEEN COMPANIES, 1997-2006

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RESEARCH HIGHLIGHTS

• Analysis of the evolution and actual trends of research in Supply Chain Management
• Review of the multidisciplinary academic research conducted on vertical relations
• Main international journals over the period 1997-2006
• The study reveals the level of development of the main lines of research into SCM
• Detect the topics that require greater attention (future studies) in SCM
ABSTRACT

The aim of this work is to contribute to a better understanding of the research conducted on Supply Chain Management (SCM) at a multidisciplinary level. To this end, a content analysis was performed of the most significant scientific literature about marketing, logistics, management and marketing channels published over the period 1997-2006. As a result, a database of 414 papers from 14 journals was created. Analysis of these works reveals the level of development of the main lines of research into SCM and makes it possible to detect the topics that require greater attention and which may be the object of future studies conducted by researchers and academics. It also allows managerial staff to identify the methodologies and tools that can be used to improve the management of relationships within the supply chain. One of the main conclusions reached in the study is the shortage of studies conducted on the supply chain as a network of enterprises, since most research focuses on a single enterprise or, at the most, on its relationships with its suppliers or direct customers.

KEYWORDS

Vertical relations between companies, supply chain management, content analysis, marketing channels, relationship marketing.
INTRODUCTION AND AIMS

Supply chain management (SCM) can be defined as the “systematic and strategic coordination of the traditional business functions within a particular company and across businesses within the supply chain, with the aim of improving the long-term performance of the individual companies and the supply chain as a whole” (Mentzer, et. al. 2001). The implementation of SCM requires different companies to stop attempting to improve their own processes independently, as has been done up until now, in order to achieve a global benefit (Bagchi & Skjoett-Larsen 2005). The coordination and the relationships established among enterprises within the supply chain (vertical relations) can offer competitive advantages, either by cutting costs or by adding value for customers (Cooper, et. al. 1997; Lambert, et. al. 1998). The aim of this work was to conduct a content analysis in order to gain a better understanding of the research conducted on vertical relations in the supply chain. As a first step in our research, the following questions must be answered: What is understood by the term vertical relations among enterprises? What approaches or disciplines have they been studied from? What literature reviews have been carried out on this topic in the past? And lastly, what contribution could this work make?

Our concept of vertical relations is based on the four characteristics of SCM defined by Cooper, et. al. (1997), that is, breadth, relationships, structure, and results. According to this author: 1) Breadth of the chain: This evolves through several stages of increasing intra- and inter-organizational integration and coordination, and, in its broadest sense and implementation, it spans the entire chain from the initial source (e.g., the supplier's supplier) to the ultimate consumer (e.g., the customer's customer); 2) Relationships: This potentially involves many independent organizations and, thus, managing intra- and inter-organizational relationships is of vital importance; 3) Structure of the chain: This includes the bi-directional

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1 Croom, et. al. (2000) and Mentzer, et. al. (2001) include a sample of definitions of supply chain management.
flow of products (materials and services) and information, and the associated managerial and operational activities; 4) Results obtained: This seeks to fulfill the goals of providing high customer value with an appropriate use of resources, and of creating competitive advantages. On the other hand, the definition of vertical relations is completed by adding the different types of interaction among enterprises belonging to a supply chain, which, according to Easton & Araujo (1992), can be: 1) Economic (exchange of goods and services between organizations); 2) Technical (share or exchange technical equipment between organizations); 3) Planning (planning and coordination of activities between different organizations); 4) Information and knowledge (flow of information and knowledge between organizations); 5) Legal (legal bonds in the form of contracts and agreements); and 6) Social (behavioral processes that take place between the parties).

Secondly, several different approaches have been followed in the study of these relationships, which illustrates the multidisciplinary nature of SCM. Croom, et. al. (2000) include up to eleven different areas associated with the study of relationships that occur in SCM, namely: 1) Purchases and supply; 2) Logistics and transport; 3) Marketing; 4) Organizational behavior, industrial organization, economy of transaction costs, and contract theory; 5) Contingency theory; 6) Institutional sociology; 7) System engineering; 8) Network theory; 9) Literature on best practices; 10) Strategic management; and, 11) Economic development.

Thirdly, several previous works have used content analysis to study the research carried out on the supply chain. Most content analyses have been used to detect the methodology and scientific level of the supply chain as a discipline and were based on the analysis of leading journals. Dunn, et. al. (1993), for example, reviewed four journals (Journal of Business Logistics; Transportation Journal; International Journal of Purchasing and Material Management; Logistics and Transportation Review) for a five-year period (1988-1992) in order to detect the use of quantitative versus qualitative techniques. Mentzer & Kahn (1995)

Another group of authors performed a content analysis with the aim of determining the influences of other disciplines on the supply chain. Thus, Stock (1997) analyzed four journals (*The International Journal of Logistics Management; International Journal of Physical Distribution & Logistics Management; Journal of Business Logistics; Transportation Journal*) from 1980 to 1996, searching for theories from other disciplines which have been implemented in logistics. Croom *et al.* (2000) used a database of articles (the Procite Database) to classify the articles according to two criteria: content and methodology. They claimed that a database was used instead of choosing several journals because of the multidisciplinary nature of the concept of supply chain.

Thus, and given the large number of literature reviews that have been carried out on SCM, what differences does this work intend to offer? From an analysis of these studies, a gap was found in this research: 1) Firstly, a lack of multidisciplinary content was observed in the
content analyses using journals from different disciplines in the study of vertical relations between companies. Most prior analyses have been performed from a single discipline, logistics, without taking into account the multidisciplinary nature of areas like marketing, management or marketing channels; 2) Secondly, most approaches focus on studying HOW (methodology) instead of WHAT (the content of the research or the lines of research being conducted), which does not make it possible to establish new lines of research for researchers or areas of greater knowledge and application for managerial staff. This study attempts to fill this twofold gap.

The main goal of this work was therefore to conduct an in-depth study on the state of academic research, as well as to suggest new lines of research, into the vertical relations between companies in SCM. With this end in mind, our intention was to review recent contributions in the main international scientific journals on marketing, logistics, management and marketing channels using the content analysis technique. The papers selected were studied from two standpoints: their content, by means of the lines of research to which they are related, and the methodology used.

The results of our work can make future research investments more productive for both academics and managers. Reviewing published research is one of the most useful and relevant approaches for evaluating the accrued knowledge within a field. Although time consuming and data intensive, journal content analyses can mark a discipline's progress, while simultaneously providing direction into future areas of needed inquiry (Williams & Plouffe 2007). Thus, on the one hand, researchers could know the level of development of the different fields of research that address vertical relations among enterprises. This would enable them to detect the topics that deserve greater attention and, as a result, to work on possible future lines of research. On the other hand, the managerial staff of the enterprises would have access to up-to-date information that would enable them to identify
methodologies and tools that can be used to improve the vertical relations among enterprises and use them as a source of competitive advantage.

This study is structured as follows: first, a brief description of the content analysis instrument and the application of this methodology in this study are developed. In the second section, the main results are identified, and finally general conclusions are drawn and the limitations of this study and future lines of research are discussed.

METHODOLOGY

Content analysis is an observational research method that is used to systematically evaluate the symbolic content of all forms of recorded communication. It possesses some advantages: it is sensitive to the context from which the information is obtained; it is an unobtrusive source of data; and it provides an empirical starting point for generating new research evidence (Kolbe & Burnett, 1991).

In order to perform the content analysis scientifically, the instructions proposed by Kassarjian (1977) and Kolbe & Burnett (1991) were followed. Figure 1 shows the different phases of this methodology and their application to this study. In order to reduce the level of subjectivity in the second, third and fourth phases (choice of sample, units of analysis and categories), we enlisted the help of a panel of experts in SCM. These experts helped us to choose the different journals and keywords. The panel of seven members was chosen from among experts in supply chain management and marketing channels who agreed to take part, by means of the Delphi method, with the aim of making the content analysis more operative. They were provided with a list of journals, keywords and lines of research, drawn from previous literature on the subject, and an iterative process was used to achieve the final lists (journals, keywords, and lines of research).

INSERT FIGURE 1 ABOUT HERE
Research Question: What is the research conducted on SCM and vertical relations between companies?

Sampling. Sample selection consists in deciding on the source of documents to be chosen and the time period. Sampling is limited to published papers on vertical relations between companies found in fourteen major peer-reviewed journals between the period 1997 - 2006. While a review of international refereed journals does not capture all the research in a field, these sources are a good indication of the norms that prevail, given the “gatekeeping” function of the peer review system (Piekkari, et. al. 2010: 111). With respect to the selection of journals, two approaches for ranking them can be used, according to their degree of importance: the analysis of citations, and expert surveys. In citation analysis, the focus is on the number of times a specific journal article has been cited as a source in other publications. The main advantage of this method is its objectivity. In contrast, expert surveys use the subjective perception of the articles in a specific field. The most common method is to send a questionnaire to a panel of experts and analyze their responses in order to rank the journals. The main advantage of this is that the use of experts ensures that knowledge is collected from the top journals in a field. Its main drawback is, however, its subjectivity. This second method was used here to examine the index ratings of the main journals on marketing (Hult, et. al. 1997), logistics (Gibson & Hanna 2003) and marketing channels (Runyan 2008), as well as those studies that analyze the multidisciplinary publication preferences of researchers working on SCM (Ferguson 1983; Fawcett, et. al. 1995; Phillips & Phillips 1998; Kumar & Kwon 2004; Zsidisin, et. al. 2007). Appendix I offers a table with the journals proposed by these last authors. Based on these ratings and in view of the goals of this study and the opinions of the panel of experts, 14 leading double-blind refereed journals in the subject areas of marketing, logistics, management and marketing channels were selected for analysis. It comprised a
heterogeneous sample made up of general journals (e.g., JM, DSJ, SMJ, MS), specialized journals (e.g., JR, IRRDCR, JBIM, IJLM), with ISI Journal Impact Factor (e.g., IMM, SCMJ), and with Google Scholar H-Index for journals (e.g., EJM, IJPDLM, IJRDM, JBIM). The final list can be seen in Table 1.

Moreover, we considered a 10-year period (1997 to 2006) to be appropriate. The same time span is common in methodological reviews (e.g., Scandura & Williams 2000; Chandler & Lyons 2001; Yang, Wang & Su 2006; Hanson & Grimmer 2007; Piekkari, et. al. 2010), and has the advantage of providing sufficient breadth to capture disciplinary practices within a scholarly community (Piekkari, et. al. 2010: 111).

Unit of analysis. The whole article was chosen as the unit of analysis. In view of the multidisciplinary content of vertical relations between companies, we used a number of keywords that had to appear in the title or abstract. The list of keywords provided by the panel of experts was used to choose the six keywords that were finally employed to select the papers, these being: channel relationships, supply chain management, seller-buyer relationships, vertical integration, collaboration, and relationships between companies. In an initial phase of this research we manually reviewed each paper with these keywords in order to identify articles for inclusion in the analysis. Consistent with the approach followed in previous research (Swan, et. al. 1991; Williams & Plouffe 2007), a small number of publication entries (editorials and articles proposing specific techniques for resolving problems in the supply chain, e.g., the calculation of the number of optimal warehouses or the most appropriate transport routes) were excluded. This resulted in 414 articles being selected (see Table 1), the

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2 Harzing & Van der Wal (2008) conclude that in the field of Economics and Business, the Google scholar-based H-index provides a better alternative for journal rankings than the ISI Journal Impact Factor.
largest percentage being from the logistics area (60.90%), although a quarter of the studies were from the area of marketing.

**Categories of analysis.** We analyzed each article according to the following dimensions: WHAT (lines of research) and HOW (methodology used). In order to code the content of the articles, we first developed an initial list of major lines of research based on previous work that provided different topics, trends, agendas, and lines of research on the supply chain (Croom, *et al.* 2000; Mentzer, *et al.* 2000; Lambert & Cooper 2000; Lancioni 2000; Alvarado & Kotzab 2001; Mentzer, *et al.* 2001; Kemppainen & Vepsalainen 2003; Alfaro, *et al.* 2002; Chandra 2006). After iteratively sorting the individual lines and regrouping them into coherent groups, the panel of experts finally proposed five mutually exclusive lines of research: THEORY, SOURCE, STRUCTURE, RELATIONSHIPS and VIRTUAL (see Table 2).

INSERT TABLE 2 ABOUT HERE

We coded the methodology of each article into two groups, single and multiple classifications, according to the following ten categories. A) Single classification (the categories are mutually exclusive and the unit would be assigned to only one category, the one it “fits best”): type of work (conceptual or empirical), sources of information used (primary and/or secondary), type of information (qualitative and/or quantitative), objective (descriptive or explanatory-predictive), time period (longitudinal or cross-sectional approach) and geographical area (local, national or international). B) Multiple classification (unit may be assigned to more than one option): sampling unit (manufacturer, supplier, distributor, other agents), type of research (surveys, simulation, interviews, cases, mathematical models, conceptual models, other qualitative, experimentation, archival/secondary data, focus group, literature review, content analysis and others) statistical techniques used (descriptive statistics, independence tests, regression, logit model, factorial, cluster, discriminant, correlations, scale reliability, structural
equations, anova-manova, conjoint analysis, time series, mathematical development, other techniques) and activity sector (food, ceramics, textile/footwear, furniture, electronics, technology, logistics operators, automobile, other sectors, various sectors). A set of classification rules were designed, and the eleven categories (what and how) and the assignation procedures were defined.

Pre-test. A pre-test was performed to measure the reliability of the categories and the classification rules. A group of doctoral degree students were chosen from a course on market research methodology, instructed in the use of the categories and the classification rules, and assigned 10% of the items to be codified (40 items). When their doubts were solved, the solution was incorporated into the classification rules. The authors classified the same items and the degree of coincidence between the two parts was measured and found to be satisfactory.

Collect data and reliability. Once the coding scheme had been refined, the 414 selected papers were coded. Reliability analysis was conducted to determine whether the lines of research could be placed within the same options by independent judges. Working independently, two raters (authors) assigned the line of research of each article to one of the five options that best described its content. Each article received one research line code, which represented the primary research line of the article. Agreement level between the two judges was calculated and the percentage of agreement (number of articles assigned to a same line of research by both raters) was found to be 89%, which is higher than the 85% proposed by Kassarjian (1977). In the case of disagreements, the authors discussed the specific article category until an agreement was reached (Williams & Plouffe 2007). If this was not possible, a decision was made by the senior author.
ANALYSIS OF RESULTS

Following are the results of the content analysis discussed in terms of lines of research and methodology.

What: Content by Lines of Research

The first line of research, identified as THEORY, includes articles that constitute a state of the art review. Specifically, this refers to conceptual articles that include literature reviews and which present research agendas or trends in that field, classifications and typologies, and reflections. This block includes articles that are conceptual or that, at most, use statistics about the relationships in a field. It also includes theoretical articles that model relationships but without any empirical studies to back them up. Our database includes 73 articles that study the different multidisciplinary viewpoints existing for the analysis of inter-organizational relationships, relationships in the marketing channel, vertical integration, how the commercial forms evolve to adapt to the new types of inter-organizational relationships, how logistics and their trends influence the management of relationships, and how added value is created through relationships in the supply chain (see Table 2).

The second line of research, SOURCE, encompasses antecedents and variables that moderate the relationships between companies. Antecedents are understood to include those internal elements that companies should have in order to be able to develop or inhibit a relationship with another company (management support, perceptions of managers, etc.). Moderators are environmental elements that may influence the creation/destruction of the relationship, such as demand, technology, competition, the environment or legislation. An example could be how new technologies (moderators) influence relationships in the supply chain. Based on the content analysis, 59 articles were included in this block. These articles study antecedents in the management of the supply chain (interdependence, trust, support of the company management) that favor the marketing of relationships in the channel, cooperation, the
distribution policy, inverse logistics, and the adoption of an innovation in the channel. They also deal with the influence of surrounding technological, legal, economic or environmental factors on the inter-organizational relationships and the general consequences thereof (see Table 2).

Thirdly, STRUCTURE is a line of research that includes all work addressing the design, implementation and evaluation of the supply chain. It refers to organizational elements (structure) and how they are coordinated in the relationship between companies, as well as the (quantitative or qualitative) results obtained. It also includes relationship design elements (resources, activities and actors, planning and control methods, elements to initiate, maintain, and end the relationship) and elements for the implementation and development of the relationship (integration, exchange of information, coordination, realignment of roles and responsibilities, outsourcing, etc.), as well as assessment and control measures that operate by establishing metrics that measure the efficiency, effectiveness, and quantitative and qualitative results obtained (benefits, cost reduction or improvement of operating results: service, flexibility, time and quality). Altogether 112 articles were identified as part of this group, and they can be classified as follows: 1) Design of the relationship: resources used, type of agreement, coordination of physical elements in the chain, choice of partners, functions to be carried out by those forming part of the chain, setting of prices, activities to measure the integration, and examples of the design of a supply chain; 2) Realignment of roles in the supply chain by means of coordination between the manufacturer and distributor or trade marketing, influence according to the level, and structure of the channels; 3) Growth strategies: factors to achieve vertical integration or to outsource or grow horizontally; 4) Structural elements of the implementation of the relationship, such as leadership, cooperation, dependence, flexibility, the exchange of information to generate share capital or the exchange of knowledge; and 5) Influence of the integration on results (see Table 2).
The fourth line, RELATIONSHIPS, includes those studies that refer to the behavioral elements of the relationships between companies, such as dependence, proximity, power, influence, conflict, cooperation, trust, risk, reward or satisfaction. It also encompasses measurement of the relationship by establishing systems of rules and assessment with respect to the aims to be met by the parties, compatibility of aims, centralization of decision making, extent of interactions in the channel, location of authority in the dyadic relationship, division of the tasks to be performed, commitment to leadership, formalization of activities, consensus in the domain, compliance assessment, and exchange standards. In this study, 132 articles were included in this block and they were classified into three sections: 1) Elements of the relationship: dependence, power, negotiation, conflict, cooperation, trust; 2) Consequences of the relationship: economic and non-economic results, relational outcomes, satisfaction in the channel, and end-customer satisfaction; and 3) Proposed layout of the study of the relationship (see Table 2).

Lastly, VIRTUAL includes articles that study the vertical relations between companies using different means (Internet, intranets, extranets) in different areas: purchases, transport, processing of orders, customer service, programming of production or any relationship between companies. In this section, only articles that study the influence of the adoption of an innovation on relationships in the channel were taken into account, and those that were simply presentations of new technologies were eliminated. This block includes 38 articles that analyzed the influence of EDI (Electronic Data Interchange), ECR (Efficient Consumer Response) and e-business on relationships in the marketing channel (see Table 2).

An analysis of the number of papers included in each of the lines proposed here shows that the lines of RELATIONSHIPS and STRUCTURE account for 59% of the studies analyzed, the line of THEORY ranking third in number and VIRTUAL being the least numerous.
Table 3 below provides a detailed list of the studies analyzed from each of the lines of research considered. Appendix II includes a complete list of references for these studies.

After analyzing the contents of the lines of research, their evolution over time was determined (see Table 4). Upon observing the changes in the lines of research over time, it could be concluded that there was no significant association between the lines of research and time variables (Cramer’s $V = 0.17$, Sig. $= 0.09^3$), i.e., there were no lines whose significance increased or decreased over time.

How: Research Methodology and Features by Lines of Research

An additional analysis was performed to determine whether or not there was a relationship between the lines of research to which the studies correspond and the methodologies used. This was carried out using key aspects such as type of work, information sources, type of information, objective, time frame, geographical area, sampling unit, type of research, statistical techniques, and the activity sector. Following is a breakdown of the methodological aspects of the research work included in the study, on which an analysis was performed based on the line of research (see Table 5a and 5b). Additionally, the data were compared with those obtained in previous content analyses (see Table 6) by Sachan & Datta (2005), Spens & Kovacs (2006), Mentzer & Kahn (1995), and Frankel, et. al. (2005).

The results showed (see Table 5a), firstly, that for the whole of the research in general, there were more empirical (69.1%) than conceptual studies (30.9%) in the period considered. Likewise, it can be observed that there is a significant association between lines of research and type of work (Cramer’s $V = 0.6$, Sig. $< 0.01$). Hence, with respect to lines of research, it

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3 If the Sig. $< 0.05$ in Cramer's $V$ test, the null hypothesis is rejected and there is a relationship between the variables. Cramer’s $V$ varies between 0 and 1. The higher the value is, the greater the association is.
was found that conceptual studies dominated the line of research THEORY, which focused on state of the art reviews, literature reviews, and so forth, whereas the rest of the lines of research (SOURCE, STRUCTURE, VIRTUAL and especially RELATIONSHIPS) were mostly studied empirically.

Secondly, it is noteworthy that, overall, in studies of an empirical nature, primary information was used more frequently (56.3%) than secondary information (39.2%), while 4.5% of the studies analyzed used both (see Table 5a). There were, however, significant differences in terms of the line of research followed in the works (Cramer’s V = 0.35, Sig. < 0.01). Thus, it should be highlighted that THEORY was the line with the highest proportion of use of primary sources and of joint use of primary and secondary sources. Furthermore, primary information was used in a greater proportion in the case of RELATIONSHIPS, and secondary information in the case of SOURCE.

As for the quantitative or qualitative nature of the information used in the empirical studies, it is worth noting the generally more frequent use of quantitative information (62%) as opposed to qualitative information (28%), while 9.8% of the studies used both types of information (see Table 5a). On comparing this data with previous studies (see Table 6), the dominance of quantitative studies over qualitative studies was observed, although a smaller difference was found by Sachan & Datta (2005) and a greater difference was noted by Spens & Kovacs (2006). In this study, significant differences were observed (see Table 5a), depending on the lines of research analyzed (Cramer’s V = 0.35, Sig. < 0.01), with a greater use of both types of information in the line RELATIONSHIPS, and a predominance of quantitative information in the THEORY and VIRTUAL lines and of qualitative information in the SOURCE line.

With regard to the type of objective of the research in empirical studies (descriptive or explanatory-predictive), an important predominance of explanatory-predictive studies (95.8%) over descriptive studies (4.2%) was observed, with the existence of differences according to
the line of research considered (Cramer’s V = 0.44, Sig. < 0.01) (see Table 5a). In the case of the VIRTUAL and THEORY lines, there were no empirical-descriptive studies.

Generally, the period of time in which the research was carried out was 81.5% cross-sectional with 18.5% longitudinal (see Table 5a). Cross-sectional studies were predominant in all lines of research, but on comparing between lines there was a higher percentage of longitudinal studies in THEORY and a higher percentage of cross-sectional studies in RELATIONSHIPS (Cramer’s V = 0.44, Sig. < 0.01).

The geographical area in which the research was carried out was mainly national 68.5%, with only 26.6% being international, and 4.9% local (see Table 5a). Analysis by line of research indicates that there are significant differences between them (Cramer’s V = 0.35, Sig. < 0.01) with a higher percentage being of an international scope in VIRTUAL, a national scope in THEORY, and a local scope in RELATIONSHIPS.

As for the criterion of the sampling unit of the research (see Table 5a), the results showed that, in general terms, manufacturing samples (53.9%), distributor samples (21.7%) and supplier samples (19.5%) were the most frequently used in the research work. Additionally, this proportion was maintained in the different lines of research (Cramer’s V = 0.13, Sig. = 0.34). To compare the unit of analysis with those identified by Sachan & Datta (2005), the sampling unit data in Table 5a were transformed using the data from Table 6. This involved grouping the studies that analyzed the relationships using a single sampling unit (manufacturer, distributor or supplier) in “Company”; those that used two sampling units (seller-buyer, regardless of whether they are supplier-manufacturer or manufacturer-distributor) were grouped under “Dyad”; three sampling units were included in “Chain”; and in the case of more than three sampling units, they were grouped under “Network”. The results show that
most analyses focused on one company, which was questioned about its relationship with other members (44.7% in this study as opposed to 56% in the study performed by Sachan and Datta, 2005). Mention should be made of the 18% of studies conducted on chains (three members) and 4% on networks (more than three members) in the research performed by Sachan and Datta, since the percentages found in this study were lower.

With respect to the type of research used in the studies analyzed (see Table 5b), the most common were surveys (26.2%), literature reviews (22.6%), and case studies (17%). Additionally, differences were found as regards the line of research followed by the studies (Cramer’s V = 0.34, Sig. < 0.01). THEORY used a higher proportion of literature reviews; SOURCE and STRUCTURE stood out for their use of cases; RELATIONSHIP conducted surveys, and used archival/secondary data, and VIRTUAL performed mainly literature reviews and surveys.

On comparing this work with studies carried out by other authors (see Table 6), there are several points that are worth noting. These include the greater use of surveys in the research by Sachan & Datta (2005), Mentzer & Kahn (1995) and Frankel, et. al. (2005), the higher proportion of interviews in the content analysis performed by Mentzer & Kahn (1995), the higher percentage of conceptual models in the study by Frankel, et. al. (2005), and the increased proportion of mathematical models in the study by Sachan & Datta (2005) as compared to those identified in our work. On the other hand, however, a higher number of case studies were used in the articles examined in our analysis than in Mentzer & Kahn (1995) and Frankel, et. al. (2005).

The statistical techniques that were most commonly used in all of the studies analyzed (see Table 5b) are as follows: descriptive statistics (43.5%), regression analysis (14.9%), and correlations (11.5%), whereas the least used were independence tests, logit model, discriminant analyses, conjoint analysis, time series and mathematical development, with
percentages of less than 1%. The results indicated that a significant association can be observed between the topics or lines of research and the statistical techniques used (Cramer’s V = 0.26, Sig. < 0.01). THEORY is characterized by descriptive statistics and mathematical development; SOURCE by regression, scale reliability and structural equations; STRUCTURE by correlations; RELATIONSHIPS by descriptive statistics; and VIRTUAL by descriptive statistics and factorial analysis.

Previous content analyses have also studied statistical techniques (see Table 6). In this regard, two aspects worth mentioning are the greater use of descriptive statistics in the study by Mentzer & Kahn (1995) and an increased use of factor analysis and structural equations in the study by Sachan & Datta (2005), as compared to the results of our study. Yet, the use of correlations is higher in our research.

Lastly, an analysis of the activity sectors used in the studies (see Table 5b) showed that, overall, the group of studies focused mainly on the logistics operator (22%) and food (17.9%) sectors, and that there was a statistically significant association between topics and sectors (Cramer’s V = 0.2, Sig. = 0.05). In the case of THEORY, research work was related to the food, ceramics, logistic operators, and automobile sectors; SOURCE had a higher proportion of work on the electronics sector; STRUCTURE focused on food, electronics and automobiles; in the case of RELATIONSHIPS, work was related to logistics operators; and the VIRTUAL line dealt with logistics operators, technology, and automobiles. Furthermore, in SOURCE and THEORY there was a higher proportion of research work studying several sectors at the same time.

INSERT TABLE 5b ABOUT HERE

INSERT TABLE 6 ABOUT HERE
CONCLUSIONS

Conceptual conclusions

SCM has generated a significant body of knowledge in recent decades. In this study we performed a multidisciplinary diagnosis of the state of research on this field over a 10-year period (1997-2006). The 414 articles from 14 scientific publications reviewed in this content analysis were considered to be a representative sample of the growing amount of knowledge being obtained about SCM. This knowledge is relevant to many stakeholders – those interested in SCM research or in industrial marketing, and others within and beyond the academy.

The main findings of our content analysis were framed in terms of the methodology of the five lines of research that were identified: THEORY, SOURCE, STRUCTURE, RELATIONSHIPS and VIRTUAL, and on comparison with previous works. The works that were analyzed share the characteristics of being empirical, using primary sources, and having a quantitative nature, as well as being objective, explanatory-predictive, cross-sectional, and conducted at a national level. The types of research that are most frequently used (above 10%) are surveys, case studies, archival/secondary data, and literature reviews. The most common techniques were descriptive statistics, regression and correlation analysis, and the sectors that received most attention were logistics operators, food, electronics, and technology. The differences between the five lines were significant, however, each of them standing out for a different methodological feature.

The studies from the THEORY line are descriptions and classifications of the theory on vertical relations. They are characterized by having a higher proportion of conceptual works, studies employing both primary and secondary sources at the same time, quantitative information, not utilizing empirical-descriptive analyses, and displaying a greater presence of
longitudinal and nationwide studies than the other lines. With regard to the types of research, the most predominant are conceptual models, literature review, and content analysis. Mathematical development is, together with descriptive statistics, the most frequently used statistical technique. The sectors with a higher proportion of studies in this line than the others are food, ceramics and automobiles.

From the second line, SOURCE, studies were taken that include different internal factors (antecedents) and external factors (moderators) that exert an influence on vertical relations. It is characterized by having a higher proportion of works that use of secondary sources, qualitative information, descriptive objectives, simulation, experimentation, and group dynamics. The most widely used statistical techniques in this line are regression, logit models, discriminant analysis, scale reliability, structural equations, and conjoint analysis. The sectors with a higher proportion of studies in this line are electronics and the study of several sectors at the same time.

The STRUCTURE line includes all the studies conducted on the design, implementation and assessment of vertical relations in the supply chain from an organizational perspective. It is characterized by having a higher proportion of case studies, mathematical models and the use of cluster and correlation analysis.

The fourth line, RELATIONSHIPS, is the most numerous and includes the study of behavioral elements of the relationship, their consequences and proposals for general models for the study of vertical relations. It is characterized by having a higher proportion of empirical studies, both quantitative and qualitative information, and cross-sectional and local studies. The predominant types of research are surveys, interviews, and archival/secondary data. It is the only line where time series have appeared and in which the activity sector that predominates over the other lines is furniture.
The last line, VIRTUAL, is the line that provides the most opportunities for the growth of research, since up to now, given its novelty, an important effort has been made to describe the different technological contributions that increase inter-organizational collaboration. It is characterized by a higher proportion of quantitative information, an explanatory-predictive objective, and an international geographical area. The statistical techniques that stand out in it are independence tests, factor analysis, and anova-manova. Lastly it focuses on logistics operators, technology, and textile-footwear.

Finally, on comparing the methodology used in the selected studies with various previous content analyses, the following conclusions were reached: 1) quantitative studies continue to predominate over qualitative studies.; 2) the use of surveys as the main research method continues to be important although the combined total of case methods and interviews is gaining ground; 3) the tendency to use multi-method or triangulation techniques is increasing (Mangan, et. al. 2004), which involves the combination of quantitative and qualitative methods to build theory; and 4) with respect to the level of analysis, in the literature on SCM what is studied is mainly the individual firm, rather than the Supply Chain itself or the networks formed within it.

Managerial implications

Notwithstanding its limitations and its more theoretical approach, this paper provides insights for managers and practitioners that may help them contemplate the role and content of SCM. First, our study provides an overview of the current state of research on SCM, giving managers a guide to review the latest developments in the field. In this respect, this work can be considered a roadmap to compare company practices with the findings from a broad array of SCM research.
Managers could know what the current trends and research agendas are by reading articles from the first line (THEORY). They can then compare them with their own firm to see what internal or external elements should have an influence on their results by examining the works contained in the line SOURCE. They can develop their SCM with respect to others that have previously been studied, by comparing them with the studies included in the line STRUCTURE. The line RELATIONSHIPS can be consulted to determine whether the relationships studied in the SCM have the same outcomes as in their enterprise. Finally, they can see what innovations are exerting an influence on the results of the firms and whether they could also be adopted by their enterprise, by analyzing the studies conducted in the line VIRTUAL.

**Methodological conclusions**

Evaluating the production and diffusion of knowledge in an academic discipline is a complex task. In this sense, given the myriad research techniques available, analyzing the content of academic journals is only one approach to such a task, but it may be one of the most revealing (Williams & Plouffe 2007). Content analysis is an important and (re-)emerging method for facilitating many other types of analyses. Potential contributions also exist in the role that content analysis can play in theory development. In our case, further research using content analysis and additional methodologies should encourage continued dialogue and renewed debate over the future development of the field of SCM.

Clearly, there are important limitations to any content analysis, including the challenges associated with subjective coding and the proper management of the sheer volume of data. In the words of Kolbe & Burnett (1991), this method is quite susceptible to the effects of researcher biases, which can in turn affect decisions made in the collection, analysis, and interpretation of data. The existence of these biases can have an effect on a study’s contribution to knowledge. To improve standards of objectivity and reliability we were
careful to follow the suggestions of experts in content analysis. We used a panel of experts to confirm journals, keywords and categories, but subjectivity appeared several times during the study in the following decisions:

1) Journal selection: although this research is international, the journals selected are mainly from Europe or America, so we could have included other journals with different geographic boundaries, for example, Asian or South-American Journals (i.e., Asia Pacific Journal of Management, Asia-Pacific Journal of Operational Research, Asia Pacific Management Review, Asia Pacific Journal of Marketing and Logistics or Journal of the Eastern Asia Society for Transportation Studies);

2) Time selection: although we chose a fairly recent decade and ten years seems sufficient to determine the content, we could have extended the research to look for trends or detect differences in other time periods (Piekkari, et. al. 2010);

3) Paper selection: the content analysis also revealed that journal articles often report only on parts of a larger study. Therefore, further studies (such as Gubi, et. al. 2003) are needed to review research and project reports as well as doctoral dissertations that encompass entire studies, in order to gain a fuller assessment of the use of research approaches in supply chain management (Spens & Kovacs 2006). In this case, only academic journals were reviewed, although the papers submitted to conferences, doctoral theses, and other high quality research could have been taken into account;

4) Category Construction: It is important to recognize that the development of categories is not a neutral phase (Sepstrup 1981); rather, category development involves the same researcher bias present in scale and questionnaire development. It is difficult to establish a specific list or universe of categories in SCM. We built on previous classification work and the opinions of a panel of experts, but in this area there are no general content analysis
dictionaries with lists of categories and classification rules, as in other areas (Insch, *et al.* 1997);

5) Assignment of papers to categories. Although we used classification rules, training of coders and pre-tests, 11% of articles raised doubts in the encoders (percentage agreement 89%) that were resolved by coming to an agreement.

**Future directions of research**

The research on this discipline is still dominated in many cases by quantitative research methods, and therefore researchers could use secondary sources of a more innovative nature, as well as using more qualitative sources. Additionally, most of the research work has focused on studying “what type” of relationships and structures were present in the supply chain. However, as proposed by Sacha & Datta (2005), to reach a higher level of maturity, it would be appropriate to study “how” and “why” these relationships and structures are produced between organizations within a supply chain.

In this sense, although the concept of vertical relations between companies seems to be well understood from a theoretical standpoint, their implementation is complex (Chen & Paulraj 2004). It is necessary to develop theoretical models that improve our understanding of the relationships between companies (Chen & Paulraj 2004) together with methods that allow them to be studied at a channel or network level, rather than stopping at a company or, at most, a dyadic level. Work focused on one function within a company does not allow us to carry out a holistic study of the whole system. Studies on chains and networks enable us to observe that the whole is greater than the sum of the parts, meaning that the level of study should be expanded to the chain and network level. Thus, researchers studying relationships between companies should know what happens between them and should spend time in the organizations in order to observe and communicate with professionals who are working at the
same time. Cases and observation are very useful and appropriate for research based on organization-to-organization relationships (Frankel, et. al. 2005).

The multidisciplinary focus of the study of vertical relations between companies has given rise to a wide range of research methods and techniques (Chen & Paulraj 2004). No method per se has advantages over all the others. However, the use of multiple data sources and different focuses (disciplines) increases the reliability of the study (Frankel, et. al. 2005). In relation to this, it would be interesting to open a future line of research that differentiates between methods and content by type of journal, i.e., marketing, logistics, management, and marketing channels. The same is true of European and North American journals. It would also be interesting to study vertical relations between companies from other parts of the world, especially from Asia, the content of which might differ from those studied up to now.

Moreover, a clear gap was detected in the research on SCM, which may be of interest to both academics and business managers, that is, the lack of studies on supply chains considered as business networks. Establishing these inter-organizational relationships in networks leads to the exchange of knowledge among the companies in a supply chain, and to the creation of new specific knowledge by promoting confidence and motivation and by establishing alliances, team spirit and better coordination and communication among the enterprises involved. This implies a higher degree of innovation, fewer losses, improved efficiency in transactions and in production itself and, in general, increased competitiveness among the companies concerned. Therefore, more research in these particular relationships is needed in the field of SCM.

Finally, it is important to point out that this study is based on vertical relations in the supply chain. However, we are aware of the strategic significance of other types of relations. Accordingly, our future work will be aimed at completing the study of inter-organizational relations by including a content analysis on horizontal relations between companies in a
supply chain. Therefore, it should be pointed out that the aim of this study was none other than to serve as primary exploratory research for the purpose of subsequently studying vertical and horizontal relations between companies. The results from this content analysis should encourage dialog and debate on the future development of the relationships among firms, at both an academic and an entrepreneurial level.

ACKNOWLEDGEMENTS

This research was financed by the Spanish Ministry of Education and Science, National R&D&Innovation Plan 2007-2010, under the project entitled “El Distrito Industrial: el impacto del Capital Social sobre la Gestión de la Cadena de Suministro” (The Industrial District: the impact of Social Capital on the management of the Supply Chain) (SEJ2007-62876/ECON).

The authors gratefully acknowledge the helpful comments and suggestions received from the three anonymous referees and the editor.
REFERENCES


# APPENDIX I: CHOICE OF JOURNALS: PREFERENCES OF SUPPLY CHAIN MANAGEMENT RESEARCHERS

<table>
<thead>
<tr>
<th>Journals</th>
<th>ABREV.</th>
<th>Zsidisin et al 07</th>
<th>Kumar and Kwon 04</th>
<th>Phillips and Phillips 98</th>
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Note: the numbers indicate the position proposed by each author in order of importance (1 is the first on the list). Phillips and Phillips (1998) only placed the first three in a hierarchy, and the other journals that are considered to be important are marked with an X.
### APPENDIX I: CHOICE OF JOURNALS: PREFERENCES OF SUPPLY CHAIN MANAGEMENT RESEARCHERS (bis)

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APPENDIX II. PAPERS ANALYZED


Table 1. Journals chosen and papers selected

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Table 2. Lines of research proposed

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(*) Numbering corresponds to Appendix II.
Table 4. Changes in the lines of research

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(1) A total of 286 empirical articles were found. The total in Sampling Unit exceed this amount because this variable to be studied allow for simultaneous options.
Table 5b. Methodology of the papers by lines of research (% vertical)

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(1) A total of 286 empirical articles were found. The totals exceed this amount because the variables to be studied allow for simultaneous options.
Table 6. Comparison\(^{(1)}\) of the methodology used in this study with other previous content analyses (% vertical)

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</tbody>
</table>

\(^{(1)}\)The comparison is based on the categories proposed by Sachan and Datta (2005), Spens and Kovacs (2006), Mentzer and Kahn (1995) and Frankel et al. (2005), and is performed by transforming the data from Table 5a and 5b to match them to these categories. The section *Others or Not Applicable* includes the rest of the categories not considered by them. Wd: without date.

\(^{(2)}\)
Figure 1: Phases in the content analysis and application in this study

Source: Compiled by authors based on Kassarjian (1977) and Kolbe y Burnett (1991)