The current issue and full text archive of this journal is available at
www.emeraldinsight.com/0957-4093.htm

Supply chain integration and performance: a review of the evidence

Nathalie Fabbe-Costes
Centre de Recherche sur le Transport et la LOGistigue, Universite de la Mediterranne-Aix-Marseille II, Aix-en-Provence, France, and
Marianne Jahre
Department of Strategy and Logistics, BI Norwegian School of Management, Oslo, Norway

Abstract

Purpose – The purpose of this paper is to analyse papers studying the link between supply chain integration (SCI) and performance, and to discuss reported empirical evidence relating to this fundamental question for logistics and supply chain management.

Design/methodology/approach – A systematic analysis of 38 papers published in nine important journals in logistics, supply chain and operations management during the period 2000-2006 is offered. Using a multidimensional framework to sort and classify selected papers, structured results are provided for the purpose of contributing to discussion of the topic.

Findings – More SCI does not always improve performance. Definitions and measures of SCI and performance are diverse to the extent that a conclusion such as "the more (SCI) the better (the performance) cannot be drawn". On the contrary more empirical research, with use of clear definitions and good measures, are needed. The conclusions drawn from the analytical literature review provide a basis from which further research can be developed, both in respect of research approaches, definitions of main concepts and the choice of theoretical basis.

Research limitations/implications – Additional journals could be included. The framework could be more detailed. More details on SCI and performance measures, as well as the items used in the papers, could be provided and discussed.

Practical implications – Results encourage researchers and practitioners to be more cautious concerning SCI and its impact on performance and to have a more conscious and differentiated view of SCI.

Originality/value – Through a rigorous analysis of prevailing research, the paper questions a common assumption in business logistics and SCM. Propositions for further research are suggested.

Keywords Supply chain management, Operations management, Classification

Paper type Literature review

1. Introduction and purpose

Since its introduction in the early 1980s (Oliver and Webber, 1982), supply chain management (SCM) has become one of the most popular concepts within management in general (La Londe, 1997) and within logistics in particular (Ross, 1998). The literature offers a number of definitions of SCM (Mentzer *et al.*, 2001), most of which are

The International Journal of Logistics Management
Vol. 19 No. 2, 2008
pp. 130-154

0957-4093
DOI 10.1108/09574090810895933

The authors gratefully thank the anonymous referees for comments and suggestions for improvements of the first version of this paper. They also acknowledge the guest editor for this special issue. They express their gratitude to Peter Tatham for the proofreading of the paper.

related to integration: "the entire concept of SCM is really predicated on integration" (Pagell, 2004, p. 460). Integration of supply chains is considered to be of strategic as well as operational importance (Bechtel and Jayaram, 1997; Christopher, 1997; Lambert *et al.*, 1998; Frohlich and Westbrook, 2001; Zailani and Rajagopal, 2005). In research as well as in practice, it is often believed that the more integration the better (Stock *et al.*, 1998; Dröge *et al.*, 2004; Gimenez and Ventura, 2005) and it is claimed that it has been widely discussed and supported on an empirical basis (Cagliano *et al.*, 2006, p. 284).

Somewhat in contrast to this optimistic view of the "proven" relationship between supply chain integration (SCI) and performance, Power (2005, p. 261) concludes from his recent literature review that there is an "apparent contradiction in the literature between promised benefits and still limited evidence of extensive implementation . . . ". This is probably due, in part, to the lack of clear definitions and understanding of the concept of SCI itself. In Kahn and Mentzer (1996, p. 6) stated: "To date, literature has neglected to provide a specific definition [of integration], and thus, the term remains vague." Again Pagell (2004) claims that integration "has been defined in a number of different, albeit interrelated ways" and "many authors who have studied integration offer no formal definition of the construct" (p. 460). Apart from these and a few other exceptions (Harland, 1996; Christopher and Jüttner, 2000; Bask and Juga, 2001) it is only recently that the concept of SCI has started to be questioned (Håkansson and Persson, 2004; Bagchi *et al.*, 2005; Jahre and Fabbe-Costes, 2005; Gripsrud *et al.*, 2006).

There have been previous calls for further empirical research on the link between integration and performance (Stank *et al.*, 2001b; Wisner, 2003; Rodrigues *et al.*, 2004), and the lack of understanding regarding the implications of integration constitutes a problem for both researchers and managers. It is, therefore, difficult to provide managers with normative advice over how and what to integrate, the cost of integration, and its possible negative consequences for innovation and agility. For researchers, it is a problem if the same concepts are interpreted in different ways, and if different concepts are used with the same meaning. If concepts are unclear, studies tend to partially overlap without explicit statements about similarities and differences in respect of prior research and how it builds upon previous studies and contributes to current theory development. Studies testing models and hypotheses without precise definitions of variables and measures cause a problem (Stank *et al.*, 2001b; Stuart *et al.*, 2002; Wacker, 2004; Min and Menzer, 2004). Thus, a better understanding of the concept of integration, its dimensions and its implications, is of managerial relevance as well as academic importance, and can contribute to theory-building in business logistics, operations and SCM.

The purpose of this paper is to investigate previous research studying the relationship between supply chain integration and performance, and to offer propositions for advancing research on this strategic question. Through an extensive review of articles, empirical evidence on this link and the concepts and measures having been used and/or discussed, is scrutinized in order to understand whether much of the rhetoric concerning integration and performance in prevailing research can be substantiated. Building on previous literature review the paper differs from prior contributions by including a larger number of journals from both business logistics, SCM and operations management; by focusing particularly on the relationship between integration and performance; and by using a multidimensional framework for categorising the studies. Because of its systemic and integrative approach, this paper

covers many aspects of integration, focusing on inter-organisational integration without excluding the intra-organisational dimension. It is not limited to a particular level (e.g. strategic or operational as in Pagell, 2004), a particular focal organisation (e.g. producer or plant as in Swink *et al.*, 2007) or a particular aspect of integration (e.g. the IT-systems as in Sabath *et al.*, 2001).

The paper is structured as follows: Section 2 presents the research design for the study. In Section 3, our results with in respect of the definitions and measures used for independent (supply chain integration) and dependent (performance) variables are discussed, as are the results relating to the SCI/performance links. Section 4 discusses and highlights the main issues related to our findings, identifying missing themes and raising new research questions. From the results of the analysis, propositions are offered as a contribution to theory building. The paper concludes with a discussion of the limitations of the research, and suggests avenues for future directions.

2. Research design

This section firstly explains how the selection of journals and papers was undertaken and, secondly, presents the multidimensional framework used for their classification.

2.1 Literature review as a research approach

The purpose of our literature review is not to make a classic synthesis of what has been published on supply chain integration and its contribution to performance improvement. Rather we want to contribute to theory-building through a rigorous, systematic and in-depth analysis of how prior studies have been conducted. In line with Wacker (2004), our purpose is to contribute to "better formal conceptual definitions" that will help both researchers and managers. Many would claim that management science should be useful for managers who wish to improve the performance of their organizations and who, therefore, need to know if increased integration will help. This is all the more important because, even if integration is an everyday keyword in logistics and SCM, "The formula for integration, however, is not a simple one" (Power, 2005, p. 257).

2.1.1 Selection of journals and papers to be analyzed. For the purpose of selecting journals we used Business Source Premier, Emerald Management Xtra, EBSCO Host, Science Direct (Elsevier) and ISI Web of Knowledge. In order to avoid too narrow a view of the question, or being overly influenced by a special "school," we wanted to include journals from operations management as well as SCM and business logistics including transportation, and selected the following nine journals:

(1) *International Journal of Logistics Management (IJLM)*;
(2) *International Journal of Logistics: Research and Applications (IJL-RA)*;
(3) *International Journal of Operations and Production Management (IJOPM)*;
(4) *International Journal of Physical Distribution and Logistics Management (IJPDLM)*;
(5) *Journal of Business Logistics (JBL)*;
(6) *Journal of Operation Management (JOM)*;
(7) *Supply Chain Management: An International Journal (SCM-IJ)*;
(8) *Transportation Journal (TJ)*; and
(9) *Transportation Research – Part E (TR-E)*.

We used journal rankings to support this selection. For *JOM* and *TJ*, *JCR* impact factor 2003 was 1,795 for *JOM*; 0,556 for *TR-E*; 0,547 for *IJOPM* and 0,394 for *TJ*. For logistics and *SCM* journals, *IJPDLM*, *IJLM*, *JBL*, *IJL-RA*, *SCM-IJ* and *TJ* are in the EU top ten and/or the US top ten in the evaluation of Gibson *et al.* (2004). In the Cranfield University School of Management (2004) ranking, *JOM*, *IJOPM*, *IJPDLM*, *TR-E*, *IJLM*, *IJL-RA*, *TJ* and *SCM-IJ* are graded and recommended for academic publication. The French CNRS (2007) categorization of *Journals in Economic and Management* ranked *JOM*, *IJOPM*, *IJLM*, *IJL-RA*, *IJPDLM* and *SCM-IJ* in the logistics, production and operations journals. Finally, Harzing (2007) provides a synthesis of the rankings considering these nine journals to be highly ranked and major refereed.

Based on this selection, we made a systematic search for articles published between 2000 and 2006 using the following criteria:

- the word "integration" had to be included in the title, key words and/or abstract; and
- the word "logistics" and/or "supply chain" had to be included in the title, key words and/or abstract.

We found 152 articles from a total of 2,017 and selected all papers reporting on empirical studies or discussing relationships between supply chain and/or logistics integration (noted as SCI in this paper) and performance, giving priority to inter-organisational integration which is considered to be the final "stage" of SCM (Stevens, 1989). This resulted in 38 papers which became the basis for our analysis. The appendix provides a synthesis of our selection, and the distribution of articles in the nine journals from 2000 to 2006.

2.1.2 About the selected papers[1]. The papers differ substantially in terms of research approach. Quantitative papers constitute by far the majority, and were grouped into hypothesis testing deductive with model testing (21 papers), descriptive surveys and statistics [2] (six papers), and mathematical simulation/experimentation (two papers). The remaining nine papers discuss concepts and their relationships on a qualitative basis, with use of case studies or illustrations (seven papers) or pure literature reviews (two).

The empirical papers (36 among the 38) also differ in terms of country, industry and echelon. Data have been collected across many countries and continents with a preponderance being from the USA (nine papers) followed by Europe (eight) and Asia (six), whilst nine papers are based on cross-country data. As shown in Table I,

Echelon	Multi echelon	Single echelon: manufacturers	Single echelon: 1st tier suppliers	Single echelon: one focal firm	Total
Industry					
Mixed industries	14 (38.9)	8 (22.2)	0	NA	22 (61.1)
Focused (single industry)	5 (13.9)	5 (13.9)	2 (5.55)	2 (5.55)	14 (38.9)
Total	19 (52.8)	13 (36.1)	2 (5.55)	2 (5.55)	36 (100)

Note: The figures represented in parenthesis are in percentages

Table I.
Empirical base of the selected papers

the majority have a mixed-industry empirical base whilst others focus on a specific industry or sector (including construction, jewellery, automotive, textiles and fashion, consumer goods, wood, package printing, industrial equipment and discrete and assembled products). Most papers have a multi-echelon empirical base (19 papers), while some focus on the manufacturer (13), and the remainder on first tier suppliers or another single focal firm.

Not many papers justify their empirical choices with the exception of a few which argue that a mixed industry approach ascertains the generalizability of their model. Cousins and Menguc (2006, p. 610) selected companies from different industries because it provided them with "substantial variation in the levels of integration." However, there are also those who point out the difficulties of drawing general conclusions (Rosenzweig *et al.*, 2003; Zailani and Rajagopal, 2005; Vachon and Klassen, 2006) because "there may be particular characteristics to these supply chains that do not apply to other sectors" (Frohlich and Westbrook, 2001, p. 197). Furthermore, Stock *et al.* (2000, p. 545)) point out that:

> [...] certain industries might achieve more effective performance by focusing enterprise logistics activities on the distribution of finished goods directly to customers rather than on the inbound supply of parts and raw materials, or vice versa.

Finally, there are those who point out that their respondents may have given results that were skewed in favour of supply chain integration (Vickery *et al.*, 2003; Rosenzweig *et al.*, 2003; Mollenkopf and Dapiran, 2005a, b).

2.2 A multidimensional framework for classification of studies

For theory building it is important to know how studies define variables. For this purpose, we used a multi-dimensional framework to systematically classify the papers. It was developed from prior literature on logistics and supply chain integration (Fabbe-Costes and Jahre, 2006) and is briefly presented in the next section. The papers were analysed in depth on the basis of:

- the way supply chain and/or logistics integration (i.e. independent variable) was defined and/or measured;
- the way performance (i.e. dependent variable) was defined and/or measured;
- the type of relationships established between SCI and performance; and
- the "answer" given in respect of our key question: "Does SCI improve performance?"

The SCI framework includes three overall dimensions: layers, scopes and degree. Compared to Fabbe-Costes and Jahre (2006), it has been expanded to include performance and its link with SCI. Articles were classified separately by each of the authors, and checked for coherence after which discrepancies were discussed and resolved. The results were input into an Excel worksheet and a database was developed in FilemakerPro[3].

2.2.1 Layers, scopes and degrees of integration. Papers define supply chain and/or logistics integration based on the aspects, or the layers, that are or have to be integrated. Four intertwined layers of integration can be established including:

(1) integration of flows (physical, information and financial);

(2) integration of processes and activities;

(3) integration of technologies and systems; and
(4) integration of actors (structure and organisations).

All papers were analysed in relation to the number and type of layers included. While some papers are explicit, there are many that are implicit in respect of the layers being considered. We chose to include both categories, but with a different coding. Furthermore, we noticed that a number of quantitative papers measure fewer layers than those considered in the papers' discussion or literature review. Because it is of importance to the analysis and discussion of results, we chose to code both.

As pointed out in prior papers, the scope of integration, i.e. the nature and number of organisations or participants included in the "integrated supply chain," may vary (Harland, 1996; Mentzer *et al.*, 2001; Jahre and Fabbe-Costes, 2005). Hence, this constitutes the second important dimension including:

- *Limited dyadic downstream.* Integration between the focal company and its customers.
- *Limited dyadic upstream.* Integration between the focal company and its suppliers.
- *Limited dyadic.* Integration between the focal company and, on the one hand, its customers and, on the one other, its suppliers (i.e. both up and downstream, but separately).
- *Limited triadic.* Integration of suppliers – focal company – customers (without differentiating upstream and downstream relationships).
- *Extended.* Integration between more than three parties along the supply chain, e.g. includes customers' customers, suppliers' suppliers or other stakeholders.

As already mentioned, we have considered only papers including external, i.e. inter-organisational, integration without or in combination with internal, i.e. intra-organisational, integration. We coded the scope that was considered in the papers' discussion as well as that which was actually measured.

The third and final dimension is the degree of supply chain integration, with the question being "does *more* SCI lead to higher performance?" In this respect, it is necessary to understand how this "more" is measured. As discussed above, SCI is a multidimensional concept, i.e. a composite of layers and scopes. Based on the literature review and the analysis of articles included in the development of the framework, we chose to make a distinction between the papers that discuss the degree of SCI as being multi-dimensional, i.e. SCI is discussed/measured for different layers and/or scopes and/or layers for different actors (i.e. coded "multi") and the papers that consider SCI as being uni-dimensional (i.e. coded "mono"). Papers where the degree of integration is not explicitly mentioned can be interpreted as either "mono" or "multi" and were, thus, coded "implicitly mono" or "implicitly multi." It should also be noted that, in the same way as for layers and scopes, there are differences in the papers regarding what is discussed and what is measured.

2.2.2 Performance. Measuring and establishing causal relationships between actions undertaken and performance is considered important, but also very problematic in management science and business administration in general. For example, in their literature study of definitions and measures of logistics performance, Chow *et al.* (1994)

conclude that performance is a complex concept in logistics because of the multiple goals. Some studies (Lynch *et al.*, 2000) link logistics competencies and capabilities to overall strategic firm performance, measured as net profit margins, return on assets, returns on investment, overall competitive position and general profitability. Hence, the focus is on financial measures. Other studies (Stank *et al.*, 2001b), consider performance to be a mix of operational (including marketing and logistics performance) and financial measures. As the selected papers base their discussion on a broad mix of performance measures and levels, rigorous analysis is difficult and, as a result, we decided to focus on how performance has been measured. In line with this, we analysed the number and the type of performance measures used, as well as how the data was retrieved, i.e. whether it was based on actual performance or on perceptions by respondents. In addition, we reviewed the articles to determine whose performance was included: the whole supply chain, the focal firm and/or other actors or levels in the chain.

2.2.3 SCI related to performance. In line with the preceding discussion of SCI as a multidimensional concept, we analysed the results from prior studies to ascertain whether the combined dimensions improve performance. As before, we found discrepancies between what is discussed and what is measured, and papers were coded in respect of both these aspects. Table II summarizes the overall classification framework.

3. Analysis of definitions and measures in the studies

This section presents the results from our analysis, both regarding the use of dimensions in SCI and the performance measures, and concluding with the evidence on the relationship between SCI and performance.

Coded elements	Discussion	Measure
Layers considered in SCI Flows (physical, informational, financial) Processes and activities Systems and technologies Actors (structure and organizations)	For each layer, yes (no) if it is included (or not) in SCI discussion	For each layer, yes (no) if it is included (or not) in SCI measure
Scope of SCI	Five possible codes depending on scope discussed + code if internal integration is included	Five possible codes depending on scope of SCI measure + code if internal integration is included
Degree of SCI	Mono or multi depending on number of dimensions included in explicit or implicit SCI discussion	Mono or multi depending on number of dimensions included in SCI measure
Performance	Nature of performance discussed	If performance is measured, number and nature of items
Link between SCI and performance	Can be explicitly or implicitly discussed, assessing that "the more is the better" or not.	If link between SCI and performance is "tested", what is the result?

Table II.
Synthesis of our multidimensional classification framework

3.1 Defining and measuring supply chain integration (SCI)

The following paragraphs present how prior studies have discussed and measured SCI and, in particular, how layers, scopes and degrees are included and combined.

3.1.1 The layers dimension. In the SCI discussion, the majority of papers (27) see integration as constituting all four layers. All papers except one (Kim, 2006a) include processes/activities in their discussion. Most papers also include actors (35) and flows (34). The systems and technologies layer is the one with the most divergence. Nine papers do not mention this at all when defining SCI, which is somewhat surprising given the interest in ICT-systems and new technologies in logistics and SCM. Some papers, but far from all, point out the relationship between the layers (McMichael *et al.*, 2000; Forza *et al.*, 2000; Hertz, 2001; Håkansson and Persson, 2004; Power, 2005).

To measure layers, most quantitative papers[4] use Likert-scales, but with a varying number of choices (1-10 in two papers, 1-7 in nine and 1-5 in 12). In most papers measurements in respect of what layers they included differed from what is discussed. Except for one paper (Maloni and Benton, 2000) there is no difference between the discussion and the measure concerning the processes layer. This also applies to the actors layer except for three papers (Closs and Savitskie, 2003; Cousins and Menguc, 2006; Germain and Iyer, 2006). There are, however, greater differences for the system layer (in five papers), and even more for the flows layer (in eight papers). Finally, we note that there are 18 papers that include all four layers in their SCI discussion, but only in nine are they all measured. Nevertheless, we can still conclude that, in discussion as well as in measurement, the majority of papers use a multiple approach when measuring layers of SCI.

3.1.2 The scope dimension and its relation to layers. In the SCI discussion, the majority of papers (23) consider an extended scope of SCI of which thirteen are quantitative. For papers (15) limited to the first tier of partners in the chain, most include both customers and suppliers, whereas three papers are restricted to customers or suppliers. As shown in Table III, the majority combines external with internal integration.

In measurements, however, the majority (80 percent[5]) use a limited scope. Further, of the five papers that measure an extended scope two (Rosenzweig *et al.*, 2003 and Narasimhan and Kim, 2001) base it only on one single question. Hence, the measurement of scope is much more limited compared to the discussion within the papers, and we can conclude that there are significant variations in how the scope of integration is taken into account in the studies. Crossing measured scopes with layers as in Table IV[6] shows that very few measure SCI with an extended scope and include all layers. We also see that papers measuring limited scopes of SCI show a considerable variety in how layers are measured.

3.1.3 The degree of SCI and its relation to scope. A (small) majority of the papers (24 papers among 35[7]) discusses SCI with a multi-approach, whereas the result is the reverse for measurements with a (small) majority (15 papers out of 25[8]) applying a mono measure. The results of crossing measured degree with scope are shown in Table V. Except for papers measuring limited triadic scopes which use a mono-measure, we see a great variation and no clear pattern.

3.2 Defining and measuring performance

In the literature review or preliminary discussion, all the selected papers use the word performance, albeit some do not define it. The papers that do offer definitions and

Table III.
Scopes considered in the selected papers

Scopes of integration in SCI discussion	Papers including only external scope	Papers including external and internal scope	Total no of papers
Limited dyadic downstream	Sahin and Robinson (2005)	Closs and Savitskie (2003)	2
Limited dyadic upstream		Trent and Monczka (2003)	1
Limited dyadic (with both suppliers and customers)	Vachon and Klassen (2006)	Cousins and Menguc (2006), Swink *et al.* (2007) and Narasimhan and Kim (2002)	4
Limited triadic	Frohlich and Westbrook (2001, 2002)	Gimenez and Ventura (2003), Kim (2006a), Mollenkopf and Dapiran (2005a, b), Stock *et al.* (2000) and Vickery *et al.* (2003)	8
Extended	Bagchi *et al.* (2005), McMichael *et al.* (2000) and Hertz (2001)	Childerhouse and Towill (2003), Forza *et al.* (2000), Germain and Iyer (2006), Gimenez and Ventura (2005), Håkanson and Persson (2004), Kannabiran and Bhaumik (2005), Kim (2006b), Lambert *et al.* (2005), Loi (2004), Maloni and Benton (2000), Mejas-Sacaluga and Prado-Prado (2002), Min and Menzer (2004), Narasimhan and Kim (2001), Power (2005), Rodrigues *et al.* (2004), Rosenzweig *et al.* (2003), Stank *et al.* (2001a, b), Wisner (2003) and Zailani and Rajagopal (2005)	23
Total no of papers	7	31	38

No. of layers in SCI measure	Measured scope: Extended scope	Limited triadic scope	Limited dyadic scope	Total no of papers
4 layers	Min and Mentzer (2004), Rodrigues *et al.* (2004) and Wisner (2003)	Kim (2006b) and Mollenkopf and Dapiran (2005b)	Mollenkopf and Dapiran (2005a), Narasimhan and Kim (2002), Stank *et al.* (2001b), Swink *et al.* (2007) and Vachon and Klassen (2006)	10
3 layers		Frohlich and Westbrook (2001) and Stank *et al.* (2001a, 2001b)	Bagchi *et al.* (2005), Germain and Iyer (2006) and Gimenez and Ventura (2003, 2005)	7
2 layers		Vickery *et al.* (2003)		1
1 single layer		Frohlich and Westbrook (2002) and Kim (2006a)	Closs and Savitskie (2003), Cousins and Menguc (2006) and Maloni and Benton (2000)	5
Total no papers	3	8	12	23
		Limited scope	= 20	

Table IV. Variety in layers and scopes measured

assume it to be improved by SCI take very different types of performance into account: from pure operational logistics performance (such as inventory level, response time, service quality or logistics cost) to broad strategic performance (e.g. improved competitive position, profitability and growth), often including customer value and satisfaction. They also look at performance for differing units of analysis such as the whole supply chain, a company, a business unit or a plant. In respect of how performance is measured (see overview in Table VI), the majority includes items related to logistics and SCM performance, with approximately 50 percent also including financial performance (Kim, 2006a, b, uses 13 mixed items). Three papers use only financial or marketing performance. There are only five papers (including Maloni and Benton, 2000[9]) that use inter-organisational measures, i.e. supply chain performance.

All papers use senior managers' perceptions of performance either by asking them to estimate performance improvements (Bagchi *et al.*, 2005) or to assess performance relative to competitors (Min and Menzer, 2004; Mollenkopf and Dapiran, 2005a; Closs and Savitskie, 2003). Some are asked to declare performance without any timeframe, some have been asked to refer to a year, a few others to a longer period. Only two papers include actual data on performance (Narasimhan and Kim, 2001, 2002). The number of items used for measuring performance varies from four (Frohlich and Westbrook, 2002) to nineteen (Frohlich and Westbrook, 2001; Min and Menzer, 2004) with a mean of 8.7. Moreover, looking more closely at the lists of items reveals diversity of performance[10] with some authors focusing on operational performance (Gimenez and Ventura, 2005) while others (Wisner, 2003) do not take such indicators into account.

Degree of SCI in measure	Measured scope: Extended scope	Limited triadic scope	Limited dyadic scope	Total no of papers
MULTI degree	Rodrigues *et al.* (2004) and Wisner (2003)		Bagchi *et al.* (2005), Gimenez and Ventura (2003, 2005), Mollenkopf and Dapiran (2005a), Narasimhan and Kim (2002), Stank *et al.* (2001b), Swink *et al.* (2007) and Vachon and Klassen (2006)	10
MONO degree	Min and Menzer (2004), Narasimhan and Kim (2001) and Rosenzweig *et al.* (2003)	Frohlich and Westbrook (2001, 2002), Kim (2006a, b), Mollenkopf and Dapiran (2005b), Stank *et al.* (2001a), Stock *et al.* (2000) and Vickery *et al.* (2003)	Closs and Savitskie (2003), Germain and Iyer (2006), Maloni and Benton (2000) and Cousins and Menguc (2006)	15
Total no of papers	5	8	12	25
		Limited scope	= 20	

Table V.
Variety in degrees and scopes measured

We therefore conclude that there is no consensus regarding how performance is to be measured, which suggests differences in strategic visions of the potential of SCI and SCM. Further, it is striking that so few papers include performance of other members of the supply chain in addition to the focal firm and, equally, how few use actual data to measure performance.

3.3 SCI and performance – what is the evidence?

With the exception of two (Hertz, 2001; Swink *et al.*, 2007), all papers explicitly or implicitly take the starting proposition that the higher the degree of SCI, the better. Among the 31 papers providing empirical evidence of the link between SCI and performance[11], 19 conclude that more is the better, while 12 provide more ambivalent results. An overview is provided in Table VII.

Even though half of the papers of our total sample conclude that SCI has a positive effect on performance, the variety of the empirical bases and the research design of the studies suggest that caution is advisable. For the 15 papers based on surveys and quantitative methods it is interesting to look at the nature of the sample (number of questionnaires, echelons and industries considered) and the "strength" of the evidence. For example, Min and Menzer (2004) recognize that the link between SCI and performance "is significant but weak" (p. 81) and "statistically valid but small effect" (p. 84). Some papers (Rosenzweig *et al.*, 2003) also offer evidence that SCI impacts first on chain performance which, in turn, impacts on overall performance: "The effect of integration on financial performance appears to be transmitted through logistical performance" (Germain and Iyer, 2006, p. 45).

Performance included	Firm performance	Others' performance included	Total no of papers
Logistics/supply chain performance	Bagchi *et al.* (2005), Closs and Savitskie (2003), Gimenez and Ventura (2003), Gimenez and Ventura (2005), Mollenkopf and Dapiran (2005a), Narasimhan and Kim (2001), Rodrigues *et al.* (2004) and Stank *et al.* (2001a)	Cousins and Menguc (2006): suppliers performance; Sahin and Robinson (2005): estimate of costs and savings including system, channel member and component; Trent and Monczka (2003): supplier quality	11
Mixed performance (including logistics/supply chain performance)	Frohlich and Westbrook (2001, 2002), Germain and Iyer (2006), Kannabiran and Bhaumik (2005), Kim (2006a, b), Min and Menzer (2004), Stank *et al.* (2001b), Stock *et al.* (2000), Vickery *et al.* (2003) and Wisner (2003)	Childerhouse and Towill (2003): suppliers performance	12
Financial performance	Narasimhan and Kim (2001) and Rosenzweig *et al.* (2003)		2
Other	Swink *et al.* (2007) (marketing)		1
Total no of papers	22	4	26

Table VI. Type of performance measures included in the studies

In papers with ambivalent results, most still (Vickery *et al.*, 2003) support the idea that more is better. Some like (Cousins and Menguc, 2006) argue that if the evidence turns out to be poor, it is because "the process of integration is not a simple one" (p. 617) and because companies probably are at an early stage of integration. In line with Stevens' (1989) idea of evolution stages, they call for more research to better understand how to achieve SCI. Ambivalent results also suggest a complex relationship between SCI and different types of performance. Vickery *et al.* (2003) provide evidence that "the direct relationship of supply chain integration to financial performance is non-significant," and that "any management actions must first have an impact on key customer service dimensions, and it is this enhanced customer service that then engenders financial performance" (p. 533).

Papers based on a multi-measure of SCI[12] support the idea that it is worth having a differentiated approach for SCM. Gimenez and Ventura (2005) confirm: "we cannot assign a global level of external integration to a firm; there is a need to consider the level of integration in each particular supply chain relationship" (p. 23). They also conclude that external integration is more powerful than internal, and believe, in contrast to Stevens' model, that "external integration [...] has to be understood as an incentive to internal integration" (p. 32). In the same vein, Stank *et al.* (2001a) offer evidence that "external collaboration does not lead directly to better outcomes in logistical service," but that it, i.e. external SCI, impacts on internal SCI that, in turn, impacts logistics performance (p. 37). Thus, the link between internal and external SCI is not very clear, with the results being somewhat divergent. Germain and Iyer (2006) show that "Downstream integration predicts logistical performance only when internal

Relation SCI and performance	Evidence: the more is the better	Evidence: discussion of pros and cons	Total no of papers
Implicit - discussion: the more is the better	Kim (2006a), Loi (2004), Maloni and Benton (2000) and Narasimhan and Kim (2001)	Gimenez and Ventura (2005), Håkanson and Persson (2004), McMichael *et al.* (2000), Sahin and Robinson (2005) and Stock *et al.* (2000)	9
Explicit - discussion: the more is the better	Bagchi *et al.* (2005), Childerhouse and Towill (2003), Closs and Savitskie (2003), Frohlich and Westbrook (2001, 2002), Germain and Iyer (2006), Kannabiran and Bhaumik (2005), Kim (2006b), Min and Menzer (2004), Trent and Monczka (2003), Mollenkopf and Dapiran (2005a), Rosenzweig *et al.* (2003), Stank *et al.* (2001a), Wisner (2003), Zailani and Rajagopal (2005)	Cousins and Menguc (2006), Gimenez and Ventura (2003), Rodrigues *et al.* (2004), Stank *et al.* (2001b) and Vickery *et al.* (2003)	20
Discussion: The more is not always the better		Hertz (2001) and Swink *et al.* (2007)	2
Total no of papers	19	12	31

Table VII.
Relations between SCI and performance identified in the empirical studies

integration is high" (p. 47). Rodrigues *et al.* (2004), conclude that if integrated internal and external operations are separated, they have no significant impact on performance, but when combined they do.

Sahin and Robinson (2005) conclude that integration at different layers contributes to performance in various ways: "the major benefit of supply chain collaboration comes from improved coordination, while information sharing unlocks only a small portion of the potential benefits associated with channel integration" (p. 592) and that "the benefits of system integration are not shared equally among participants" (p. 588). In the study by Cousins and Menguc (2006), SCI does not prove to have much impact on performance except for integration at the actor layer (p. 65). Stock *et al.* (2000, p. 544) also conclude that "enterprise logistics [integration] does not necessarily provide a benefit for performance in all cases," and that its benefits arise in combination with other dimensions of a firm's supply chain structure. Håkanson and Persson (2004, p. 19) show that "improvement in one supply chain may be counter-productive in another supply chain.". Clearly, the nature of SCI is complex and more knowledge is needed in respect of its relation to performance.

4. Discussion and propositions

Less than 2 percent out of a total of 2,017 papers in our initial sample discuss and/or report on empirical studies of relations between supply chain integration and performance. It seems that there has been an almost universal acceptance of the relationship without much proof, which might also apply to other "common assumptions" in business logistics:

P1. Researchers can contribute to theory-building by "going behind the curtains" and questioning common assumptions such as "SCI always improves performance."

Our second point is that our analysis does, indeed, support the statement by Kahn and Mentzer (1996) and confirmed by others (Arlbjørn and Haldorsson, 2002; Pagell, 2004) almost a decade later, on the "conceptual vagueness" of supply chain integration. We have seen that studies test models and hypotheses based on quantitative measures and operational measures developed from unclear and fragmented definitions. Questions in the surveys are often based on a limited number of indicators and operational measures. Hence, most studies in our sample suffer from unclear definitions and "weak" measures relating to SCI, performance or both which makes it hard to draw conclusions from the "evidence" that comes out of the studies (Stuart *et al.*, 2002; Wacker, 2004):

P2. Researchers can contribute to theory-building by defining concepts properly and clearly. Our multidimensional classification framework is a contribution to the understanding of the complex concepts of SCI and performance.

Numerous examples of conceptual discrepancies can be pointed out from our analysis. Firstly, the IT/systems layer is not included as part of supply chain integration in many papers, whereas others point to this as a major aspect of such integration. Pagell (2004) concludes that, contrary to the literature review on which he based his analysis, "there was almost no evidence of information technology in and of itself being a key enabler or inhibitor of integration" (p.470). Hence, this point is particularly unclear and calls for further research. Secondly, there are significant variations in the scope of integration as measured in the studies. In line with Mentzer *et al.* (2001), most authors view that an integrated supply chain must include three or more echelons. Hence, it can be questioned whether the papers with limited dyadic scope do in fact study supply chain integration. Furthermore, very few papers measured an extended scope across all four layers. Thirdly, the significant variations in what papers have measured in relation to scope and degree make comparisons of results difficult. Problems concerning the evidence become more obvious when looking at performance both in regard to what has been taken into account and how it is measured.

Linked to this is the problem that even the names of the SCI dimensions differ in the articles, with resulting confusion as to the content of SCI. For example, the layer dimension is called integration strategies (Sahin and Robinson, 2005). The scope dimension is called level (Narasimhan and Kim, 2002; Kim, 2006b), stage (Kim, 2006a), degree (Frohlich and Westbrook, 2002), arc (Frohlich and Westbrook, 2001), type (Swink *et al.*, 2007) and supply chain structure (Stock *et al.*, 2000). The degree dimension is also called level (Stock *et al.*, 2000; Bagchi *et al.*, 2005; Gimenez and Ventura, 2005; Power, 2005) and stage (Kim, 2006a, b) as well as intensity (Rosenzweig *et al.*, 2003; Bagchi *et al.*, 2005) and capabilities (Mollenkopf and Dapiran, 2005b):

P3. To improve logistics knowledge and contribute to theory-building we need to stabilize the vocabulary, to agree on formal conceptual definitions, and to define their properties clearly before measuring anything.

Our point is not that we should stop using a quantitative approach measuring independent and dependent variables. On the contrary, our study provides a basis for

improvement in this domain and we encourage further quantitative research. However, care should be taken with regards to indicators, measures, questions, and items. Our study has identified papers that do, indeed, make serious efforts to measure SCI and performance. However, there is only limited cross-referral between them. For example, is there not much cross-referencing, i.e. cross-fertilization, between *JOM* and *IJOPM* on the one hand, and *JBL*, *IJLMPD*, *SCM-IJ* and *IJL-RA* on the other. This fragmentation is definitely something to avoid in further research, both in empirical papers and literature reviews. Our research provides an initial basis for improved measures of SCI and performance:

P4. Theory-building in logistics, operations and SCM would benefit from cross-fertilization. Research should analyse studies across a broad set of journals and develop cross-referencing between them.

Moreover, the basis for the assumption that supply chain integration gives higher performance is very limited. A check on the references used in the papers (i.e. in their discussion and reviews), shows that there are some which are used in many papers and can be considered as being fundamental: Stevens (1989), Frohlich and Westbrook (2001), Narasimhan and Kim (2002) and Vickery *et al.* (2003). However, on examining these papers, we find that few are based on primary data and empirical studies. Another point is that, in line with many other studies within business logistics, operations and SCM (for discussion, see, e.g. Jahre and Persson, 2005; Gripsrud *et al.*, 2006), the papers are based on different research streams and theoretical bases. This is not a problem in itself – it may add breadth as well as depth to the studies – but awareness of the assumptions of the theories on which the research is based, would improve the validity of the studies (Arlbjørn and Halldòrsson, 2002; Jahre and Persson, 2005):

P5. It is important to return to the theoretical bases "behind" prevailing research. Having an integrated approach also implies being critical and reflective. Strengthening theoretical bases will help in being more accurate in defining concepts and relationships between concepts.

Further, more rigorous quantitative studies must be complemented by qualitative studies such as case studies of high quality using criteria such as those suggested by Halldórsson and Aastrup (2003). Case studies provide insight into complex interrelationships (Ellram, 1996; Dubois and Araujo, 2004) to the extent that some would say they are the only option when it comes to supply chain integration: "increasing our understanding of very complex phenomena in a manner that is only possible when using qualitative methods" (Pagell, 2004, p. 482). Whether quantitative or qualitative approaches are used, there is a need for further empirical research in order to increase the understanding of the extent to which integrated supply chains exist in the "real-world." This is all the more important because the practices within business logistics and SCM are subject to substantial change. In order to detect and understand developments, in-depth empirical research is called for. If we believe that companies are trying to increase supply chain integration, results from these efforts need to be continuously monitored. But changing business practices can also lead to new ideas such as questioning the usefulness of tight integration with the potential consequences of limited flexibility (Jahre and Fabbe-Costes, 2005). In-depth cases studies can help to identify and explain such changes:

P6. To improve our logistics knowledge and contribute to theory-building, different research approaches are required. A variety of research approaches will help to ensure that research remains aligned to the needs and/or questions of (logistics) managers, and with the changes in (and of) the business environment.

Our final point concerns the varying context, i.e. the industries and countries, from which data has been retrieved and which may be part of the explanation of the unclear evidence. We consider it a problem for theory-building that there are a number of papers that do not seem to provide conscious and in-depth discussions of the implications (and possible limitations) of their collected data. Even more important is the fact that very few papers (exceptions being Frohlich and Westbrook, 2001; Vachon and Klassen, 2006; Zailani and Rajagopal, 2005) reflect upon contingencies issues, i.e. how specific situations impact on the ways and reasons for supply chains being integrated or not, and what effect this may or may not have on performance. Contingencies are considered important in general management literature and were also, to a large degree, addressed in earlier logistics research when organisational structures for logistics were focused upon (Withey, 1974; Persson, 1978; Pfohl and Zöllner, 1987; Daugherty and Dröge, 1991; Kahn and Mentzer, 1996; Kohn and McGinnis, 1997). In these studies, classical references such as Woodward (1958), Thompson (1967), Lawrence and Lorsch (1967) and Galbraith (1973) are used, in demonstrating the main point that, depending on characteristics of the context (company, industry, etc.), different organisation forms or structures are considered more or less suitable. As a result, we believe that further theory-building could benefit from a re-introduction of contingency approaches, in order, for example, to study how, where, when and to what extent supply chain integration is (or could be) beneficial to the performance:

P7. To improve our logistics knowledge and contribute to theory-building, "classic" theories such as contingency theory must not be forgotten. Re-introducing such theories that are not specific to logistics or SCM can highlight important aspects of the problems and open new research areas.

5. Conclusions, limitations and further research

Our study reinforces the usefulness of systematic critical literature reviews for the purpose of theory-building and suggests that such reflective research is particularly useful when managerial issues are complex and strategic. Our paper contributes to a clarification of the concept of integration and a better understanding of the phenomenon by providing a "state-of-the-art" of the empirical evidence. The multidimensional framework provides a structure for the identification of convergences and divergences as well as of themes that have been in focus and themes that are missing. The review also provides a starting point for raising new research questions and for improved operationalisation of the integration concept for use in practical applications and in further studies.

In going behind the rhetoric of "integration is always best," we have shown that "evidence" cannot be taken for granted and that more research is needed in particular with regard to the impact of extended inter-organisational SCI on supply chain performance. Our research supports the idea of a multi-dimensional SCI framework,

and confirms the importance of defining clearly the boundaries of studied systems as differences in scope may give different results. Our research also supports the idea that a differentiated approach of SCI is of interest and can help companies to identify and focus on a limited number of key integration elements. Finally, our research adds to the debate with in respect of the kind of performance that can be improved thanks to SCI. Swink *et al.* (2007), Stonebreaker and Liao (2004) and Zailani and Rajagopal (2005) conclude that there are limitations in research which views integration as a monolithic concept: "Aggregated measures of integration fail to surface the details and interactions of various integration types" (Swink *et al.*, 2007). Our results confirm this and illustrate the need for a multi-dimensional approach – not only with regards to the concept of integration, but also to performance and context.

Our research suffers from limitations that further studies could overcome. The first is related to our ambition of building a framework permitting classification of all papers studying the link between SCI and performance. This, we accept, has probably led to a simplification of SCI analysis for more extensive research. The framework used was sufficient to point out discrepancies and differences between studies, but further work must be done to develop the conceptual definition of SCI. Secondly, there are additional journals that could have been included, such as *International Journal of Purchasing and Supply Management*, *International Journal of Production Research*, *International Journal of Retail and Distribution Management*, *European Journal of Operational Research*, and *Journal of Supply Chain Management*. In the sample that we analysed there are more journals focusing on business logistics and SCM than relating to operations management. We could also have included general management journals publishing papers on logistics or SCM (e.g. *Omega* and *Management Science*). Another sample may have given other results. On the other hand, this paper is the second step in our research, and the results from the first analysis (Fabbe-Costes and Jahre, 2007) are confirmed in the more extensive analysis that we now present. Hence, there is no reason to believe that the results would change using a larger sample. Finally, in respect of our methodology for identifying papers, we limited our search to those with certain words in their title, keywords or abstract. Of course, there are papers that discuss the subject but which do not have these words in their title, keywords or abstract. Furthermore, there are bound to be papers about integration that do not even use this word. On the other hand, we were more interested in looking at how concepts and measures are used, not only how rhetoric and management recipes but also apply to managing supply chains.

Our research provides some avenues for further research. Among them, and without returning to the propositions presented in Section 4, our research suggests two developments. The first one concerns an alternative methodological choice to conduct the systematic literature review. Our study is a base that suggests using meta-analysis to provide stronger empirical generalization to existing results. However, meta-analysis is not easy to conduct, and this is particularly true when the empirical base is fragmented, heterogeneous in quality and insufficiently detailed – which is why we have chosen a less sophisticated approach for this first exploratory step. But, as research in business logistics expands, meta-analysis should be developed to pool results from the existing range of empirical studies. The second development concerns the measurement of supply chain performance. We see a void in developing the use of actual performance data, in particular financial data, and ideally across

numerous actors of a supply chain. Based on our analysis it is, indeed, difficult to make any conclusions about the supply chain performance since it is in effect not being measured. Mixing classic supply chain performance items with financial data to better understand the unclear link between SCI, operational performance and financial performance is, therefore, another interesting area for further research.

Indeed, SCI and its relation to performance is an interesting research topic with important managerial implications because it is important for managers to understand:

- What it means to integrate supply chains?
- The extent to which it is possible to integrate supply chains.
- What it takes to do it?
- How it is possible to differentiate SCI in relation to layers, scope and degrees?
- The possible trade-offs between integration and flexibility, and what approaches of plug-in and plug-out (such as modularisation and standardisation) could help solving these.

It is not until we have the answers to the above that the theory of integration in business logistics, supply chain and operations management can provide managers with normative advice concerning how and what to integrate, the cost of integration and its possible negative consequences for innovation and agility.

Notes

1. More details on the articles can be provided upon request.
2. In accordance with discussions by Mentzer and Kahn (1995) and Sachan and Datta (2005).
3. Detailed information about the classification of the 38 papers can be provided upon request.
4. As mentioned in Section 2.1.2, we have 29 quantitative papers. The two papers based on simulation/experimentation do not really measure SCI and were excluded for Section 3.1. Rosenzweig *et al.* (2003) and Narasimhan and Kim (2001) measure integration with a single question such as: "How integrated is your business unit's supply chain," making it impossible to classify regarding layers. They were, thus, excluded from this part of the analysis as is Trent and Monczka (2003) who do not describe how SCI is measured and Mejas-Sacaluga and Prado-Prado (2002) because they do not measure SCI. The layer analysis is, thus, based on 23 papers.
5. For the measure of scope, 25 papers out of the 27 quantitative papers included in Section 3.1 were considered. Mejas-Sacaluga and Prado-Prado (2002) is excluded because SCI is not measured, and Trent and Monczka (2003) because the paper does not describe the way SCI is measured.
6. The 23 papers are those considered in Section 3.1.1.
7. Three papers (McMichael *et al.*, 2000; Min and Menzer, 2004; Stank *et al.*, 2001a) were excluded from the 38 analysed as they were impossible to classify because "degree" is not discussed.
8. The 25 papers are the same than in Section 3.1.2.
9. Maloni and Benton (2000) is not included in Table VI because performance is "measured" by the three following questions: (1) the performance of the entire supply chain has improved as a result of our relationship with XXX; (2) the efficiency of our relationship with XXX has improved XXX's performance; and (3) without XXX, our performance would not be as good as it is with them.

10. More details can be provided upon request.
11. The following seven papers are excluded since they do not really "test" the relationship between SCI and performance: Forza *et al.* (2000), Lambert *et al.* (2005), Mollenkopf and Dapiran (2005b), Narasimhan and Kim (2001), Power (2005), Vachon and Klassen (2006) and Mejas-Sacaluga and Prado-Prado (2002).
12. As mentioned in Section 3.1.4 (see Table V), we have ten papers with a multi-degree measure. Nine of them test the SCI – performance relationship. Crossing Tables V and VII, we observe that four papers offer evidence that more SCI gives better performance, while five discuss the link between SCI and performance.

References

Arlbjørn, J.S. and Halldorsson, A. (2002), "Logistics knowledge creation: reflections on content, context and processes", *International Journal of Physical Distribution and Materials Management*, Vol. 32 No. 1, pp. 22-40.

Bagchi, P.K., Ha, B.C., Skjoett-Larsen, T. and Soerensen, L.B. (2005), "Supply chain integration: a European survey", *The International Journal of Logistics Management*, Vol. 16 No. 2, pp. 275-94.

Bask, A.H. and Juga, J. (2001), "Semi-integrated supply chains: towards the new era of supply chain management", *International Journal of Logistics: Research and Applications*, Vol. 3 No. 1, pp. 5-23.

Bechtel, C. and Jayaram, J. (1997), "Supply chain management: a strategic perspective", *The International Journal of Logistics Management*, Vol. 8 No. 1, pp. 15-34.

Cagliano, R., Caniato, F. and Spina, G. (2006), "The linkage between supply chain integration and manufacturing improvement programmes", *International Journal of Operations & Production Management*, Vol. 26 No. 1, pp. 283-99.

Childerhouse, P. and Towill, D.R. (2003), "Engineering the seamless supply chain", *The International Journal of Logistics Management*, Vol. 14 No. 1, pp. 109-20.

Chow, G., Heaver, T.D. and Henriksson, L.E. (1994), "Logistics performance: definition and measurement", *International Journal of Physical Distribution & Logistics Management*, Vol. 24 No. 1, pp. 17-28.

Christopher, M. (1997), *Marketing Logistics*, Butterworth-Heinemann, Oxford.

Christopher, M. and Jüttner, U. (2000), "Supply chain relationships: making the transition to closer integration", *International Journal of Logistics: Research and Applications*, Vol. 3 No. 1, pp. 5-23.

Closs, D.J. and Savitskie, K. (2003), "Internal and external logistics information technology integration", *The International Journal of Logistics Management*, Vol. 14 No. 1, pp. 63-76.

CNRS (2007), Categorization of *Journals in Economics and Management*, October, available at: www.gredeg.cnrs.fr/Section37/Liste-2007-final.pdf (accessed April 24, 2008).

Cousins, P.D. and Menguc, B. (2006), "The implications of socialization and integration in supply chain management", *Journal of Operations Management*, Vol. 24 No. 5, pp. 604-20.

Daugherty, P.J. and Dröge, C. (1991), "Organizational structure in divisionalized manufacturers: the potential for outsourcing logistical services", *International Journal of Physical Distribution & Logistics Management*, Vol. 21 No. 3, pp. 22-9.

Dröge, C., Jayaram, J. and Vickery, S.K. (2004), "The effect of internal versus external integration practices on time-based performance and overall firm performance", *Journal of Operations Management*, Vol. 22 No. 6, pp. 557-73.

Dubois, A. and Araujo, L. (2004), "Research methods in industrial marketing studies", in Håkansson, H., Harrison, D. and Waluszewski, A. (Eds), *Rethinking Marketing: Developing a New Understanding of Markets*, Wiley, Chichester, pp. 207-27.

Ellram, L.M. (1996), "The use of case study method in logistics research", *Journal of Business Logistics*, Vol. 17 No. 2, pp. 93-138.

Fabbe-Costes, N. and Jahre, M. (2006), "Logistics integration and disintegration – in search of a framework", *International Conference on Information Systems, Logistics and Supply Chain (ILS'06), Proceedings, 2, FUCAM edition, Mons, Belgium, May 14-17*, pp. 841-50.

Fabbe-Costes, N. and Jahre, M. (2007), "Supply chain integration gives better performance – the emperor's new suit?", *International Journal of Physical Distribution & Logistics Management*, Vol. 37 No. 10, pp. 835-55.

Forza, C., Romano, P. and Vinelli, A. (2000), "Information technology for managing the textile apparel chain: current use, shortcomings and development directions", *International Journal of Logistics: Research & Applications*, Vol. 3 No. 3, pp. 227-43.

Frohlich, M.T. and Westbrook, R. (2001), "Arcs of integration: an international study of supply chain strategies", *Journal of Operations Management*, Vol. 19 No. 2, pp. 185-200.

Frohlich, M.T. and Westbrook, R. (2002), "Demand chain management in manufacturing and services: web-based integration, drivers and performance", *Journal of Operations Management*, Vol. 20 No. 6, pp. 729-45.

Galbraith, J.R. (1973), *Designing Complex Organizations – An Information Processing Model*, Addison-Wesley Longman Publishing Co., Inc., Boston, MA.

Germain, R. and Iyer, K.N. (2006), "The interaction of internal and downstream integration and its association with performance", *Journal of Business Logistics*, Vol. 27 No. 2, pp. 29-52.

Gibson, J.G., Hanna, J.B. and Menachof, D.A. (2004), "Periodical usefulness: an international perspective", *International Journal of Logistics: Research & Applications*, Vol. 7 No. 3, pp. 297-311.

Gimenez, C. and Ventura, E. (2003), "Supply chain management as a competitive advantage in the Spanish grocery sector", *The International Journal of Logistics Management*, Vol. 14 No. 1, pp. 77-88.

Gimenez, C. and Ventura, E. (2005), "Logistics-production, logistics-marketing and external integration – their impact on performance", *International Journal of Operations and Production Management*, Vol. 25 No. 1, pp. 20-38.

Gripsrud, G., Jahre, M. and Persson, G. (2006), "Supply chain management – back to the future?", *International Journal of Physical Distribution and Logistics Management*, Vol. 36 No. 8, pp. 643-59.

Håkansson, H. and Persson, G. (2004), "Supply chain management: the logic of supply chains and networks", *The International Journal of Logistics Management*, Vol. 15 No. 1, pp. 11-26.

Halldórsson, A. and Aastrup, J. (2003), "Quality criteria for qualitative inquiries in logistics", *European Journal of Operational Research*, Vol. 144 No. 2, pp. 321-32.

Harland, C.M. (1996), "Supply chain management: relationships, chains and networks", *British Journal of Management*, Vol. 7, pp. 63-80.

Harzing, A-W. (2007), *Journal Quality List*, 36th ed., available at: www.harzing.com (accessed April 24, 2008).

Hertz, S. (2001), "Dynamics of alliances in highly integrated supply chain networks", *International Journal of Logistics: Research & Applications*, Vol. 4 No. 2, pp. 237-56.

Jahre, M. and Fabbe-Costes, N. (2005), "Adaptation and adaptability in logistics networks", *International Journal of Logistics: Research and Applications*, Vol. 8 No. 2, pp. 143-57.

Jahre, M. and Persson, G. (2005), "Logistics – origins, influences and assumptions", in Gammelgaard, B. and Tage-Skøtt-Larsen, T. (Eds), *NOFOMA-Proceedings*, Copenhagen Business School, Copenhagen, pp. 3-18.

Kahn, K.B. and Mentzer, J.T. (1996), "Logistics and interdepartmental integration", *International Journal of Physical Distribution & Logistics Management*, Vol. 26 No. 8, pp. 6-14.

Kannabiran, G. and Bhaumik, S. (2005), "Corporate turnaround through effective supply chain management: the case of a leading jewellery manufacturer in India", *Supply Chain Management: An International Journal*, Vol. 10 No. 5, pp. 340-8.

Kim, S.W. (2006a), "The effect of supply chain integration on the alignment between corporate competitive capability and supply chain operational capability", *International Journal of Operations & Production Management*, Vol. 26 No. 10, pp. 1084-107.

Kim, S.W. (2006b), "Effects of supply chain management practices, integration and competition capability on performance", *Supply Chain Management: An International Journal*, Vol. 11 No. 3, pp. 241-8.

Kohn, J.W. and McGinnis, M.A. (1997), "Advanced logistics organization structures: revisited", *Journal of Business Logistics*, Vol. 18 No. 2, pp. 147-62.

La Londe, B. (1997), "Supply chain management: myth of reality?", *Supply Chain Management Review*, Vol. 1, pp. 6-7.

Lambert, D.M., Cooper, M.C. and Pagh, J.D. (1998), "Supply chain management: implementing issues and research opportunities", *The International Journal of Logistics Management*, Vol. 9 No. 2, pp. 1-18.

Lambert, D.M., García-Dastugue, S.J. and Croxton, K.L. (2005), "An evaluation of process-oriented supply chain management frameworks", *Journal of Business Logistics*, Vol. 26 No. 1, pp. 25-51.

Lawrence, P.R. and Lorsch, J.W. (1967), "Differentiation and integration in complex organizations", *Administrative Science Quarterly*, Vol. 12 No. 1, pp. 1-47.

Loi, T.H. (2004), "Business timeliness: the intersections of strategy and operations management", *International Journal of Operations & Production Management*, Vol. 24 No. 6, pp. 605-24.

Lynch, D.F., Keller, S.B. and Ozment, J. (2000), "The effect of logistics capabilities and strategy on firm performance", *Journal of Business Logistics*, Vol. 21 No. 2, pp. 47-67.

McMichael, H., Mackay, D. and Altmann, G. (2000), "Quick response in the Australian TCF industry", *International Journal of Physical Distribution & Logistics Management*, Vol. 30 Nos 7/8, pp. 611-26.

Maloni, M. and Benton, W.C. (2000), "Power influences in the supply chain", *Journal of Business Logistics*, Vol. 21 No. 1, pp. 49-73.

Mejas-Sacaluga, A. and Prado-Prado, J.C. (2002), "Integrated logistics management in the grocery supply chain", *The International Journal of Logistics Management*, Vol. 13 No. 2, pp. 67-78.

Mentzer, J.T. and Kahn, K.B. (1995), "A framework for logistics research", *Journal of Business Logistics*, Vol. 16 No. 1, pp. 231-50.

Mentzer, J.T., Dewitt, W., Keebler, J.S., Min, S., Nix, N.W., Smith, C.D. and Zacharia, Z.G. (2001), "Defining supply chain management", *Journal of Business Logistics*, Vol. 22 No. 2, pp. 1-25.

Min, S. and Menzer, J.T. (2004), "Developing and measuring supply chain management concepts", *Journal of Business Logistics*, Vol. 25 No. 1, pp. 63-99.

Mollenkopf, D. and Dapiran, G.P. (2005a), "The importance of developing logistics competencies: a study of Australian and New Zealand firms", *International Journal of Logistics: Research & Applications*, Vol. 8 No. 1, pp. 1-14.

Mollenkopf, D. and Dapiran, G.P. (2005b), "World-class logistics: Australia and New Zealand", *International Journal of Physical Distribution & Logistics Management*, Vol. 35 No. 1, pp. 63-74.

Narasimhan, R. and Kim, S.W. (2001), "Information system utilization strategy for supply chain integration", *Journal of Business Logistics*, Vol. 22 No. 2, pp. 51-75.

Narasimhan, R. and Kim, S.W. (2002), "Effect of supply chain integration on the relationship between diversification and performance: evidence from Japanese and Korean firms", *Journal of Operations Management*, Vol. 20 No. 3, pp. 303-23.

Oliver, R.K. and Webber, M.D. (1982), "Supply chain management: logistics catches up with strategy", in Christopher, M. (Ed.), *Logistics: The Strategic Issues*, Pitman, London, pp. 63-75.

Pagell, M. (2004), "Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics", *Journal of Operations Management*, Vol. 22 No. 5, pp. 459-87.

Persson, G. (1978), "Organisation strategies for business logistics", *International Journal of Physical Distribution and Materials Management*, Vol. 8 No. 6, pp. 287-97.

Pfohl, H-C. and Zöllner, W. (1987), "Organisation for logistics: the contingency approach", *International Journal of Physical Distribution and Materials Management*, Vol. 17 No. 1, pp. 3-16.

Power, D. (2005), "Supply chain management integration and implementation: a literature review", *Supply Chain Management: An International Journal*, Vol. 10 No. 4, pp. 252-63.

Rodrigues, A.M., Stank, T.P. and Lynch, D.F. (2004), "Linking strategy, structure, process, and performance in integrated logistics", *Journal of Business Logistics*, Vol. 25 No. 2, pp. 65-94.

Rosenzweig, E.D., Roth, A.V. and Dean, J.W. Jr (2003), "The influence of an integration strategy on competitive capabilities and business performance: an exploratory study of consumer products manufacturers", *Journal of Operations Management*, Vol. 21 No. 4, pp. 437-56.

Ross, D.F. (1998), *Competing Through Supply Chain Management*, Chapman & Hall, New York, NY.

Sabath, R.E., Austry, C.W. and Daugherty, P.J. (2001), "Automatic replenishment programs: the impact of organizational structure", *Journal of Business Logistics*, Vol. 22 No. 1, pp. 91-105.

Sachan, A. and Datta, S. (2005), "Review of supply chain management and logistics research", *International Journal of Physical Distribution & Logistics Management*, Vol. 35 No. 9, pp. 664-705.

Sahin, F. and Robinson, E.P. Jr (2005), "Information sharing and coordination in make-to-order supply chains", *Journal of Operations Management*, Vol. 23 No. 6, pp. 579-98.

Stank, T.P., Keller, S.B. and Daugherty, P.J. (2001a), "Supply chain collaboration and logistical service performance", *Journal of Business Logistics*, Vol. 22 No. 1, pp. 29-48.

Stank, T.P., Keller, S.B. and Closs, D.J. (2001b), "Performance benefits of supply chain logistical integration", *Transportation Journal*, Vol. 41 Nos 2/3, pp. 32-46.

Stevens, G.C. (1989), "Integrating the supply chain", *International Journal of Physical Distribution and Material management*, Vol. 19 No. 8, pp. 3-8.

Stock, G.N., Greis, N.P. and Kasarda, J.D. (1998), "Logistics, strategy and structure: a conceptual framework", *International Journal of Operations & Production Management*, Vol. 18 Nos 1/2, pp. 37-52.

Stock, G.N., Greis, N.P. and Kasarda, J.D. (2000), "Enterprise logistics and supply chain structure: the role of fit", *Journal of Operations Management*, Vol. 18 No. 5, pp. 531-47.

Stonebraker, P.W. and Liao, J. (2004), "Environmental turbulence, strategic orientation – modelling supply chain integration", *International Journal of Operations & Production Management*, Vol. 24 No. 10, pp. 1037-54.

Stuart, I., McCutcheon, D., Handfield, R., McLachlin, R. and Samson, D. (2002), "Effective case research in operations management: a process perspective", *Journal of Operations Management*, Vol. 20 No. 5, pp. 419-33.

Swink, M., Narasimhan, R. and Wang, C. (2007), "Managing beyond the factory walls: effects of four types of strategic integration on manufacturing plant performance", *Journal of Operations Management*, Vol. 25 No. 1, pp. 148-64.

Thompson, J.D. (1967), *Organizations in Action*, McGraw-Hill book Company, New York, NY.

Trent, R.J. and Monczka, R.M. (2003), "Understanding integrated global sourcing", *International Journal of Physical Distribution & Logistics Management*, Vol. 33 No. 7, pp. 607-29.

Vachon, S. and Klassen, R.D. (2006), "Extending green practices across the supply chain: the impact of upstream and downstream integration", *International Journal of Operations & Production Management*, Vol. 26 No. 7, pp. 795-821.

Vickery, S.K., Jayaram, J., Droge, C. and Calantone, R. (2003), "The effects of an integrative supply chain strategy on customer service and financial performance: an analysis of direct versus indirect relationships", *Journal of Operations Management*, Vol. 21 No. 5, pp. 523-39.

Wacker, J.G. (2004), "A theory of formal conceptual definitions: developing theory-building measurement instruments", *Journal of Operations Management*, Vol. 22 No. 6, pp. 629-50.

Wisner, J.D. (2003), "A structural equation model of supply chain management strategies and firm performance", *Journal of Business Logistics*, Vol. 24 No. 1, pp. 1-26.

Withey, J.L. (1974), "Job assignments in physical distribution organizations", *International Journal of Physical Distribution and Materials Management*, Vol. 4 No. 3, pp. 196-203.

Woodward, J. (1958), *Management and Technology, Her Majesty's Stationery Office*, HMSO, London.

Zailani, S. and Rajagopal, P. (2005), "Supply chain integration and performance: US versus East Asian companies", *Supply Chain Management: An International Journal*, Vol. 10 No. 5, pp. 379-93.

Further reading

Cranfield School of Management (2004), *Journal Recommendations for Academic Publication*, July.

Appendix. Results from the selection process

Selected journals and years	2000	2001	2002	2003	2004	2005	2006	Total (percent)
IJLM								
Total number of papers	16	13	15	16	14	15	20	109
Integration papers	2	2	3	5	3	2	1	18 (16.5)[a]
Integration/performance	0	0	1	3	1	1	0	6 (33.3[b])
IJL-RA								
Total number of papers	18	17	17	22	23	23	27	147
Integration papers	3	4	1	1	1	3	3	16 (10.9)
Integration/performance	1	1	0	0	0	1	0	3 (18.8)
IJOPM								
Total number of papers	74	82	72	66	59	63	54	470
Integration papers	1	1	1	3	3	3	4	16 (3.4)
Integration/performance	0	0	0	0	1	1	2	4 (25)
IJPDLM								
Total number of papers	53	41	47	42	46	42	43	314
Integration papers	3	4	2	4	3	2	5	23 (7.3)
Integration/performance	1	0	0	1	0	1	0	3 (13)
JBL								
Total number of papers	23	19	16	20	18	21	41	158
Integration papers	5	3	1	3	3	1	3	19 (12)
Integration/performance	1	2	0	1	2	1	1	8 (42.1)
JOM								
Total number of papers	30	37	39	22	35	36	49	248
Integration papers	1	3	3	2	1	3	3	16 (6.5)
Integration/performance	1	1	2	2	0	1	2	9 (56.3)
SCM-IJ								
Total number of papers	23	24	30	44	39	45	58	263
Integration papers	2	2	1	1	3	8	10	27 (10.3)
Integration/performance	0	0	0	0	0	3	1	4 (14.8)
TJ								
Total number of papers	16	22	12	17	18	19	17	121
Integration papers	1	2	1	1	2	1	1	9 (7.4)
Integration/performance	0	1	0	0	0	0	0	1 (11.1)
TR-E								
Total number of papers	19	26	29	27	29	30	27	187
Integration papers	0	1	0	6	0	1	0	8 (4.3)
Integration/performance	0	0	0	0	0	0	0	0 (0)
Total for the nine journals								
Total number of papers	272	281	277	276	281	294	336	2,017
Integration papers	18	22	13	26	19	24	30	152 (7.5)
Integration/performance	4	5	3	7	4	9	6	38 (25)

Notes: [a]Percentage calculated as share of total number of papers published; [b]percentage calculated as share of number of "integration papers"

Table AI.

About the authors

Nathalie Fabbe-Costes is a Professor of Management Science at the "Université de la Méditerranée" (Aix-Marseille 2, France) and a Senior Researcher at the CRET-LOG Research Center. She is also the Director of the Master program "Logistics Management and Strategy"

in the Business and Economics Faculty of Aix-Marseille 2 University. She received her PhD in Transport Economics and Logistics in 1989 and became Full Professor in 1993. She teaches logistics, SCM, management information systems and strategy. Her major fields of interest include logistics and SCM as inter-organizational management concepts and practices. She also focuses on logistics information and communication systems as part of SCM and company strategy. She has published more than 20 articles in academic journals, has been the co-author or coordinator of more than 15 books and has supervised ten defended PhDs. Nathalie Fabbe-Costes is the corresponding author and can be contacted at: nathalie.fabbe-costes@univmed.fr

Marianne Jahre is aa Associate Professor at BI Norwegian School of Management, has been recently appointed as a Professor at Lund University in Sweden and is a Visiting Professor at Université de la Méditerranée – Aix-Marseille II in France. She received her PhD in Logistics in 1995 at Chalmers University of Technology and is docent there. Her current research interests include humanitarian and disaster relief logistics, supply chain integration and relationship approaches, design and development of logistics resource networks and reverse logistics. She has edited several books and has published in journals including *International Journal of Physical Distribution and Logistics Management*, *International Journal of Logistics: Research and Applications*, and *Journal of Chain and Network Science*.