Concepts of Supply Chain Management: Literature Review

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Abstract: Supply chain Management (SCM) has assumed a significant role in firm's performance and has attracted serious research attention over the last few years. A literature review reveals a considerable spurt in research in theory and practice of SCM. Combining and informing on features of Supply Management and distribution Management. This integration has resulted in the concept of extended enterprise and the supply chain is now manifest as the collaborative supply chain across intercompany borders to maximize the value across the entire supply chain. A large number of research papers have been published in various journals in last two decades. In this paper an attempt is made to review the status of literature on Supply Chain Management. A literature classification scheme is proposed. A total of 588 articles from 13 refereed academic journals are classified into articles in five methodologies i.e. Exploratory, Normative, Methodology, Literature Review and Hypothesis testing. This literature review finds that exploratory type of research is mostly preferred it is expected that with the maturity of SCM the hypothesis testing method will pick up. The articles are further categorized in fifteen categories on the basis of content analysis. Based on this review, some possible research issues are identified.

Keywords: Supply Chain Management, Supply Chain Strategy

1. Introduction

Traditionally, SCM has been a melting pot of various aspects, with influences from logistics and transportation, operations management and materials and distribution management, marketing, as well as purchasing and information technology (IT). Ideally, the all-encompassing philosophy of SCM embraces each of these functions to produce an overall supply chain strategy that ultimately enhances firm performance (Croom et al. 2000; Wisner and Tan 2000). In actuality, the literature is still very fragmented and although several studies purports to discuss supply chain issues, most of the existing research only examines one link of the chain, or most importantly only focuses on one ingredient in the supply chain performance mix. Six major movements can be observed in the evolution of supply chain management studies. Creation, Integration, Globalization, Specialization Phases One and Two, and SCM 2.0 These phases are given in Table 1.

The six-stage evolutionary era depicts that in a particular era which strategy was emphasized. For instance, in the sixth era information Technology was given priority and IT enabled supply chain was the burning issue.

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This research investigates the history of the SCM literature looking at the various trends and developments in the field through a historical analysis covering the 18-year-period between 1990 and mid-2008. During this period, SCM evolved into a more prominent area of research (Mentzer et al. 2001). The objective of this study is to provide an extensive literature review on supply chain management. More specifically, the purpose of this study is to:

i. Define what constitutes supply chain management research.
ii. Classify SCM research articles according to their approach and methodologies.
iii. Explore the trend in the SCM research and suggest a research agenda for future work.

The next section presents various connotations given by various researchers; then a literature classification scheme is explained and a research agenda is suggested after identifying the gaps between theory and practice of SCM.

2. Literature Review

2.1 Supply Chain Management definitions

SCM has been interpreted by various researchers. Based on the relatively recent development of the supply chain literature, it is not surprising that there has been much debate as to a specific SCM definition. Ganesan and Harrison (1995) has defined SCM as a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Lee & Corey (1995) stated that SCM consists of the integration activities taking place among a network of facilities that procure raw material, transform them into intermediate goods and then final products, & deliver products to customers through a distribution system. Christopher (1998) defined the supply chain as the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer. SCM is the "strategic and systematic coordination of the traditional business functions and the tactics across these business functions within a particular firm and across businesses within a supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole" (Mentzer et al. 2001). Various connotations of supply chain management given by other researchers are given in Table 2.
Vaart and Pieter (2003) draw conclusions on the need for an inter-disciplinary approach, combining the technical and relational aspects from the respective fields of system dynamics and collaboration in order to deliver superior order replenishment performance. Gunasekaran and Ngai (2005) indicated that E-Business, product, and service-quality, all have a significant direct effect on customer behavioral intentions to purchase again. Balakrishnan and Cheng (2005) reviewed and update the methodology based on spreadsheet that provided enhanced solutions in complex environments with multiple products and bottleneck situations. Nagarajan and Sosic (2004) reviewed literature dealing with buyer vendor coordination models that have used quantity discount as coordination mechanism under deterministic environment and classified the various models.

Burgess et al. (2006) reviewed 100 randomly selected articles from 614 usable articles found in the ABI/Inform Database across a 19-year (1985 to 2003) period. Their sample addressed manufacturing and consumer goods industries, and the research articles reviewed by them focused on a more narrowly defined operations management approach to Supply Chain Management. They classified the articles into four groups, namely (1) Descriptive features of SCM, (2) Definition issues, (3) Theoretical concerns and (4) Research methodological issues. They found SCM to be a relatively young field with exponential growth in interest from researchers in the recent past. The importance of this research in contrast to Burgess et al. (2006) is that instead of sampling 100 articles from a pool of 614 over a 5-year period, we examined 588 articles over 18 years. This not only makes for a more in-depth review, but provides a larger base from which to chart the maturation of the SCM field. It also helps to assess gaps in the literature and project future trends, thereby underscoring the importance and robustness of this study. Finally, Burgess et al., include books, manuscripts and conference proceedings while this research focuses solely on published articles in peer reviewed SCM journals.

In view of this discussion, the authors conclude that a broader view of SCM is needed in order to develop a wider consensus and resolve the present conceptual and research methodological confusion. In contrast to single journal review, or limited random review, this research surveys thirteen academic journals and reviews 588 research-based articles published during an 18-year period from 1991 to mid-2008, thereby covering the entire significant period of SCM emergence to its evolution as a strong discipline. The authors these articles in terms of research method, and data analysis techniques to discover the extent of research trend.

In summary, this research extends the previous literature reviews by:

i. Specifically focusing on multi facet SCM work in scholarly journals,

ii. Reviewing the current 18 years period during which SCM grew as a discipline and academic research in this field gained importance and increased significantly,

iii. Providing an investigation of the research methods and data analysis method used in current literature.

3. Research Methodology

This section presents the methodology used in this research. Initial stage of the process involved data collection. In order to develop an extensive database of academic articles within the SCM field, several citation and identification methods were used. (1) A basic search was carried out using search criteria based on the presence of the phrases "supply chain management" and/or "supply chain" in the abstract and/or title, in order to capture articles concentrating on the broader supply chain concept, and (2) Publication in one of the thirteen listed academic journals. The journal selection was developed after investigating those that had been examined in previously published articles which was supplemented by an intelligent internet scanning of the journals to determine those where articles on SCM appeared during the review period. For example, the Journal Supply Chain Management was studied by Carter and Ellram (2003), while Rungtusanatham et al. (2003) examined six Operation Management Journal. Other academic journals, such as the Journal of Business Logistics, Industrial Marketing Management, the International Journal of Logistics Management and International Journal of Physical Distribution and Logistics Management were selected based on the volume of SCM-oriented articles published in each outlet, as well as their rankings by Baumgartner and Pieter’s (2003) and Kumar and Kwon (2004).

The selected articles were analysed and classified for:

i. Type of Research Methods

ii. Content analysis

3.1 Type of Research performed

Mentzer and Kahn (1995) recommended a typology for classification of research articles based on the type of research. They devised a classification system comprising of five categories namely normative literature, Literature reviews, exploratory studies, Methodological reviews and Hypothesis testing. The explanation of different research methods is given in Table 3.

Table 3. Explanation of Categories of Research Methods

<table>
<thead>
<tr>
<th>No</th>
<th>Category</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normative Literature</td>
<td>&quot;Research that examines what ought to be and what individuals and organizations ought to do&quot; (Mentzer and Kahn 1995).</td>
</tr>
<tr>
<td>2</td>
<td>Literature Reviews</td>
<td>A review and synthesis of existing literature, the result of which is the development of a framework, proposal, or normative prescriptions grounded in the existing literature.</td>
</tr>
<tr>
<td>3</td>
<td>Exploratory Studies</td>
<td>Research that makes observations of supply management for the purpose of developing theories, but leaves the testing of the theories for other studies.</td>
</tr>
<tr>
<td>4</td>
<td>Methodology Reviews</td>
<td>A review of research methodologies used in the field of supply management. A &quot;how to&quot; article includes articles that review introduced an academic research methodology as well as a practical methodology.</td>
</tr>
<tr>
<td>5</td>
<td>Hypothesis Testing</td>
<td>Articles that introduce and then test research hypotheses or propositions.</td>
</tr>
</tbody>
</table>

3.2 Content Analysis
A Content Analysis enables one to determine the nature of content, identify the patterns, and estimate the relationships between the research papers being analysed.

Content analysis methodologies was employed to both code and categorize the selected articles into one of the 15 categories adapted from Carter and Ellram (2003) and displayed in Table 4.

Table 4: Details of Content Categories

<table>
<thead>
<tr>
<th>No.</th>
<th>Category</th>
<th>Description and topics covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SCM Strategy</td>
<td>It includes resource based view, competitive advantage, agency theory and risk management.</td>
</tr>
<tr>
<td>2</td>
<td>SCM Frameworks, Trends and Challenges</td>
<td>It includes future trends, supply chain definitions and benefits/problems of scm.</td>
</tr>
<tr>
<td>3</td>
<td>Alliances or Relationships</td>
<td>It includes commitment, trust, conflict, intra and inter-firm relationship building etc.</td>
</tr>
<tr>
<td>4</td>
<td>Transportations &amp; Logistics</td>
<td>It includes procurement of transportation and logistics services</td>
</tr>
<tr>
<td>5</td>
<td>World Wide Web and E-Commerce</td>
<td>It includes just in time, cycle time supply chain agility and flexibility, inventory management etc.</td>
</tr>
<tr>
<td>6</td>
<td>Time Based Strategy</td>
<td>It includes environmental policies, government regulations recovery and scrap and surplus.</td>
</tr>
<tr>
<td>7</td>
<td>Quality</td>
<td>It includes ISO and quality management practices.</td>
</tr>
<tr>
<td>8</td>
<td>Environmental and Social Responsibility</td>
<td>It includes third party logistic and contract manufacturing.</td>
</tr>
<tr>
<td>9</td>
<td>Outsourcing</td>
<td>It includes supplier selection criteria, supplier training and improvement, supplier monitoring, management and assessment.</td>
</tr>
<tr>
<td>10</td>
<td>Computer Applications and Electronic Data Interchange</td>
<td>It includes use of information technology and computer applications.</td>
</tr>
<tr>
<td>11</td>
<td>Royer Behavior</td>
<td>It includes decision making, purchasing motivation and risk management, including dealing with uncertainty and shortages, new product development, and internal integration.</td>
</tr>
<tr>
<td>12</td>
<td>International/Global Supply Chain</td>
<td>It includes global logistics cultural issues and international logistics.</td>
</tr>
<tr>
<td>13</td>
<td>Manufacturing Resource Planning, Legal and Regulatory Issues</td>
<td>It includes planning of manufacturing resources and all legal and regulatory issues along with negotiations.</td>
</tr>
</tbody>
</table>

4. Observation & Discussion

It is seen from the preliminary discussion that 588 articles were found in 13 journals after selecting for multi-facetedness of the articles, and approximately 370 articles were dropped from the analysis, as they pertained to treatment of only one single parameter. Earlier literature reviews provided the basis of selecting the relevant journals, which was supplemented by an intelligent internet scanning of the journals to determine those where articles on SCM appeared during the review period. A journal-wise count of the short listed SCM articles appearing in these journals is shown in Table 5.

Table 5. Distribution of Reviewed SCM Publications

<table>
<thead>
<tr>
<th>No</th>
<th>Journal Name</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cumulative percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Journal of Supply Chain Management</td>
<td>138</td>
<td>23.46%</td>
<td>23.46%</td>
</tr>
<tr>
<td>2</td>
<td>International Journal of Production Economics</td>
<td>197</td>
<td>32.28%</td>
<td>55.74%</td>
</tr>
<tr>
<td>3</td>
<td>European Journal of Operational Research</td>
<td>74</td>
<td>12.59%</td>
<td>68.33%</td>
</tr>
<tr>
<td>4</td>
<td>Journal of Operations Management</td>
<td>60</td>
<td>10.26%</td>
<td>78.60%</td>
</tr>
<tr>
<td>5</td>
<td>OMEGA</td>
<td>10</td>
<td>1.71%</td>
<td>80.31%</td>
</tr>
<tr>
<td>6</td>
<td>The IJ of Logistics Management</td>
<td>10</td>
<td>1.71%</td>
<td>82.02%</td>
</tr>
<tr>
<td>7</td>
<td>The IJ of Logistics Management</td>
<td>20</td>
<td>3.44%</td>
<td>85.46%</td>
</tr>
<tr>
<td>8</td>
<td>The IJ of Logistics Management</td>
<td>5</td>
<td>0.84%</td>
<td>86.30%</td>
</tr>
</tbody>
</table>

It is seen from Table 5 that 64.50% of the selected articles appeared in only 04 Journals, out of which also, The Journal of Supply Chain Management contributed the lion’s share – 138 articles forming 23.46% of all the 588 articles across 13 journals. However, the wide-ranging interest and activity in SCM is evinced by the fact that there are ten Journals with twenty or more articles.

All the 588 selected journal articles were categorized into the 15 categories specified in section 3.03 above. The category Supply Chain Strategy received maximum attention of the researchers with a total of 127 (21.60%) papers appearing during the survey period on this topic. SCM frameworks, Trends and Challenges were the topic which received the next most attention with a total of 101 papers (17.17%). All other categories individually contribute less than 5%, and collectively 148 papers (25.17%). This is clearly visible in Figure 1.

Fig. 1. Distribution of articles in top six categories

A general rising of interest in almost all the 15 categories is seen from the Table 9. However, the rise of interest in SCM Strategy is much more than in other topics, and when compared to the total trend, we can see the interest very clearly in Figure 2.
4.1 Supply Chain Management Strategy

Given the relative recency of SCM for researchers, as well as how it continues to evolve, Supply Chain Strategy SCM Frameworks, Trends and Challenges should remain an important topic going forward. In other words, at some point in the future, the lines between categories such as these may become blurred because IT and e-commerce are continually integrated into the frameworks and strategies of supply chain. Giunipero et al. (2008) in his review of SCM literature up to 2006 observed that articles on e-commerce peaked in 2004. The authors find from their data which specifically looks at only those papers which address multiple aspects of supply chain gained in numbers only from 2005 and 7, 7, 10 and 8 numbers of papers were published in year 2005, 2006, 2007 and 2008 respectively. This shows that the impact of rapid development of Information Technology has manifested in development in supply chain field and further developments in multidimensional aspects of scm will increase in terms of their value to SCM researchers and managers in the coming years. For a successful integrated supply chain continuous flow of information is necessary. Our study confirms the observation of Giunipero et al. (2008) that traditional areas such as Quality, Human resource and Supplier Development areas have remained fairly stable, and this trend continues. However, the field of Environmental and Social Responsibility has seen an increased activity, reflecting the heightened government and public concerns and industry awareness in these areas. (Cruz, 2008), Literature on green supply chain is emerging (Zhu and Sarker, 2004) and gaining prominence and represents a research area with a huge potential.

There was very little discussion on the global supply chain up to 2006 (Giunipero et al., 2008). Our study found no appreciable increase in numbers of papers published in this field in 2007 (publication =4) and in year 2008 (publication=3). Therefore, this field is still developing and has a lot of potential for research. This confirms the findings of Giunipero et al (2008) that this field should continue to see increased activity given the increased emphasis on global business.

Integrating supply chain strategy with the overall firm strategy is an important consideration to maximize profitability (Tan et al. 1998). This has resulted in a sharp increase in the literature concerning SCM Strategy, and 21. 6% of the articles included in our literature review are seen to belong to this category, even though Time-based strategies have been separately categorized and add an additional 6.71%, making the attention on Strategy as 28.31% of the total articles. The articles dealing with strategy are observed to be concentrating on various aspects, mainly on Risk Management in Supply Chains, Competitive Advantages, Resource based Views and Agency theory, Strategic Alliances, Strategic Alliances (Sandelands 1994; Carr and Pearson 1999), Strategic Performance Measures (Tan, Kannan and Handfield 1998; Gunasekaran, Patel and Tirtiroglu 2001) and Supply Chain Forecasting (McCarthy and Golicic 2002). Gong (2008) highlights flexibility as an important determinant of Strategy and proposes an economic model for evaluation of Supply Chain Flexibility.

Also, most of these articles only investigated strategy alignment between the firm and one key supplier rather than a chain investigation. The idea of a supply chain organization has been presented (Ketchen and Giunipero 2004), but this has yet to be systematically investigated. Additionally, there is still considerable work yet to be done in terms of merging existing strategic management literature with theoretical work being conducted in the SCM field.

4.2 SCM Frameworks, Trends and Challenges

SCM Frameworks, Trends and Challenges represent the second largest area of recent growth within the supply chain field. As shown in Figure 1, 101 of the 588 total articles, or approximately 17.38%, fall into this category. While SCM has, in some form or other, existed for several decades, the true value of SCM to the organization’s growth and profitability targets has been realized only recently with the emergence of global supply chains and information technology advances. The development and mechanics of supply chains have become very complex, and Blackhurst et al. (2005) showed as to how supply chain complexity can make the modeling of the chain a multifaceted task. The authors have concentrated only on those articles which focus on the multi-faceted aspects of the Supply Chain and examine the inter-dependence and co-ordination of two or more facets of the Supply Chain.

Several authors have examined several aspects of the SCM and contributed to enhance overall understanding of multifaceted SCM. This category also includes several definitions and frameworks which were developed for multidimensional SCM (Sanders et.al. (2007). Jüttner and Baker (2007) examine aspect of integrating marketing and supply chain management. Sanders et.al. (2007) suggested a Multidimensional Framework for Understanding Outsourcing Arrangements. Frizzelle and Efstratiou (2007) report a study the impact of operational complexity on the cost in customer supplier systems. Zhao et.al. (2007) discuss the value of early order commitment in a two-level supply chain. Adhitya et.al. (2007) developed a model-based rescheduling framework for managing abnormal supply chain events.

4.3 Supplier Alliances/Relationships

The resurgence of publications in this area was observed by Giunipero et al. (2008) and explained as a result of a general trend within industries of moving away from simple transaction and contractual-based relationships, and toward more long-term relational forms of collaboration between parties involved in supply chain activities. The development of these long-term, strategic relationships between buyers and sellers within the supply chain has been previously shown to offer opportunities to create considerable competitive advantage (Tanner 1999). Ghosal and Moran (1996) cautioned that many firms were recognizing these implications and as a result were attempting to adopt a more collaborative and
Supply chain management is an exploding field, both in research and in practice. Major international consulting firms have developed large practices in the field of supply chain, and the number of research papers in the field is growing rapidly. Firms operate in global environments, deal with multiple suppliers and customers, are required to manage inventories in new and innovative ways, and are faced with possible channel restructuring. The field promises to continue growing as the research advances and as firms continue to apply new knowledge in their global networks. It would be almost impossible to foray into the unknown and predict the future course research in SCM is likely to take. However, there are a few issues within SCM which are identified as suitable and appropriate for further research exploration. Some issues for future research:

### 5.1 Demand Driven Supply Chains

Aligning supply and demand in today’s complex and dynamic manufacturing environment can be challenging at best. Many companies spend much amount of time and resources in an attempt to better predict demand. But still, static forecasts are often out of date within hours of creation, making some question the real value of traditional planning tools as it relates to near-term demand volatility.

### 5.2 Supply chain in Food and Service industry is also a prominent field of research.

While the objectives to be addressed by future research are outlined broadly above, certain barriers exist to deter the research in these fields. With the expansion of the supply chain to a global status, the average researcher is left high and dry, with little or no access to the corporate data, problems and with little resource to look into the status and devise solutions. Large MNC’s tend to be severely confidential and closed, and fend for their own, particularly in the developing economies where the possibilities of research largely exist. Due to this reason, most research has been limited to individual aspects of SCM with limited data, and mostly has been empirical research. Large consultants do have access to corporate working and data, and that is perhaps one reason that more and more information is sought by researchers on the Internet, where one can find secondary and processed data like the reports of major consultants like McKinsey. The researcher community needs to find a way around this problem.

Geographic distances between the different parts of a supply chain present another problem. A normal researcher can work at one location, and trade, tariff, financial and diplomatic barriers often prevent the researcher from accessing the other parts of a global supply chain. Earlier research has suffered from a major drawback pointed out in Giunipero et.al. (2008) who cited Malhotra and Grover (1998) as reporting that 30% of the operations management survey studies they assessed suffered from statistical conclusion errors due to small sample sizes. Tanner (1999) suggested involving trade associations to increase access to more companies and increase sample sizes.

### 6. Conclusion

The review of literature and its categorization has highlighted the popularity of SCM as a field of research. SCM Strategy, SCM Frameworks, Trends and Challenges; Alliances/Relationships and WWW and E-commerce are the principal areas of research and publication in the SCM domain. In this paper attempt has been made to review the literature on SCM. We have presented a literature classification scheme in line with the suggestion made by Mentzer & Kahn (1995). We have categorized the articles in five methodologies of SCM i.e. Exploratory, Normative, Methodology, Literature Review and Hypothesis testing.
A literature review reveals a considerable spurt in research in theory and practice of SCM. Combining and informing on features of Supply Management and distribution Management. This integration has resulted in the concept of extended enterprise and the supply chain is now manifest as the collaborative supply chain across intercompany borders to maximize the value across the entire supply chain.

We hope this study contributes to a better understanding of the direction in SCM research. Regarding the methodologies used by researchers, the Exploratory reviews have been the most used, followed by the Normative study, Methodological reviews, Literature review and Hypothesis testing. This literature review finds that exploratory type of research is mostly preferred it is expected that with the maturity of SCM the hypothesis testing method will pick up. Content wise categorization revealed that paper on supply chain strategy dominates over others so the papers in the field of supplier development and management and environmental and social responsible categories should also be promoted.

There is an increased interest in SCM and Internet by academicians and practitioners. Some directions for further research that we have identified are: to conduct empirical studies about the impact of Internet on several e-SCM processes, as for example the reverse and demand management processes which, so far, have only been considered by a couple of authors. Another important area of research is the application of decision models and technologies on Internet. As more and more firms have high quality and real-time information available, the use of these decision technologies will increase, since they add significant value to the members of a supply chain.

The SCM is continuously redefining itself. Past literature reviews provided valuable results, they were based upon the random selection of articles, book chapters and conference proceedings (Croom et al. 2000; Burgess et al., 2006). Other literature reviews were either more focused on operations management or examined a single journal (Carter and Ellram 2003; Rungtusanatham et al., 2003). A review of suspended data collection in 2003 (Burgess et al. 2006) was carried out. The aim of this study was to provide an up-to-date and extensive review of the SCM literature that was focused on a broad definition of the SCM concept. Also, the most recent literature review was given by Giunipero et al. (2008) in which they had given past present and future implications of SCM.

It is our hope that researchers will use the gaps identified herein to generate much needed conceptual and empirical work in the SCM literature, thereby creating a body of literature that is more heavily influenced by a deeper analysis of the supply chain on a chain wide or network basis.

References


