SCMI: a study to improve the integration of the SCs

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Abstract

The Supply Chain Management Integration (SCMI) has been widely discussed in academic circles in recent years, given the need to raise the level of integration between members seeking the best results for the entire supply chain. However, there is no agreement for the definitions of SCMI found in literature, making each author to present different characteristics, which implies difficulty in determining higher levels of integration between supply chain members. Therefore, this paper aims to survey the approaches of SCMI, seeking to align the similarities and differences between existing definitions. This survey was conducted using the bibliometric review system that uses statistical methods to objectively evaluate scientific production. Thus, it was identified that SCMI is basically composed of four aspects - (1) trust, (2) information sharing, (3) partnership, (4) cooperation, collaboration, and coordination - and the definitions of each of these is also conflicting. Therefore was sought initially to find a consensus between the definitions of the aspects of SCMI and out of that to propose a new definition that includes them all.

Keywords
Supply chain management integration, trust, information sharing, partnership, collaboration.

1. Introduction

The supply chain management (SCM) is a topic increasingly attention in the Academic medium due to the provided progress to the partaker companies in the value generation to the final client and more gains to the chain. However, to reach those gains it is needed to form integration between its members. Because, it is not enough a good business strategy to improve the internal structure, it is needed to have integration with suppliers and customers to achieve success [1].

Although, the meaning of supply chain management integration (SCMI) is not yet set, not having a literature consensus about its characteristics. Many authors say every company is part of a supply chain (SC) [2-6]. But, it cannot be said if there is no integration between its members, because it is the integration level in the links that will define the SCM’s gains.

The SCM seeks to improve the relationships in the supply chains, integrating every activity that is composed by it, coordinating the products flow along the supply to get competitive and profitability advantage to every members [7]. However, generally, the SCs are poor integrated and becomes a problem to its management [8], once the loosenesses are smaller, improving the planning significance related to unexpected events [9].

The interruption size and the request for agility is bigger, and the SC’s high complexity is also a factor to make it more risk prone and show the difficult to reach satisfactory performance levels [10]. Therefore, it is needed to increase the relationship level of the supply chain’s members with the focal company, reflecting the integration degree between companies, being the improvement and the partnership commitment requirements to the SCMI [11].

To be integrated in an SC means to work in conjoint, seeking a common goal through coordination and management of products flow, service, information and financial control from the main businesses processes between the focal company and its main suppliers and customers. But, how to do it?

It is found in the literature many SCMI definitions involving cooperation [12-14], coordination [4, 7, 15], collaboration [16], information sharing [4, 17, 18], partnership [11] and each one of its characteristics requires trust. However, there is no consensus among the presented definitions, making it harder to rise the SCM integration level. Therefore, this article seeks to answer the following questioning: What definitions and characteristics guide the SCMI?
2. Literature review

The SCM must be focused on an organizational restructuring, with actions going beyond internal activities optimization, integrating itself to the focal with its members upstream and downstream to make it possible to synchronize and to control every part flow [1, 19]. Hereby, offer and demand may be strategically managed [2]. However, to be part of an inter-organizational set-up, the companies must share resources, as such infrastructure, intangible assets and organizational competencies [20].

Although the SCM benefits are very attractive like, stock decrease, delivery services improvement and reduction in product development cycle, the companies still struggle to keep supply chains partnerships, as such, lack of confidence, change resistance, culture and collaboration difficulties [21]. The setting of SCM’s internal goals and guidelines to information exchange are fundamental to rise its execution level [22], considering mainly the information flow management is seen as strategic to big companies [23].

However, it is easier to perceive them investing on technological advancements to create competitive advantage, rather management of internal and external relationship, because they lack the knowledge to practices to acquire value and, with that, always seek fast and urgent solutions, undermining its potentials [24].

The integration with suppliers is a key element to deliver products with higher performance, however, some criteria deserve attention to be well succeeded, such as SCM’s mentality development, communication openness, collaborative action and higher confidence levels [25].

To work well it is needed to make the information flow along the chain, integrating every member, for the integration increases effectiveness and improves performance’s SC [26]. However, its main difficulty is to break through the idea that is better to work individually rather in partnership [27], implying on lack of coordination among its members, which is the most important factor to get an effective and efficient supply chain [28].

Many are the definitions to SCMI found in the literature, as can be seen in Table 1. However, there is no consensus among them. Some address about SC’s flow management but usually put aside the strategic integration factor [16].

<table>
<thead>
<tr>
<th>Definition</th>
<th>Reference</th>
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<tbody>
<tr>
<td>Consists on cooperation between buyers and suppliers, product joint development, common systems and information sharing.</td>
<td>[12]</td>
</tr>
<tr>
<td>Action integrations among suppliers and customers and also processes, sharing informations along SC, splitting risks and earnings based on long term relationships.</td>
<td>[29]</td>
</tr>
<tr>
<td>It is a strategic tool seeking to minimize costs, increasing earnings, linking every chain member, from the supplier up to the final consumer.</td>
<td>[30]</td>
</tr>
<tr>
<td>It does not involve just internal activities in a company, but seeks to coordinate all chain’s activities.</td>
<td>[15]</td>
</tr>
<tr>
<td>It involves flow integration which can be information, material and financial; processes and activities integration; technologies and systems integration; and actors integration, as in organizations and structures.</td>
<td>[17]</td>
</tr>
<tr>
<td>It is about the cooperative work seeking results that are beneficial to both parts.</td>
<td>[13]</td>
</tr>
<tr>
<td>Strategic collaboration degree of a manufacturer with its partners in the chain and management of intra and interorganizational processes, seeking effective flows and efficient products, services, informations, decisions and financials, to generate value to the customer.</td>
<td>[16]</td>
</tr>
<tr>
<td>Improvement in cooperation relationship with suppliers and costumer.</td>
<td>[14]</td>
</tr>
<tr>
<td>Information broadcast in all business’ functions with the goal to ease the goods and services flow along the chain.</td>
<td>[18]</td>
</tr>
<tr>
<td>Coordination and management flow of products, services, information and financial from main business’ processes among the focal company and its mains suppliers and customers.</td>
<td>[4]</td>
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</table>

As it can be seen, there is no consensus among the authors about what is supply chain management integration, however, some characteristics repeat themselves regularly, as shown in Table 2.
Tabela 2 – SCMI Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Reference</th>
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<tbody>
<tr>
<td>Trust</td>
<td>[19, 25]</td>
</tr>
<tr>
<td>Information Sharing</td>
<td>[4, 16, 17, 25, 26, 31-35]</td>
</tr>
<tr>
<td>Information Sharing through IT</td>
<td>[34, 36-38]</td>
</tr>
<tr>
<td>Partnership</td>
<td>[4, 11, 14, 19, 27, 39]</td>
</tr>
<tr>
<td>Cooperation</td>
<td>[4, 12-14, 33, 34, 40]</td>
</tr>
<tr>
<td>Coordination</td>
<td>[4, 15]</td>
</tr>
<tr>
<td>Collaboration</td>
<td>[1, 4, 16, 25, 32, 36, 40]</td>
</tr>
</tbody>
</table>

One characteristic displayed in the Table 2 but not directly quoted in the SCMI’s definitions is the Trust, because it is an inherent characteristic to others, pointed by many authors as a requisite to the information sharing [41-44], partnership [45-48], coordination [49] and collaboration [24, 45, 50].

The trust is fundamental to reach SCMI because its absence creates broken chains [51]. Nevertheless, to establish the trust among the SC’s members is not very simple, because it is needed to evaluate the risk to decide about the trust intensity then [52]. This concept applied to the relationship management between companies constitutes the base to SCMI building, once, to work as a joint is needed to depend on others to reach its goals and, they are the managers actions that will set if this way is more or less reliable [53].

Despite this feature significance to the integration, many authors do not regard their characteristics at the time to make out their concepts. The Table 3 gathers some definitions found in the literature to trust.

Tabela 3 – Trust Definitions

<table>
<thead>
<tr>
<th>Reference</th>
<th>Definition</th>
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<tbody>
<tr>
<td>[54]</td>
<td>“Belief in moral probity, in sincerity, loyalty, competency; that something will not fail, that is well done or strong enough to fulfill its function”.</td>
</tr>
<tr>
<td>[53]</td>
<td>Availability of a part to be vulnerable, assuming the other part will play an action in its favor, without opportunism.</td>
</tr>
<tr>
<td>[49]</td>
<td>It is to worry about the welfare of other members of the chain, always considering the impact of its actions upon others.</td>
</tr>
<tr>
<td>[51]</td>
<td>To consider the one’s necessities and strive to satisfy them.</td>
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</table>

The information sharing is among the SCMI’s characteristics most quoted in the literature. Being defined as the degree where the informations are available within the SC, evaluating cautiously the relationship between risks and benefits of this action [55]. In the higher integration levels it is possible to identify the information systems usage to perform this exchange. However, it is needed to exist trust and coordination [44].

A step ahead in the SCMI building is the partnership shaping that has as requisite the free information sharing as way to widen the supply chain capacity to attend the final customer needs [50].

The relationship among the supply chain members may be faced as a partnership when the parts interact both short term and long term and, as this form makes to the opportunist behavior, to succeed it is important to have an elevated trust level among the parts [46].

Partnerships development is fundamental to deal with supply chains problems, seeking companies that are complementary in their assets and strategic alignment [56]. Whilst one traditional relationship choses suppliers according to prices, makes deals in short terms, has many suppliers and individualized informations, in a partnership the suppliers are picked based on many criteria, agreement are made in long terms, lesser suppliers and shared informations. [57].

The lack of understanding depth about the partnership concept may take the companies to believe it prevents the creation of more profitable relationships, however, it is needed to perceive that the partnership works to highlight the strengths of each one and not make up individuals weaknesses, such as lack of trust, lack of communication, etc. [56].

Therefore, refers to partnership as a long term relationship between two or more independent companies, who has as common goals and shared benefits equally among them [48, 56, 57], being considered effective when they share information systematically [58].
The last three SCMI characteristics, highlighted in Table 2 are cooperation, coordination and collaboration. Those characteristics show some singularity concerning others, because some authors use to work them as a set, while in different manners [50, 59, 60]. Table 4 gathers the definitions found in the literature to every each of them.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Cooperation</th>
<th>Coordination</th>
<th>Collaboration</th>
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<tbody>
<tr>
<td>[59]</td>
<td>Group effort integration to reach a common goal</td>
<td>Various tasks assigned to different members where one determines who does what</td>
<td>The group members have the same assignments and the joint work leads to the final goal.</td>
</tr>
<tr>
<td>[43, 50]</td>
<td>Mutual comprehension interactions among partners where’s the perception of each other necessities</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>[50]</td>
<td>Long term relationships where companies seek strategic advantage building to the whole chain</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>[49]</td>
<td>Each member must consider the impact of its actions, avoiding the pursuit of personal improvement, because it may lead to a poor performance, even if each one gives its best</td>
<td>Goals and incentives alignment, better information accuracy, improvement on operational performance, price strategy planning to stabilize orders, strategic and trust partnership creation</td>
<td>-</td>
</tr>
<tr>
<td>[61]</td>
<td>-</td>
<td>All decisions are aligned towards the best to all members</td>
<td>-</td>
</tr>
<tr>
<td>[62]</td>
<td>-</td>
<td>-</td>
<td>Information Exchange between two or more companies, about planning, management, performance execution and measurement, it is about long term relationships among companies with common goals.</td>
</tr>
<tr>
<td>[45]</td>
<td>-</td>
<td>-</td>
<td>Joint working overtime seeking to fulfill customer’s necessities.</td>
</tr>
<tr>
<td>[63]</td>
<td>-</td>
<td>-</td>
<td>Capacity to work beyond organizational borders to build better added value and increase to comply with customer’s necessities. It is not only about transactions management but new approaches development and implementation to problem solving, having the trust as a basic principle, may be ruled by contracts or informally.</td>
</tr>
<tr>
<td>[64]</td>
<td>-</td>
<td>-</td>
<td>Exchange between two or more companies seeking to work together to reach benefit that cannot be reached individually.</td>
</tr>
</tbody>
</table>
It is noted the cooperation and collaboration are nearly synonyms, mainly concerning actions towards integration, it is impossible to dissociate them. However, cooperation or collaboration without coordination may not imply the best results from those actions, because the lack of focus and organization might create efficiency loss in the joint actions.

This way, comes the necessity to review the SCMI related concepts aligned to similarity and divergences among the available definitions to be determined to reach higher integration levels between the supply chain members.

3. Methodology

A theoretical framework building needs a structured process to select the higher academic material relevance about the subject found spreaded through the many broadcast mediums [65]. Therefore, the research selection method is one of the main decisions to be taken in its building process [66], because the data gathering needs a careful and systematic planning in achieving the research [67].

This way, the ProKnow-C Knowledge Development Process-Constructivist was picked [68], making possible the information systematization in a simple way through the bibliometric techniques and the researcher judgement as to what is relevant [69]. The steps to this procedure are described in the Figure 1.

![Figure 1 – ProKnow-C Article Process Selection](image)

The review started by the main data bases identifications about the subject: Web of Science, Scopus, Emerald and Science Direct. Following, it was set the key words to be used. The first search used “supply chain” in the title and “integration” in the abstract, considering the period from 2008 to 2012. It was found 1085 titles that were exported and went by a filtering process, starting by removing repetitions and titles not aligned with the theme, leaving 473.

In the following step it was checked the scientific articles reliability through the citations numbers, taking consideration those with 80% citations total, corresponding to 126 articles. From the remaining set, were selected 182 articles because they were published after 2011 and, that way, they had no time have a significant proven by the number of citation.

These two sets with 308 titles went ahead to the next step, abstract review, eliminating 193 reviews, leaving 115 articles to full review. From their review were identified the SCMI characteristics accounted in this research – trust, information sharing, partnership, collaboration, coordination, and cooperation – using the same research procedure, relating each one to “supply chain”.

The articles selected, according to the process indicated in Figure 1, allowed the evidence to the lack of consensus in the actual literature towards the SCMI definition, identified in another researches [4, 16],
above the existing difficulty to determine each one of the characteristics that made up the integration, hindering complexity understanding to build up integrated supply chains.

4. Discussion

The SCMI is a subject being broadly discussed in the academic medium in the latter years given the necessity to rise the integration level among the members seeking to get better results to the whole supply chain. However, there is no consensus to the SCMI definitions found in literature, letting each author hold different characteristics, implying difficult in determining higher integration levels between supply chain members.

From reading the first set of articles selected with the ProKnow-C were identified some characteristics regularly quoted, but hardly show up together in the very work, they are: trust, information sharing (in some cases, surrounding the use of IT), partnership, cooperation, coordination and collaboration.

For this, it is considered to understand the SCMI depth it is needed, firstly, understand individually each one of these concepts, performing a new procedure for selection of articles for each of the aforementioned characteristics. This way, the definitions found in literature to each one of them were highlighted.

The first remarked concept was trust. From the presented definitions is identified aspects as moral, loyalty, competence, one’s necessity consideration, but, by other side, to rely on imply in greater vulnerability, to give one to benefit from the situation trusting he will not do. Thus, trust among supply chains members is actions made to benefit the partner believing it will not use it on its own benefit, but will use it in a positive way to both.

The information sharing is the SCMI characteristic where there is less literature divergence. However, it is important to remark some criteria must be highlighted, such as: content, quality and technology support to information sharing [70]. It implies to say that the information flow through SC is not simple, but the strategic information flow, promoting the making of competitive advantage as performance measures [41, 71], operational and strategic decisions [61, 72], productivity capacity availability [41, 60, 61, 71], stock levels [41, 60, 61, 71], costs information [61, 71], demand projections [41, 60, 61, 71] and production information [41, 61]. This way, the information sharing in supply chains consists on strategic informations exchange to benefit making competitive advantage to the chain as a whole.

The third SCMI characteristic highlighted is the partnership among members showing an evolution in the SC integration level, being determined as a long term relationship, where there is higher trust and information sharing levels, with compromising from both parts, allowing fulfillment relationship set ups and problem solving as a group, seeking continuous improvement and benefits to the whole chain.

Cooperation and collaboration deal with the joint effort towards a common goal, just as the partnership. However, they include the consideration of the need of others, avoiding the search for individual improvement, where there is free information sharing and higher trust, working beyond organizational borders, implementing new approaches to problem solving, reaching benefits that could not be reached individually. Nevertheless, it is needed coordination to ensure decisions alignment and strategic planning, assuring greater gains to the whole chain.

From the concept gathering it may be concluded that SCMI surrounds trust, information sharing, partnership, cooperation, collaboration and coordination. Emphasizing on integration beginning with trust among members, allowing to start the information sharing promoting competitive advantage to the SC as a whole, this way, is built a relationship partnership with compromising from both parts with the goal to create value by the chain to the final customer, reaching cooperation and collaboration allowing results still better when there is coordination on the taken actions.

5. Conclusion

The rise on SCMI is an increasing necessity to improve the supply chain results, allowing them to maintain themselves competitiveness. However, the definitions shown in literature are still very conflicting, not covering all integration aspects between SC members.
Proceedings of the 2014 Industrial and Systems Engineering Research Conference
F. P. Arantes, M. S. A. Leite and J. L. Maciel, eds.

This work searched to find the SCMI characteristics and understand the meaning of each one of them, giving a new integration concept that enfolds each one of these. From that, it was possible to notice the cumulative nature of the integration characteristics, because it is possible to identify trust among supply chain members of a chain which has not information sharing, partnership or collaboration, but none of these aspects will be identified in the relationship if there is no trust. As well as it is required to have information sharing to be partnership or collaboration.

Thus, SCMI can be defined as a relationship with a high level of confidence, information sharing and partnership, culminating in shares of cooperation, collaboration and coordination among all members of the SC.

The identification of this cumulative relationship between SCMI characteristics allow to follow the researches to rise integration among supply chains members. A detailed study towards each one of them will provide a better understanding about how to reach more integrated supply chains, improving results to the whole chain.

References


