

## INTERNAL INTEGRATION IN SUPPLY CHAIN INTEGRATION: A SYSTEMATIC LITERATURE REVIEW

## INTEGRAÇÃO INTERNA NA CADEIA DE SUPRIMENTOS INTEGRADA: UMA REVISÃO SISTEMÁTICA DE LITERATURA

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## **ABSTRACT**

Supply Chain Integration (SCI) is a topic that gains growing attention in studies related to Supply Chain Management (SCM). The discussions about integration are divided into two categories: (i) external integration, which refers to integration between firms and external partners including suppliers and customers, and (ii) internal integration, which refers to integration among firms' internal functions. However, the understanding of what influences SCI remains incomplete. This paper aims to investigate the theories about internal integration in SCI based on a Systematic Literature Review. The search covered the 1990-2016 period and the analysis of the articles selected resulted in the systematization of three factors of internal integration to SCI: (i) enablers factors, (ii) barriers and (iii) influence of the human factor. The results may help researchers and practitioners to design an internal organization setting that improves the performance of supply chain practices.

**Keywords:** Supply Chain Management. Supply Chain Integration. Internal Integration. Systematic Literature Review.

## RESUMO

A Integração da Cadeia de Suprimentos (SCI) é um tópico que ganha crescente atenção em estudos relacionados ao Gerenciamento da Cadeia de Suprimentos (SCM). As discussões sobre integração são divididas em duas categorias: (i) integração externa, que se refere à integração entre empresas e parceiros externos, incluindo fornecedores e clientes, e (ii) integração interna, que se refere à integração entre as funções internas das empresas. No entanto, a compreensão do que influencia a SCI permanece incompleta. Este artigo tem como objetivo investigar as teorias sobre integração interna em SCI com base em uma revisão sistemática de literatura. A pesquisa cobriu o período 1990-2016 e a análise dos artigos selecionados resultou na sistematização de três fatores de integração interna para SCI: (i) fatores facilitadores, (ii) barreiras e (iii) influência do fator humano. Os resultados podem ajudar pesquisadores e profissionais a projetarem uma organização interna que melhore o desempenho das práticas da cadeia de suprimentos.

**Palavras-chave:** Gestão da cadeia de Suprimentos. Integração da Cadeia de Suprimentos. Integração interna. Revisão sistemática da literatura.

## 1. Introduction

Supply Chain Management (SCM) is described as a process of upstream to downstream, which is composed of intra- and inter-operational steps sequentially interconnected (LAMBERT, 2008; KOTZAB et al., 2015). The flows that promote the exchange of material, financial resources and information are understood by two points of view: (1) internal to the company, between functional areas with activities related to the SCM, and (2) external to the company, between the links that compose the supply chain (BARRAT; BARRAT, 2011; YANG; YEO; VINH, 2015). These ideas may be observed in different definitions of SCM (Table 1).

**Table 1.** Notion of integration in the definitions and frameworks of SCM

Authors/Frameworks	Definition
Mentzer et al. (2001)	Supply Chain Management is defined as <u>the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain</u> , for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole.
GCSF* (Lambert, 2008)	Supply Chain Management is the <u>integration of key business processes from end-user through original suppliers</u> that provides products, services, and information that add value for customers and other stakeholders.
SCOR** (Lambert; Garcia-Dastugue; Croxton, 2005)	The model enables users to <u>improve and communicate the management practices of supply chain within the company and among all stakeholders</u> , from simple supply chains to the most complex.

(emphasis ours)

Notes: \* Global Supply Chain Forum

\*\* Supply Chain Operations Reference

The relationship between the internal integration and external integration results in the concept of Supply Chain Integration (SCI). This concept is considered a key factor for the success of SCM (FLYNN; HUO; ZHAO, 2010; DANESE; BORTOLOTTI, 2014). Its relevance has been widely discussed, and some empirical research confirms that the higher the level of integration, the better the performance of companies, and it also contributes to the supply chain process (FABBE-COSTES; JAHRE, 2008).

Many authors have maintained that the internal integration enables external integration. They believe that there must be an internal preparation in organizations (e.g. KOUFTEROS; VONDEREMBSE; JAYARAM, 2005; JIN; FAWCETT; FAWCETT, 2013; HORN; SCHEFFLER; SCHIELE, 2014; RALSTON et al., 2015). Gimenez (2006) explains that companies need to achieve a high level of collaboration across the internal processes before starting external arrangements in the supply chain. Kotzab et al. (2011, p.241) analyzed the model of construction that includes drivers of SCM adoption and execution. They stress as one of the results, “the importance for supply chain members to “get their house in order” before thinking of or intensifying supply chain partnerships”. Braunscheidel and Suresh (2009) found that internal integration has a positive influence on external integration, which includes supplier and customer integration as two sub categories. In addition, Yunus and Tadisina (2016) found that without an internal culture focused on integration, the efforts towards external integration will occur slowly and in a more complicated way.

In fact, Stevens (1989) highlighted the role of internal integration to SCI which should occur before the external integration with suppliers and customers. Such evolutionary perspective is based on the latest discussions (e.g. ZHAO et al., 2011; BASNET, 2013; VALLET-BELLMUNT; RIVERA-TORRES, 2013; ZSIDISIN et al., 2015). This concept of internal integration before external integration in SCM is also necessary to adopt supply chain practices such as demand management (LEE; KWON; SEVERANCE, 2007), quality management (THEODORAKIOGLOU; GOTZAMANI; TSIOLVAS, 2006), new product development (KOUFTEROS; VONDEREMBSE; JAYARAM, 2005) and customer relationships (WONG; BOON-ITT; WONG, 2011).

Although, there is a recognition of the role of internal integration for the SCI, a better understanding of its characterization in the internal context of companies for SCM is required. In a recent study, Kamal and Irani (2014) retrieved and analyzed a sample of 293 articles about SCI. These articles were published in journals in the field of operations management between 2000 and 2013. Only 75 specifically refer to internal integration, and another 45 refer to both forms of integration.

This paper aims to investigate the literature about the intervening factors of internal integration to SCI based on a Systematic Literature Review (SLR). The difficulty to implement the principles and practices of SCM justifies this research approach, since most initiatives fail or are not completed (KOTZAB et al., 2011; TELLER; KOTZAB; GRANT, 2012). The major causes are intra-organizational, such as collaboration difficulties between functional areas, lack of support from senior management, lack of professional training, among others (FAWCETT; MAGNAN; MCCARTER, 2008; ALFALLA-LUQUE; MEDINA-LOPEZ; SCHRAGE, 2013; TANCO; JURBURG; ESCUDER, 2015). Therefore, the investigation of the internal integration may not exclude the external integration. It means, in fact, parting from a point

recognized by the literature as critical to the effectiveness of SCI and the superior performance of the supply chain, but with the need for greater understanding of the factors involved for its effectiveness (CHEN; DAUGHERTY; LANDRY, 2009; SWINK; SCHOENHERR, 2015). According to Mentzer, Stank and Esper (2008), the factors that define internal integration for SCM are different from the ones that characterize the external integration, thus requiring a specific management effort. Therefore, the results we introduced bring important theoretical and practical contributions.

The structure of the paper is as follows: first, we introduce the background and justify the research theme. The next section presents the research method, followed by the presentation of analysis of papers which were retrieved by the SLR. In the final section, the findings are discussed and conclusions are presented.

## 2. Internal integration for SCI

The concept of internal integration (also mentioned in the literature as intraorganizational or interfunctional) is widely accepted in the field of Organizational Theory. An important concept was created by Lawrence and Lorsch (1967, p.28), presented as "the quality of the collaborating status among departments necessary to perform the effort unit according to the environmental demands." In the SCM context, internal integration is defined as "the degree to which a manufacturer structures its own organizational strategies, practices and processes into collaborative, synchronized processes, in order to fulfill its customers' requirements and efficiently interact with its suppliers" (FLYNN; HUO; ZHAO, 2010, p.59) and "[...] the chain of activities or functions within a company that results in providing a product to the customer. Integration of these functions involves the holistic performance of activities across departmental boundaries" (BASNET, 2013, p.153). In essence, internal integration refers to knowledge and information collaboration and sharing within and between functional areas (BRAGANZA, 2002; PAGELL, 2004). Collaboration refers to the development of unstructured activities of social and affective nature, and implies the existence of close and cohesive relationships. Interaction activities are also part of the internal integration process as formal and coordinated activities. These activities occur between functional areas, such as formal meetings and formation of committees. Both interaction and collaboration, are described as "dimensions" of cross-functional integration (ELLINGER, 2000; VALLET-BELLMUNT; RIVERA-TORRES, 2013).

The benefits of internal integration are mentioned by the literature, such as reducing the ordering cycle, improving communication, creating new product projects quickly, developing better levels of customer service, improving the level of coordination across activities, and increasing involvement of professionals (SABATH; WHIPPLE, 2004; CHEN; DAUGHERTY; ROATH, 2009; JACOBS; YU; CHAVEZ, 2016).

The ideas of SCM as the key business processes proposed by the GSCF and SCOR models demonstrate the difficulty to allocate SCM into a specific functional area. These ideas reinforce the importance of internal integration (TANCO; JURBURG; ESCUDER, 2015). In both models, the execution of business processes depends on the participation of different professionals, each one with its specific prerogative. According to Mentzer, Stank and Esper (2008, p.31), "...SCM is not "owned" by any one discipline or department, but rather is a phenomenon that touches nearly all areas of business". However, the key business processes will only achieve their objectives if

the functional managers are aware of the inputs that their areas promote to the others (LAMBERT, 2008; HUO, 2012).

The search for the effectiveness of SCM practices justifies the internal integration efforts by the companies comprising a supply chain (RICHEY et al., 2009). If successful, they can improve performance and strengthen the competitive advantage of the entire supply chain. Strategic partnership with suppliers, supplier development and customer relationships are practices mentioned in the specialized literature (DROGE; JAYARAM; VICKERY, 2004; THEODORAKIOGLOU; GOTZAMANI; TSIOLVAS, 2006; YU et al., 2013.). Koufteros, Vonderembse and Jayaram (2005) illustrate this context. The authors investigated in a set of 244 plants, the contribution of internal and external integration to develop new product projects. The results showed that if the internal members are not able to generate a consistent project of what they want as a product, already considering customer information, the suppliers can contribute little. The authors (p.123) concluded that “external integration probably would not be realized in the absence of an internal system that not only advocates it but also facilitates it. Efforts to integrate suppliers without an internal integrated sensory and interpretive system may be futile.”

The analysis of the literature indicates that internal integration between areas should occur before the external integration with suppliers and customers in the supply chain (CHILDERHOUSE; TOWILL, 2011; LAI et al., 2012; KIM, 2013). Huo emphasizes that (2012, p.599) “from a cumulative capability perspective, internal integrative capabilities, which focus on a company’s internal process management, are the base from which external integrative capabilities can be developed”. Danese and Bortolotti (2014, p.16-17) found that there is a synergy between internal integration and the adoption of SCM practices, and they suggest a sequence for the adoption of SCI: “[...] to start with internal integration and supply chain planning to obtain preliminary improvements on performance, and afterwards complete the SCI journey by leveraging on customer”. Table 2 presents other examples of research in this perspective.

**Table 2.** Examples of empirical research on internal integration as an antecedent to the external integration

Authors	Integration	Results/contributions
Das et al. (2006)	Integration with suppliers occurs through practices which involves internal integration between purchasing and manufacturing and external initiatives with suppliers	External integration can not be reached without reaching prior internal integration. Therefore, the integration between purchasing and manufacturing is necessary.
Braunscheidel and Suresh (2009)	A company's performance in supply chain depends on three organizational practices: (1) internal integration (2) external integration: with suppliers and key-customers (3) external flexibility: of volume and mix	The authors verified that internal integration significantly contributes to achieving external integration. Internal integration should be the first step before initiating external integration, aiming for greater agility in the supply chain.

Continues

Continuation

Authors	Integration	Results/contributions
Barrat and Barrat (2011)	Internal and external integration to consolidate transparent and trustworthy information which is shared with suppliers and customers. Internal integration depends on interconnections among Marketing/Sales, Purchasing Production and Logistics.	Internal integration among functional areas is related to the increase of external visibility, upstream and downstream of the supply chain.
Wong, Wong and Boon-Itt (2013)	The study investigates the effects of internal and external integration to each company individually or as a group. It focuses on innovation.	Results highlight the importance of internal integration and its relevance by demonstrating that by complementing the efforts of external integration, the company's innovation performance improves.
Horn, Scheffler and Schiele (2014)	The relationship between SCI and the performance of supply chain in a global scale. The necessary actions are: (1) internal integration: common objectives and collaboration among functional areas (2) external integration: collaboration among organizations, especially with suppliers.	Results demonstrated that the internal integration among functional areas is a pre-requisite for external integration success with suppliers in global supply chains. Maturity for the global performance is related to internal integration.
Ralston et al. (2015)	Propose a SCI model in which internal integration is a priority comparing to external integration with suppliers and customers.	The results confirm the theoretical propositions. Comparatively, positive influence was greater in integration with suppliers. Authors assume that internal integration should take place prior to external integration.

### 3. Research method

The literature review is an important step for any kind of research, and it is essential to research in unexplored fields of knowledge (HART, 2009). The SLR method is presented as an alternative to literature review (TRANFIELD; DENYER; SMART, 2003). This method is based on research and analysis of articles in a given area of science in order to define the research limit to develop it from a scientific perspective. It is different from the traditional method, since it adopts a transparent and replicable scientific procedure. In addition the SLR allows the identification of scientific contributions related to a particular subject (DENYER; TRANFIELD, 2009). This method has been used by researchers in SCM (e.g. KAMAL; IRANI, 2014; WONG; WONG; BOON-ITT, 2015). The Journal "Supply Chain Management: An International Journal" dedicated two special editions (v.17, n.4/5, 2012) to articles using SLR. The number of publications in the field may be one of the reasons for this interest. A search on Scopus database with the term "Supply Chain Management" in the title, abstract or keywords resulted in approximately 26,600 papers published from 1990 to 2016.

This study used SLR method proposed by Tranfield, Denyer and Smart (2003), structured in three phases:

- Phase 1 - Planning the review process: (a) preparing the proposal and (b) developing the review protocol;
- Phase 2 - Conducting the review process: (a) identifying, selecting and evaluating the research studies and (b) synthesizing appropriate research studies;
- Phase 3 - Dissemination of the research results: analysis and discussion of results.

The following subsections refer to the explanation of how to develop each phase.

### **3.1 Phase 1: planning the review process**

The research protocol followed these steps: (a) defining relevant keywords, (b) searching two databases and (c) identifying relevant papers. The defined keywords used in the search were: (i) supply chain management, (ii) supply chain integration, (iii) internal integration, (iv) cross-functional integration, (v) intraorganizational integration and (vi) inter-functional integration. We consider the terms (iii), (iv), (v) and (vi) because they are interchangeably.

The list of keywords was developed to identify papers that investigate internal integration in SCI. The two selected databases were Scopus and Web of Science, respectively. The decision criteria used for this search order was the scope of the databases in number of indexed journals. A paper should have at least one combined term to be included in the sample (e.g. supply chain integration and cross-functional integration, supply chain management and intraorganizational integration). These keywords could be in the keywords list, in the title or in the abstract. The search covered the 1990-2016 period, because according to Kim (2013) and Kamal and Irani (2014) 1990 is the origin of the research period for SCI. The articles search and selection procedures for the SLR are described in the next subsection (Table 3).

### **3.2 Phase 2: conducting the review process**

The first selection filters were applied already at the first search. In both databases, the selected areas were "Physical Sciences" and "Social Sciences and Humanities" and the filter to stipulate the period was applied to search since 1990.

Table 3 describes other procedures applied to each database, and it emphasizes the search terms and the exclusion criteria for articles (filters). These criteria were defined based on the possibilities available in each database.

Search Term (Title/Abstract/Keywords)	Database	Result 1	Filters	Result 2
(supply chain management OR supply chain integration) AND (internal integration OR cross-functional integration OR intraorganizational integration OR inter-functional integration )	Scopus	409	- type of document: articles only - type of source: journals only	228
	Web of Science	415	- idioms: English and Spanish - they had appeared in a peer-reviewed journal	273

Considering the 228 pre-selected articles in Scopus (result 2), each abstract was read in order to select the ones that met the research purposes. The articles selected from the reading of the abstracts were read completely. After this step, the final sample was composed of 40 articles, which were considered as relevant to this research. The same procedure was adopted for the articles retrieved in Web of Science. The search added the criteria "eliminate duplication" of articles previously selected in Scopus (23 duplicated articles), resulting in 22 articles. The final sample was composed of 62 papers. Over half of the papers were published in the journals: (i) Supply Chain Management: An International Journal – 12 papers, (ii) Journal of Operations Management – 10 papers, (iii) Journal of Business Logistics – 7 papers and (iv) International Journal of Physical Distribution & Logistics Management – 7 papers. The results of the interpretation of papers found in the SLR (Phase 3) are presented in the next section.

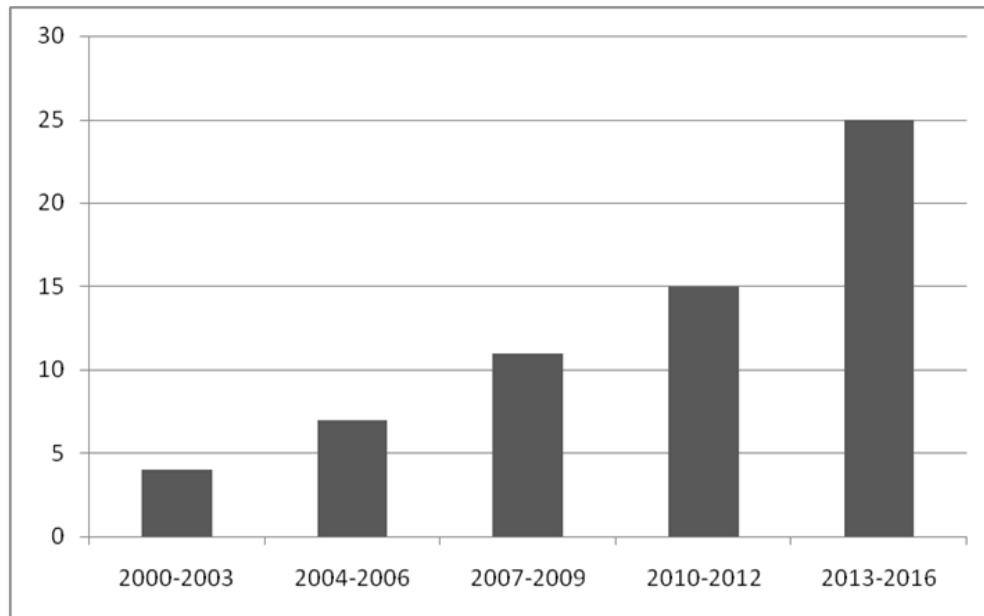
#### 4. Results

The results of this research will be presented in different subsections, according to the identified aspects. These aspects can be subdivided into two categories. The first category concerns the aspects of quantitative nature and characterizes the papers in general (section 4.1). The second category relates to the qualitative variables, i.e., those related to theoretical discussions (section 4.2).

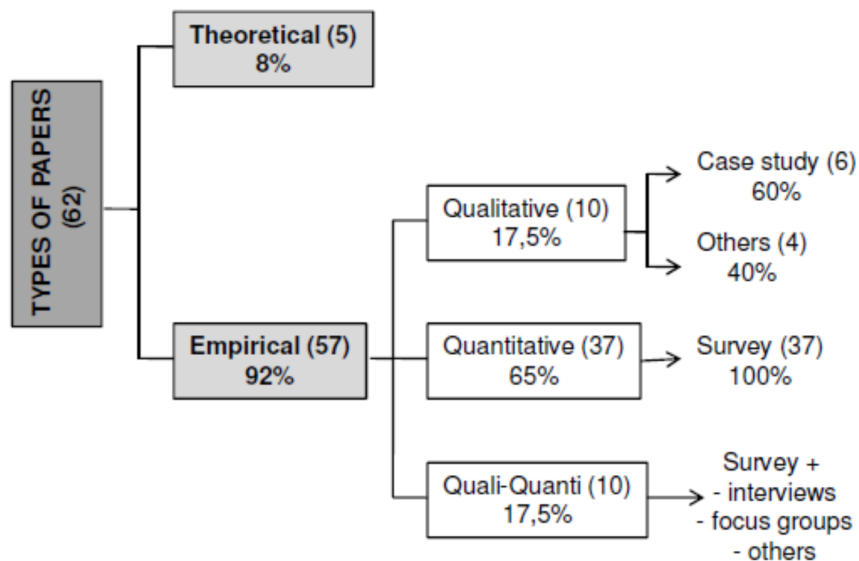
##### 4.1 Years and types of publications

Although the searches have considered the year 1990 as the emergence of the studies, the publications about "Supply Chain Integration" began to be discussed only from the year 2000, more specifically, internal integration for SCM (Figure 1). However, an increasing interest has been observed, as publications increased from 4 articles between the years 2000-2003 to 25 articles between the years 2013 to 2016. This growth of publications can be justified because of the the results obtained in empirical research exemplified in Table 2. In every article, internal integration has played an important role in initiatives with suppliers and/or customers, or in the effectiveness of SCI. As highlights Wong, Wong and Boon-Itt (2013, p.569), "without internal integration, external integration efforts would hit a disintegrative wall at the interface between the two firms".



**Figure 1.** Total number of papers published between 2000 and 2016

The data presented in Figure 2 demonstrate that most of the publications are empirical papers, followed by theoretical papers. This context demonstrates the academic interest in analyzing, from the organizational practice, the pragmatic aspects of internal integration for SCI. The use of quantitative approach is predominant in the empirical research.

**Figure 2.** Classification of types of publication

The difference between these approaches will be presented in the conclusion of this paper, along with proposals for future research. This discussion is related to perceptions and insights presented in the following subsections.

## 4.2 Findings of the intervening factors of internal integration to SCI

The analysis of the discussions of the 62 articles selected from SLR resulted in the systematization of three intervening factors of SCI internal integration: (i) enablers factors, (ii) barriers and (iii) influence of the human factor. Each one will be presented in the following subsections.

### 4.2.1 Enablers factors of internal integration for SCI

Implementation and execution of supply chain practices are elements that guide the understanding of internal integration in SCI (KOTZAB et al., 2015). However, it was only in the 1990s that some companies started to use the integration process to implement the SCM approach (GIMENEZ, 2006).

The basic level of integration is the internal operation of each company. The benefits of that level are related to efficiencies among functions within a company. These processes are based on the strategic alignment of each functional area involved with SCM (BARRAT; BARRAT, 2011; JACOBS; YU; CHAVEZ, 2016). The need for organizational factors is suggested by the authors, and it is considered as an element that encourages the internal integration. However, the internal processes are diffuse in the literature, because they are cited separately in each publication. The major mentioned are:

- *Knowledge and information sharing*: knowledge exchange (tacit and implicit) and the availability of information between professionals from different functional areas. They contribute to improve strategic decisions and operational actions of the SCM (YANG; YEO; VINH, 2015; HUO et al., 2016);
- *Top management support*: awareness and commitment to promoting integration. Representation of Supply Chain managers in top administration of the company (FAWCETT; MAGNAN, 2002; DROGE; JAYARAM; VICKERY, 2004; XU; HUO; SUN, 2014);
- *Multifunctional teams*: formation of working teams of professionals from functional areas more directly related to SCM (CHEN; DAUGHERTY; LANDRY, 2009; FLYNN; HUO; ZHAO, 2010; SWINK; SCHOENHERR, 2015);
- *Support of information systems*: use of information systems to make data and information more efficient. Professionals disseminate information about suppliers and customers between functional areas (LEE; KWON; SEVERANCE, 2007; HUO, 2012; TELLER; KOTZAB; GRANT, 2012);
- *Goal planning and problem solving together*: between functional areas about policy, goals and actions for the operations of the supply chain. Anticipation and problem solving based on responsibilities of each functional area (GIMENEZ, 2006; YU et al., 2013; ZSIDISIN et al., 2015);

- *Organizational structure*: organizational structure less centralized and verticalized. It should encourage the flow of business processes (PAGELL, 2004; DAS; NARASIMHAN; TALLURI, 2006; ZHAO; FENG; WANG, 2015);
- *Alignment metrics and reward systems*: establish internal plans and metrics focused on the SCM goals. Use of common reward systems across functional areas to stimulate multifunctional teams (FAWCETT; MAGNAN; MCCARTER, 2008; ASHENBAUM et al., 2009);
- *Organizational culture*: promote knowledge and information sharing between functional areas and the SCM practices (MOLLENKOPF; RUSSO; FRANKEL, 2007; CAO et al., 2015; YUNUS; TADISINA, 2016);
- *Alignment between organizational strategy and functional goals*: the competitive strategy and every functional strategy must be aligned to construct a coordinated global strategy (ELLINGER, 2000; KOTZAB et al., 2011).

Elmuti, Minnis and Abebe (2008) investigated the impact of SCI on productivity, efficiency and performance of the participants of a chain. They concluded that the introduction of an integrated SCM program requires the introduction of multi-faceted changes in organizational operations. These changes occur in the internal integration patterns between functional areas to then change the external integration patterns with suppliers and other members. Compared to other papers with similar conclusions, the authors started a discussion about the complexity of achieving interfunctional integration, which requires effort, skills and management actions focused on that purpose. The difficulties and barriers to internal integration are discussed in the next section of this paper.

#### 4.2.2 Barriers of SCI internal integration

Although the studies about the barriers of SCI internal integration prescribe and test the factors previously listed, the effectiveness of internal integration related to SCM is a challenge. These challenges occur because internal integration is much more difficult to achieve in practice than theory predicts (FABBE-COSTES; JAHRE, 2008; CHEN; DAUGHERTY; ROATH, 2009). Some of the factors are characterized as barriers, since managers do not pay attention on them, and do not understand the meaning of SCM (RALSTON et al., 2015). That is a paradox based on the fact that companies are able to develop integrated operations with suppliers, but they have difficulty to connect the external process with internal functional areas of the company (FAWCETT; MAGNAN, 2002). Halldórsson, Larson and Poist (2008) discuss the consequences of this scenario, since they proved empirically that internal resistance is more complicated to SCI than the resistances of the external integration with suppliers and customers.

Internal integration is associated with a number of difficulties (BRAGANZA, 2002). Although the matrix structure is indicated as an alternative to overcome the barriers across specializations - which would be perfectly applicable to SCM - little effort can be observed in this regard. However, Richey et al. (2009) explain that internal barriers must be considered and managed before the external ones. Table 4 shows some of the barriers to internal integration for SCI mentioned and discussed in some of the articles from SLR.

**Table 4.** Barriers to internal integration

Authors	Barriers to internal integration							
	Functional silos	Collaboration difficulty	Low level of management support	System evaluation and rewards	Organizational culture	Lack of professional capacity	Resistance to change	Lack of commitment
Fawcett and Magnan (2002)	X	X	X		X			
Pagell (2004)	X		X	X	X			
Sabath and Whipple (2004)		X		X				
Ellinger, Keller and Hansen (2006)		X	X	X				
Gimenez (2006)	X	X		X		X	X	
Fawcett, Magnan and Mccarter (2008)	X	X	X	X	X			X
Halldórsson, Larson and Poist (2008)	X	X	X			X		
Richey et al. (2009)	X	X		X			X	X
Braunscheidel, Suresh and Boisnier (2010)	X				X			
Flynn, Huo and Zhao (2010)	X			X				
Primo (2010)	X	X	X					X
Richey et al. (2010)				X			X	
Thomas et al. (2011)	X	X	X	X		X		

(Continues)

Continuation

Authors	Barriers to internal integration							
	Functional silos	Collaboration difficulty	Low level of management support	System evaluation and rewards	Organizational culture	Lack of professional capacity	Resistance to change	Lack of commitment
Alfalla-Luque, Medina-Lopez and Schrage (2013)	X	X					X	
Jin, Fawcett and Fawcett (2013)	X		X					X
Williams et al. (2013)	X	X						
Hartley et al. (2014)		X	X		X			
Petersen and Autry (2014)	X		X			X		
Cao et al. (2015)					X		X	
Fawcett et al. (2015)	X	X	X		X	X	X	X
Kotzab et al. (2015)	X	X	X					
Tanco, Jurburg and Escuder (2015)	X	X	X			X		
Zhao, Feng and Wang (2015)			X		X			
<b>Total</b>	<b>17</b>	<b>15</b>	<b>14</b>	<b>9</b>	<b>8</b>	<b>6</b>	<b>6</b>	<b>5</b>

### *- Functional silos*

Functional silos and myopic view of the members are among the situations caused by traditional structures (FAWCETT; MAGNAN, 2002). Jin, Fawcett and Fawcett (2013) reinforce this statement, since they emphasize that functional orientation persists although the SCI imperatives. Thomas et al. (2011, p.658) confirmed these statements in practice. They asked 150 managers related to SCM the question: "If we gave you a magic wand and granted you just one wish, what would you wish for to improve your supply chain?" The predominant response was that they would create an internal organizational structure which eliminates the traditional functional silos. Primo (2010) analyzed the integration between an electronic plant and its suppliers. He found that internal disconnection between manufacturing and purchasing is the main barrier to integration with first tier suppliers. Other problems related to functional silos are: disconnection between policies and practices, misalignment in system evaluation and rewards, information loss, difficulty to establish business processes vision and difficulties to meet the demand (PAGELL, 2004; WILLIAMS et al., 2013).

### *- Collaboration difficulty*

Collaboration is characterized by people's willingness to work together, sharing information and knowledge, solving problems and making decisions (HARTLEY et al., 2014). Kotzab et al. (2015) explain that collaboration is an essential aspect of integration. It should occur across the strategic, tactical and operational levels of the companies. The lack of communication between functional areas is one of the main consequences of the lack of cooperation (ELLINGER; KELLER; HANSEN, 2006). Furthermore, the problems of cooperation may jeopardize the effectiveness of the actions established in business processes (SABATH; WHIPPLE, 2004). The aversion to change is one of the explanations for the difficulty in collaboration (FAWCETT; MAGNAN; MCCARTER, 2008; FAWCETT et al., 2015). The role of managers is fundamental to foster human collaboration for information sharing and joint planning (GIMENEZ, 2006).

### *- Low level of management support*

Managers often lack the ability to integrate the business functions in the company. In fact, most professionals are skeptical of the notion of internal integration, and therefore they do not make any efforts towards it (FAWCETT; MAGNAN, 2002; FAWCETT; MAGNAN; MCCARTER, 2008). Because of that, they reinforce the "great divide". Fawcett et al. (2015, p.654) use the term "territoriality" to explain the management trend to non-cooperation. They emphasize that the functional management prevalence, which focus on individual performance goals and rewards encourages these kinds of behaviors. This situation is influenced by the fact that managers' practices guide employees' behavior. Therefore, a negative influence on collaboration is constructed (HARTLEY et al., 2014). However, managers behaviors could be an alternative to overcome the difficulties arising from traditional organizational structures. According to Pagell (2004, p.465), "managers who do not know how strategic decisions are made in other functions may not be tightly integrated into the supply chain".

#### *- System evaluation and rewards*

Differences in metrics and rewards reinforce the existence of functional silos, so they cause problems and conflicts of interest between functional areas. Different incentives for groups may lead them to manipulate information and results for their own benefit (RICHEY et al., 2010). According to Sabath and Whipple (2004), the traditional measurement of performance and reward systems hamper cross-functional coordination by relying on isolated functional achievements rather than on the overall performance of the process. Thus, the challenge lies in the elaboration of metrics and rewards based on departments, which are focused on integrated processes, and carried out by multifunctional teams (THOMAS et al., 2011). However, selecting synchronized performance measures is a challenge due to the inherent complexity of SCM (FLYNN; HUO; ZHAO, 2010).

#### *- Organizational culture*

For Cao et al. (2015), the influence of organizational culture in SCI initiatives has not been investigated in the literature or considered by companies. That happens because the concept of culture is intangible. As a result, the capacity for organizational flexibility is nonexistent, although essential for SCM integration (BRAUNSCHEIDEL; SURESH; BOISNIER, 2010; ZHAO; FENG; WANG, 2015). The difficulty to encourage collaborative cultural relationships is also discussed by Fawcett et al. (2015, p.659). In an empirical, qualitative investigation, the authors realized that “socio-structural resistors not only limit the establishment of relational routines but also negatively influence an organization’s culture and its ability to nurture a collaborative workforce.”

#### *- Lack of professional capacity*

Having the right people is a critical issue for supply chain performance (TANCO; JURBURG; ESCUDER, 2015). For Halldórsson, Larson and Poist (2008) there are three main barriers to internal integration: functional silos, lack of a common understanding of SCM and inadequate professional skills. For the authors, they are connected: inadequate professional skills promote functional silos which prevent the collective thought about SCM. According to Petersen and Autry (2014), the professionals' specialized performance is not only due to professional experience in specific functional areas. It is also related to learning gaps in higher education, as well as fragmented academic discussion about the subject. The challenge is how to overcome a functional specialization trend to achieve collaborative relationships and interactive actions.

#### *- Resistance to change*

Aversion to change is also common in SCM initiatives (CAO et al., 2015). The adoption of an integrative philosophy implies dramatic changes in the ways people work. Before they feel comfortable and confident of working in an integrated manner, the process of change causes dissatisfaction to and resistance from employees (RICHEY et al., 2009). Alfalla-Luque, Medina-Lopez and Schrage (2013) researched the SCI in the aeronautical sector. They found that most external integration difficulties with suppliers are consequences of the resistance to change internal practices and work processes, including at the management level. These resistances are not only

related to the operational aspect, but also to the relational aspect among professionals in different functional areas. Gimenez (2006) suggests that the change processes aimed to improve integration must be managed to reduce people's resistances.

#### *- Lack of commitment*

The term commitment in the SCM context refers to an implicit or explicit guarantee to establish and maintain collaborative relationships among partners in the supply chain (PRIMO, 2010). Therefore, it is applied in behavioral aspects and in the intra-organizational context of collaboration for integration (FAWCETT; MAGNAN; MCCARTER, 2008). According to Jin, Fawcett and Fawcett (2013), most companies fail when they try to establish programs to increase commitment to SCI activities. For the authors, this commitment is characterized by the presence of human relationship skills and integrative operational routines.

A careful analysis of both factors and the barriers of internal integration for SCI allows the researcher to observe the human factor as a key element. The technology, information and measurement systems are recognized by managers as potential barriers to SCM when they are not managed properly. Human factors such as confidence, aversion to change, willingness to collaborate are still neglected (FAWCETT; MAGNAN; MCCARTER, 2008, p.45). As indicated by the authors, "while SCM is enabled by modern information technology, SCM success is founded on people".

### **4.2.3 Influence of the human factor**

SCI involves organizations, processes, technology and people (YANG; YEO; VINH, 2015). For Fawcett et al. (2015), the relationship between structural factors and human factor, either to prevent or to effect collaboration, is inseparable. Das, Narasimhan and Talluri (2006) indicate that several researches in SCM show that individual skills and initiatives are more common to integration than other resources. In an empirical study by Halldórsson, Larson and Poist (2008, p.137), the authors observed that "people appear to be more important than computers in SCM implementation".

The relational nature of SCI justifies the human factor influence on the success or failure of SCM practices. For Ellinger, Keller and Hansen (2006), the involvement of employees can modify the internal structure of organizations, so they can share information and solve problems collectively. The emphasis on open communication among people from different functional areas as an internal integration facilitator for the SCI is also demonstrated by Horn, Scheffler and Schiele (2014) and Zsidisin et al. (2015). That idea reinforces the emphasis of the human capital in SCI. Basnet (2013, p.169) identified the need for "affective relationship within the functions" as one of the aspects of internal integration in supply chain. Therefore, these kinds of relationships are worthy of further study. Huo (2012) and Richey et al. (2010) share the same ideas, since they observed that the human factor must be considered by SCI constructs. They suggest the development of social norms that encourage cooperative relationships such as predisposition to collaborative work and information sharing. According Huo



et al. (2016), strategic partnerships, communication, and working together are the three major tasks required for SCI. These tasks lead to interaction between different functions for internal integration such as strategic collaboration and cooperative work. Therefore, they are human behaviors.

Given the recognition of the importance of the human factor in SCI, authors have suggested the search for Human Resources (HR) (THEODORAKIOGLOU; GOTZAMANI; TSIOLVAS, 2006; THOMAS et al., 2011; JACOBS; YU; CHAVEZ, 2016) especially the human resources practices (PAGELL, 2004; HANDFIELD et. al., 2015). For example, Ellinger (2000) examined the relationship between HR practices of "performance evaluation" and "compensation" as incentives for cross-functional collaboration between the areas of Marketing and Logistics. Ashenbaum et al. (2009) suggest HR practices of "compensation" based on multifunctional team performance as a way to encourage internal integration.

## 5. Discussion and conclusions

SCI has been viewed as an essential component for enhancing organization competitiveness and performance. As a consequence, organizations recognize that integrating SC is a key strategic issue. However, the understanding of what influences SCI remains incomplete. Most of the research on SCI emphasizes practices related to external integration between the upstream and downstream links (HORN; SCHEFFLER; SCHIELE, 2014). From this view, the SCM has been limited to the management of external links, neglecting the role of internal integration. On the other hand, the recognition of the need for a better understanding of the role of internal integration in SCM is a trend in the literature (WILLIAMS et al., 2013; SWINK; SCHOENHERR, 2015).

In this research, the main goal was to identify, among the papers on the theme of SCI, the ones addressing internal integration and to identify the main aspects they discussed. The presented discussion is based on SCI in order to achieve the desired performance with SCM. This full integration results from the interconnection between internal integration and external integration. Several authors have advocated the need for a better understanding of internal integration dynamics in the SCI context. They demonstrated the difficulty to implement practices and supply chain projects because of the lack of internal organizational preparation. For others, the search for this internal organizational preparation must be prior to the external integration initiatives with partners upstream and/or downstream of the supply chain. The SLR allowed the researcher to identify that the dynamics of internal integration in the context of SCI is characterized by enablers factors, by the barriers to internal integration and by the influence of the human factor.

Although scored separately, a close correlation was observed among enabling factors, barriers to internal integration, and the human factor. For example, at the same time "alignment of rewarding metrics and systems" and "organizational culture" are identified as enabling factors. When these factors are absent, they become barriers to integration. The presence of barriers such as "functional silos", "collaboration difficulty" and "low level of managerial support" hinders the presence of enabling factors such as "knowledge and information sharing", "cross-functional teams" and "planning of goals and joint problem solving". The influence of human factors occurs both because of the

need for technical training for the performance of professional activities and the need for behavioral skills, especially those of a collaborative nature. The definition of enabling factors "knowledge and information sharing", "cross-functional teams", "support from information systems", and "planning of goals and rewards systems" presupposes that the absence of this professional training hinders or even prevents their effectiveness. At the same time, it enhances the barriers "functional silos", "collaboration difficulty," "low-level of managerial support" and "lack of professional training." It is also emphasized that the barriers "resistance to change" and "lack of commitment" are fundamentally behavioral. Because of that, enablers factors and barriers to internal integration should be considered together, and the human factor is the main aspect that needs to be managed.

The awareness of this correlation, covering functional areas related to SCM and its impact on the improvement of external integration can change the way managers are planning and managing key business processes. As discussed by Fawcett and Magnan (2002), managers often do not have the ability to integrate the business functions effectively. In fact, low managerial support is configured as one of the most mentioned barriers to internal integration in the literature. Another theoretical and managerial contribution is in the systematization of enabling factors and barriers to internal integration. According to Richey et al. (2009), internal integration is much more difficult to achieve in practice than in theory, therefore it is necessary to acknowledge the factors that facilitate or impede it (TANCO; JURBURG; ESCUDER, 2015). However, the identification and discussion of enabling factors and barriers are scattered in the literature. This systematization can also be useful as a management reference, as the dynamics of the business routine tends to hinder the perception of the existence of these enabling factors and barriers and their categorization (Hartley et al., 2014). The introduction of the human factor as an aspect that influences SCI internal integration emphasizes its importance to achieve competitiveness. That aspect is another contribution of this paper. The influence can be either positive or negative. Fawcett et al. (2015) suggest the development of more empirical studies that aim to understand its influence on the integration initiatives in the supply chain. Therefore, this research has implications for researchers and practitioners.

## 5.1 Limitations and future research

This research has some limitations. Although the SLR technique is reliable and recommended by a large number of scientific papers published in numerous databases, the criteria used for the inclusion of articles may have led to the exclusion of other articles which are also important. In fact, this limitation is more associated with the preference of the researcher than with the used technique. Although the databases used (Scopus and Web of Science) have a significant number of indexed journals and are reliable, the research could have been done on other important databases such as ABI, Inform, ProQuest and EBSCO. The research on only two databases may have limited the access to other papers with important contributions for the SLR purposes of this article. Furthermore, articles that were not accessible through the official University network were not included.

We emphasize the significant discrepancy in the number of publications using quantitative approach (65%) versus qualitative approach (17,5%). One of the findings obtained in the qualitative category is the influence of the human factor in integration.

This finding is relevant to reflect if the use of quantitative methods would be appropriate to capture, interpret and suggest findings about behavioral variables in SCI. Human factor proved to be an important factor to internal integration for SCM. In fact, human factor as a key to effective integration is widely accepted in the field of Organizational Theory since the 1920s. Since then, management theories have brought contributions on how to coordinate the relationship between people and organizations.

In this scenario, the first suggestion for further research is the development of studies about SCI using of qualitative methods, especially those focused on the nuances of human nature. According to Soltani et al. (2014), due to its predominantly behavioral nature, the human factor is best analyzed and interpreted in the organizational context by qualitative procedures. The studies that insert the human factor as a variable to be analyzed (including for external integration) are configured as a second proposal for further research. As a third proposal, we suggest the development of empirical research in the context of Brazilian companies in order to identify the factors and barriers of internal integration for SCM and, if so, their characterization in this companies.

The search for theoretical contribution in other areas of knowledge is a fourth proposal. The indication of using Human Resource practices (e.g. recruitment and selection, training and development, compensation, teamwork) has been growing in the literature on SCM (e.g. KOULIKOFF-SOUVIRON; HARRISON, 2010; HOHENSTEIN; FEISEL; HARTMANN, 2014; HUO et al., 2016). Therefore, research that seeks to reconcile SCM with Human Resource Management could bring important contributions to better understanding and management of the human factor in internal integration (HUO et al., 2015).

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