Are collaboration and trust sources for innovation in the reverse logistics? Insights from a systematic literature review

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Abstract

Purpose – The purpose in this paper is to develop a systematic literature review aiming to reveal innovation opportunities associated with the thematic collaboration and trust in the reverse logistics field.

Design/methodology/approach – The authors adopted a parallel analysis approach segregating the systematic literature review papers in two groups at NVivo®, collaboration and trust in the supply chain and collaboration and trust in reverse logistics, aiming to explore in the first group of papers insights for innovation on collaboration and trust in reverse logistics. The content analysis strategy was supported by the knowledge exchange theory described in Gravier *et al.* (2008).

Findings – Reverse logistics is hardly dissociated from broader sustainable supply chain management approaches, which make all considerations on collaboration and trust designed for such approaches valuable and valid for reverse logistics. Collaboration and trust concepts in supply chain and in reverse logistics contexts are quite similar, while collaboration/trust is mandatory for managing networks in sustainable approaches and in reverse logistics, as well. Downstream and upstream, the chain disruptive innovation business models may be developed between focal companies and returns system third-party logistics providers, fourth-party logistics providers or end-customers, in a business-to-customer collaboration approach. Several collaboration technologies are listed in three perspectives: knowledge sharing, knowledge generation and knowledge implementation.

Research limitations/implications – This study uses a specific protocol for the systematic literature review, and due to inclusion and exclusion criteria, other protocols can provide different results. The strategy of analysis under the knowledge exchange perspective may give a type of result different from other perspectives.

Originality/value – This research systematizes the existing knowledge on the collaborations and trust, which is a priority basis for reverse logistics, providing insights to researchers and practitioners in the area and identifying an agenda for future studies.

Keywords Innovation, Knowledge, Trust, Reverse logistics, Collaboration, Supply chain management

Paper type Literature review

1. Introduction

According to the 17 sustainable development goals from the United Nations, "a successful sustainable development agenda requires collaboration among governments, the private sector, and civil society":

> This inclusive collaboration built upon principles and values, a shared vision, and shared goals that place people and the planet at the center, are needed at the global, regional, national and local levels (United Nations, 2017).

Likewise, at organization's, local context, Chen *et al.* (2017, p.1) declare that "supply chain collaboration has become a strategic issue for companies' managers that wish to achieve their economic, social and environmental sustainability targets."

Collaboration is repeatedly mentioned in the literature as a strategy against supply chain disruption (Mari *et al.*, 2014; Scholten and Schilder, 2015; Levalle and Noff, 2015; Chen *et al.*, 2017; Pakdeechoho and Sukhotu, 2018) and toward competitiveness and good performance (La Forme *et al.*, 2007; Chen *et al.*, 2007; Vachon and Klassen, 2008; Ramanathan *et al*, 2011; Hudnurkar *et al.*, 2014; Kumar and Nath Banerjee, 2014). Despite there are several definitions for sustainable chain

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Supply Chain Management: An International Journal
25/2 (2020) 176–222
 [ISSN 1359-8546]
[DOI 10.1108/SCM-03-2018-0129]

Received 28 March 2018
Revised 15 August 2018
2 November 2018
Accepted 3 November 2018

collaboration (Soosay and Hyland, 2015), Simatupang and Sridharan (2002, p. 19) defined supply chain collaboration as:

> [. . .] two or more chain members working together to create a competitive advantage through sharing information, making joint decisions, and sharing benefits which result from greater profitability in satisfying customer's needs than acting alone.

Similar grounds upon principles, values, shared vision and trust are necessary to establish the peculiar collaboration at the supply chain, either of a real or virtual business (Doney and Cannon, 1997; Camarinha-Matos and Afsarmanesh, 2008; Day *et al.*, 2013; Pomponi *et al*, 2015; Camarinha-Matos, 2016). Besides that, it is important to emphasize the need of information to connect suppliers and buyers, which is only feasible in case there is trust among them (Vieira *et al.*, 2009; Park *et al.*, 2010).

Literature has demonstrated that trust is an implicit condition for collaboration (Camarinha-Matos and Afsarmanesh, 2007; Verdecho *et al.*, 2012; Fawcett *et al.*, 2015; Pomponi *et al.*, 2015; Narayanan *et al.*, 2015; Kongar *et al.*, 2015; Kurdve *et al.*, 2015; Campos *et al.*, 2017b). It is identified as a key antecedent of building relational capital with suppliers, as mentioned by Day *et al.* (2013). Trust is considered a critical governing mechanism that enables supply partners to "focus on the long-term benefits of the relationship, ultimately enhancing competitiveness and reducing transaction costs" (Doney and Cannon, 1997, p. 35). Considering the premise that Reverse Logistics is part of supply chain management (Corominas, 2013; Corominas *et al.*, 2015) and given the importance of collaboration and trust in the supply chain management, the focus in this paper is placed on collaboration and trust in the reverse logistics portion of supply chain management.

On one hand, managers are discovering the hidden value of the returned assets and restructuring the processes of return, repair and reallocation of products, as evidenced by literature review in the area from Agrawal *et al.* (2015). This and other studies reveal the effort of reverse logistics implementation in a diversity of segments, such as retailing Bernon *et al.* (2011), bottling (González-Torre *et al.*, 2004), paper industry (Ravi and Shankar, 2006), packaging (González-Torre and Adenso-Díaz, 2006), cell phone industry (Rathore *et al.*, 2011), pharmaceuticals (Kumar *et al.*, 2009; Sartori, 2010; Narayanana *et al.*, 2014; Singh *et al.*, 2016; Campos *et al.*, 2017a) and battery recycling (Wang *et al.*, 2014). Other investigations deal with the decision-making related to reverse logistics (Hazen *et al.*, 2012), such as the selection of third-party reverse logistics under multi-criteria decision aid approach (Jayant *et al.*, 2014; Guarnieri *et al.*, 2015; Tavana *et al.*, 2016), the structuration of reverse logistics of e-waste (Li and Tee, 2012; Guarnieri *et al.*, 2016) and the use of multi-criteria decision aid techniques in environmentally conscious manufacturing and product recovery (Ilgin *et al.*, 2015).

On the other hand, barriers still impair the reverse logistics implementation as described by Prakash and Barua (2016) in an electro electronics study in India, and remarkably, the theme collaboration is among them. They have elicited 38 barriers, and Agrawal *et al.* (2015, p. 83) state "[. . .] network design is one of the most important strategic issues that may have a long-term impact on the performance of Reverse Logistics."

According to Agrawal *et al.* (2015), the network would include repairing, remanufacturing, recycling, direct reuse and secondary market that would collaborate, in some level, to the successful process management of reverse logistics, in a vertical collaboration basis. Similarly, Soosay and Hyland (2015) defend that another element of the network would be the end consumer, indicating the need for a more holistic approach, multi-tier perspectives and research into business-to-customer (B2C) collaborations. In summary, Soosay and Hyland (2015) draw attention to the various collaborative roles that stakeholders and end consumers play in co-creating value within the Supply Chain, through their contributions in knowledge, information and tangible resources. Leitner *et al.* (2011), Lozano *et al.* (2013) mention possible cost savings through transport clustering and optimization of logistics processes and structures.

All the arguments above lead to at least three observations: first, the theme collaboration is discussed in the scope of reverse logistics concurrently with collaboration in supply chain management, but contrasts between the specificities of collaboration and trust in the two fields are not clear. Although there is some literature review on collaboration and trust, the main focus of researchers is on the supply chain as a whole. Zeng *et al.* (2012) apply environment-based design methodology and identify research problems and future trends. Soosay and Hyland (2015) make a very important analysis of 10 years back on collaboration and trust literature and indicate key investigation areas. Chen *et al.* (2017) analyze collaboration under the sustainability lens, but even in this case, the relationship with reverse logistics is not deepened. In fact, none of these reviews explore collaboration and trust on reverse logistics. Second, the results of the researches support the assumption that network, collaboration and trust, at some level, are necessary approaches to achieve better results in reverse logistics management; third, the collaboration and trust is not deeply explored in the scope of the interface between supply chain management-reverse logistics, and it may be the source of disruptive innovation opportunities in the management field. Innovation is recognized as a critical capability to enterprise business success (Jakimavicius *et al.*, 2010; O'Connor, 2008). Authors like Arnold *et al.* (2011) have presented definitions of innovation capability in two categories. While radical innovation refers to incorporating substantially different technology and fulfilling novel and emerging customer needs, the incremental innovation refers to involving minor technology changes based on existing know-how and relatively incremental customer benefits. Additionally, Christensen (2013) and Schmidt and Druehl (2008) argue that disruptive innovation aims to improve new product and service development meeting unexpected but potential market space, bringing the market perspective for the definition. An innovation that is disruptive allows a whole new population of consumers at the bottom of a market access to a product or service that was historically only accessible to consumers with a lot of money. Still, Zeng *et al.* (2012, p. 552) affirm that "the integration of new knowledge in the innovation process is an important issue to an innovation success," reinforcing the role of collaboration to the innovation process.

Considering that organizations should overcome issues related to the network, collaboration and trust barriers on a priority basis for effective reverse logistics adoption (Agrawal *et al.*, 2015; Prakash and Barua, 2016) and that this subject

deserves a deeper analysis, the objective of this study is to develop a systematic literature review aiming to reveal disruptive innovation opportunities associated with the thematic collaboration and trust in the reverse logistics field.

Due to the frequent overlap of supply chain management and reverse logistics in the literature, the first research question aims at distinguishing the specificities of collaboration into these fields:

RQ1. How do the themes collaboration and trust have been treated into supply chain management and reverse logistics literature and what are the specificities of them?

The theory about the disruptive innovation concept in supply chain encompasses new management and business collaboration models and technology. The study by Li *et al.* (2015) points out the evolution of information technologies in terms of available technologies: radio frequency identification (RFID) technology (Sari, 2010; Carr *et al*, 2010) and Internet of Things (IoT), (Parry *et al*, 2016; Li *et al*, 2015; Qu *et al.*, 2017). Emerging technologies such as cloud computing, big data, service-oriented architecture and IT outsourcing models are shifting the infrastructures and relative IT implementation strategies of enterprises (Li *et al.*, 2015a, 2015b, Morgan *et al.*, 2016). Therefore, the second and third research questions are:

RQ2. How current literature may point to the development of disruptive business models and how other types of innovation in supply chain management (sustainable or not) may inspire disruptive innovation in terms of reverse logistics collaboration and trust?

RQ3. What resources (technologies, practices, and tools) are associated with disruptive innovation in terms of reverse logistics collaboration and trust?

From the academic point of view, this research contributes to making a parallel discussion of the role of Collaboration and Trust in the interface between supply chain management and in reverse logistics, systematizing the existing knowledge and, to identify disruptive innovation opportunities related to this thematic. From the practical point of view, the research reveals practices and tools that may make the managers' task clearer in bringing collaboration and trust to the organization's management routine.

2. Reverse logistics: evolution and concepts

Several definitions and concepts are present in the literature on reverse logistics. Kroon and Vrijens (1995) argue that reverse logistics is characterized by logistical management skills and activities related to waste reduction, management, and disposal. Fuller and Allen (1995) list five factors that lead to the application of Reverse Logistics:

1 economic factors, related to production costs, use of raw materials and environmental costs;
2 governmental factors, which involve legislation and policies related to the environment;
3 corporate responsibility, translated into the collection of waste generated after the end of the useful life of the products;
4 technological factors, related to the advances in recycling and green design, where the products are designed to facilitate the reverse process; and
5 logistics factors, which deal with reverse channels and other aspects.

Rogers and Tibben-Lembke (1998, p. 2) define reverse logistics as:

> [...] the process of planning, implementing and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin for the purpose of recapturing value or of proper disposal.

Dowlatshahi (2000) highlights that reverse logistics is a process in which a manufacturer systematically accepts the return of previously forwarded products, or part of them, to recycle, remanufacture or dispose of. In addition, Fleischmann *et al.* (2000) argue that reverse logistics includes from the logistics activities of used products that no longer serve the users, as well as the replacement of products still usable in the market.

Traditionally, reverse logistics has been designed within the product development process lifecycle and has been adopted as an environmental approach, as its processes are most likely triggered when something goes wrong, for instance, the product presents some post-sales failure; the customer changed its mind about purchasing the product; the excess stock that is not selling; an order that was shipped incorrectly; and the product getting damaged during its use (Campos *et al.*, 2017a). Guide and Van Wassenhove (2009) explain that reverse logistics has evolved organically since the 1990s supply chain literature, from remanufacturing as a technical problem to a value-added reverse logistics process, in which design, management and control were key issues, including a large number of actors in a decentralized system. Later on, researchers have closed the loop, bringing another perspective, concentrating their efforts on a dynamic system design over the entire product lifecycle. More recently, the problem of consumer behavior and product valuation is finally recognized, calling the attention to relevant questions such as does anyone want to buy remanufactured products? Can value be recovered from returns at a reasonable cost? Is there sufficient access to used products? These authors reinforce that closed-loop supply chain (CLSC) is a fruitful area for the development of more sophisticated operations research models. It should be added that it is not only an opportunity for more complex and integrative models but also a chance for technology incorporation and investigation of new tools and practices applicable to CLSC or Reverse Logistics.

From a practical perspective, some organizations consider reverse logistics only from the time the waste is generated and should be sent for recycling or environmentally sound disposal. However, Reverse Logistics should be considered throughout the product lifecycle, including as part of product design to be economically feasible (Bernon and Cullen, 2007; Srivastava, 2007; Guarnieri, *et al.*, 2016). Furthermore, it is important to point out that in developed countries the adoption of Reverse Logistics is more consolidated; however, in developing countries this concept is still considered in the state of infancy, in terms of development (Bouzon *et al.*, 2015; Abdulrahman *et al.*, 2014). In the developing economies, some barriers still need to be surpassed to the successful implementation of the concept of reverse logistics, which covers aspects related to technology and infrastructure; governance and supply chain

process; financial/economics; knowledge; policies; market and competitors; and management (Bouzon *et al.*, 2015; Abdulrahman *et al.*, 2014; Prakash *et al.*, 2015). Moreover, Rubio and Jiménez-Parra (2017) have named other challenges for reverse logistics in the next years, especially those related with the marketing of the recovered products, namely competition issues in remanufacturing, the cannibalization problem, the purchase intention of consumers of remanufactured products, their perceptions and willingness to pay for this sort of products.

3. Methodology

Systematic literature reviews are supported by several systemic protocols to select and analyze scientific works. Amongst these protocols, we may mention: Tranfield *et al.* (2003); in the health area, the Cochrane Collaboration Model, described by Higgins and Green (2011), the Handbook for identification and review of the scientific literature (National Health and Medical Research Council, NHMRC, 1999) are frequently cited; in Software Engineering, the Procedures for Systematic Literature Review (Kitchenham, 2004), and Kitchenham *et al.* (2009) are cited in the literature as the most recommended; and the Guide of Systematic Literature Review (Okoli and Schabram, 2010). Ralston *et al.* (2017) and Durach *et al.* (2017) have proposed guidelines specifically for systematic literature review in supply chain management.

The important work of Ralston *et al.* (2017) has its roots on Tranfield *et al.* (2003) which, on its turn, is supported by the Cochrane Collaboration Model (2001). However, to have many researchers to help out in the reviews is not to help out in the reviews is not the reality for the great majority of researchers in other areas. Therefore, Pagani *et al.* (2015) proposed a protocol, named *Methodi Ordinatio*, designed to researchers who perform independent works. This methodology also has as its main root the Cochrane model, nevertheless differently from other protocols existent in the literature, it is a Multi-Criteria Decision Aid tool, which allows the researcher to ponder on three variables: impact factor, number of citations, and year of publication. The reasoning on these three variables generates the *InOrdinatio*, which is an index that indicates the scientific relevance of the paper. From this index, it is possible to rank the papers individually. Considering the extra formalism this method brings to the Systematic Literature Review and, in face of the large amount of papers retrieved, the method was adopted since it has proved to be helpful, in this paper and in literature, according to the growing number of citations. The steps applied were grouped. in a synthetized way, as described next.

3.1 Step 1: establishing the keywords for the search

The intention of research consisted on the specificities of the theme "collaboration" in the interface supply chain management-reverse logistics; then, another search was done aiming to identify the opportunities of disruptive innovation on the theme "collaboration" and Reverse Logistics. The combinations of keywords for the two groups of searches were:

- *Group 1*: collaboration AND supply chain management; supply chain AND collaboration; collaboration platform AND reverse logistics; horizontal collaboration AND trust development
- *Group 2*: trust development AND horizontal collaboration AND reverse logistics; horizontal collaboration AND reverse logistics; trust development AND reverse logistics; collaboration AND reverse logistics

The bibliographic databases used in the searches were Web of Science, Science Direct, Emerald and Scopus. The temporal delimitation established was from 2000 to 2017.

3.2 Steps 2, 3 and 4: collecting the papers

Papers were collected and stored using the reference manager Mendeley.

3.3 Step 5: filtering out the papers

Filtering procedures considered to eliminate papers that were in duplicate; conference papers and books and/or book chapters (Pagani *et. al*, 2015; 2018); papers not related to the theme (we did this by analyzing the title, keywords and abstract.

3.4 Step 6: finding the impact factor and the number of citations

The data collected by the reference manager were then exported to an electronic spreadsheet. In the spreadsheet, the year of publication, the number of citations (obtained from Google Scholar) and the metrics of the paper (impact factor) were added. The metrics of the papers (impact factor) was also manually obtained from the Clarivate Analytics[1] list; if not found there, the list provided by Scopus[2] was then searched. This information along with the year of publication is necessary to calculate the *InOrdinatio* (1) index (Pagani *et al.*, 2015, 2018).

3.5 Step 7: establishing the rank for the papers

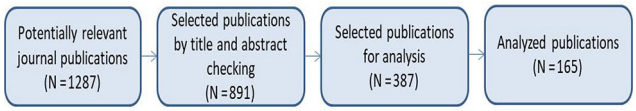
This step is designed to rank the papers according to its scientific relevance, determined by the pondering of the most important elements in a paper: year of publication (new researches mean new contributions and advancements of science); the metrics, which show the significance of a scientific journal; and the number of citations, which proves the recognition of the work in the scientific community (Pagani *et al.*, 2015).

$$InOrdinatio = (\mathrm{IF}/1000) + (\alpha * (10 - (\mathrm{ResearchYear} - \mathrm{PublishYear}))) + (\mathrm{Ci}) \quad (1)$$

where IF is the impact factor, α is a weighting factor ranging from 1 to 10 to be attributed by the researcher; *ResearchYear* is the year in which the research was developed; *PublishYear* is the year in which the paper was published; and Ci is the number of times the paper has been cited on Google Scholar (Pagani *et al.*, 2015, 2018).

Therefore, the researcher may attribute importance to the year of the papers' publication according to the search needs. For this study, the value of α was defined to be 10, that is, given the assumption in *RQ1*, *RQ2* and *RQ3*, aiming to understand the aspect of disruptive innovation of collaboration for the generation of value in SC. Thus, the final portfolio is composed of seminal studies, with the more recent papers prioritized. Figure 1, presents the Systematic Literature Review steps search, selection and analysis and the number of papers returned at each step.

Figure 1 Systematic literature review steps and returned papers



3.6 Steps 8 and 9: finding full papers and systematic reading

After the selection of the 165 articles, the periodical classification was extracted to characterize the article sample, considering the following rankings: Impact Factor (IF), Scimago Journal & Country Rank (SJR), Australian Business Dean's Council (ABDC) list of journal rankings Academic Journal Guide, (Appendix 1). Similarly, to the study by Soosay and Hyland (2015), which used these rankings to filter articles for RSL, our objective was to present the quality panorama of the selected publications to compose the portfolio, considering world rankings.

The 165 articles that cover topics related to supply chain management collaboration and reverse logistics collaboration were then loaded into the software QSR NVivo 11, where it was possible to perform qualitative data analysis (QDA) (see Appendix 2). The software Vosviewer® (Van Eck, and Waltman, 2010) was used to accomplish a bibliometric analysis of co-occurrence networks. After the categorization performed by QSR NVivo, the content analysis allowed to extract some theoretical evidence that will be discussed in the next section.

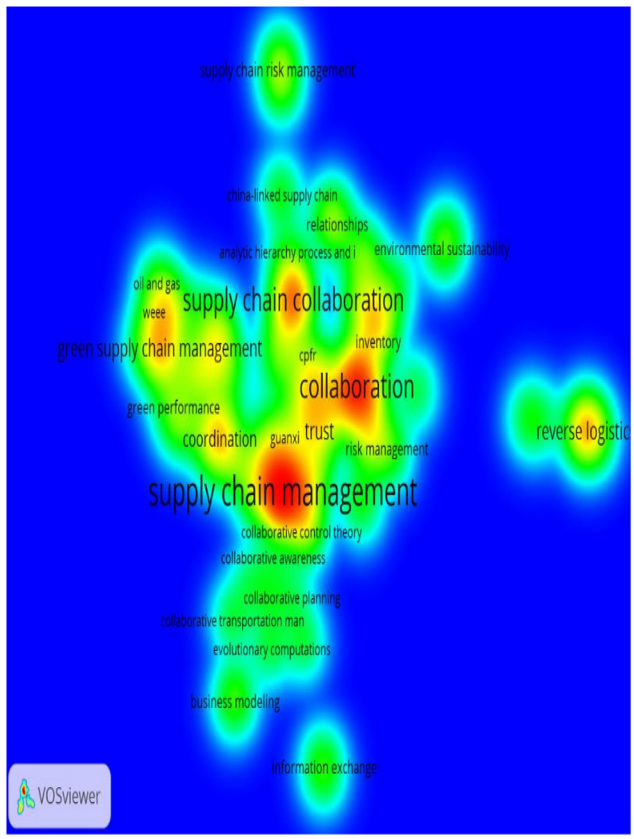
4. Discussion

To answer RQs, the results are presented obeying a hierarchy of the most comprehensive theme to the most specific. A number of 165 papers were selected and a bibliometric analysis of co-occurrence networks was accomplished in Vosviewer® (Van Eck, and Waltman, 2010). From a total of 435 keywords elicited by this software, 300 keywords were selected, after the exclusion of inconsistent words, to create the maps from Figures 2 and 3.

Figure 2 shows the visualization of density based on keywords. It is possible to see that there are three larger clusters in the middle of Figure 2, in the reddish region, composed by the term supply chain management. In the first cluster, there is a relationship among supply chain management and sustainability, triple bottom line, buyer-supplier, supply chain risk, demand information sharing, value creation, performance. In the second cluster, there is a relationship among collaboration and trust, innovation, information technology, networks, disruption, alliances, partnering and supply chain resilience. In the third cluster, supply chain collaboration is associated with supply chain performance and investment decision. The fourth cluster with a lower intensity is formed by green supply chain management, which is associated with green performance, environmental performance, information sharing, coordination, knowledge management, behavioral factors, and cooperation. Finally, reverse logistics has a distance from the center but is associated with logistics and collaborative partners.

The combination of the terms collaboration, trust, supply chain management and reverse logistics has returned dozens of

Figure 2 Map density of the 165 papers in Vosviewer®



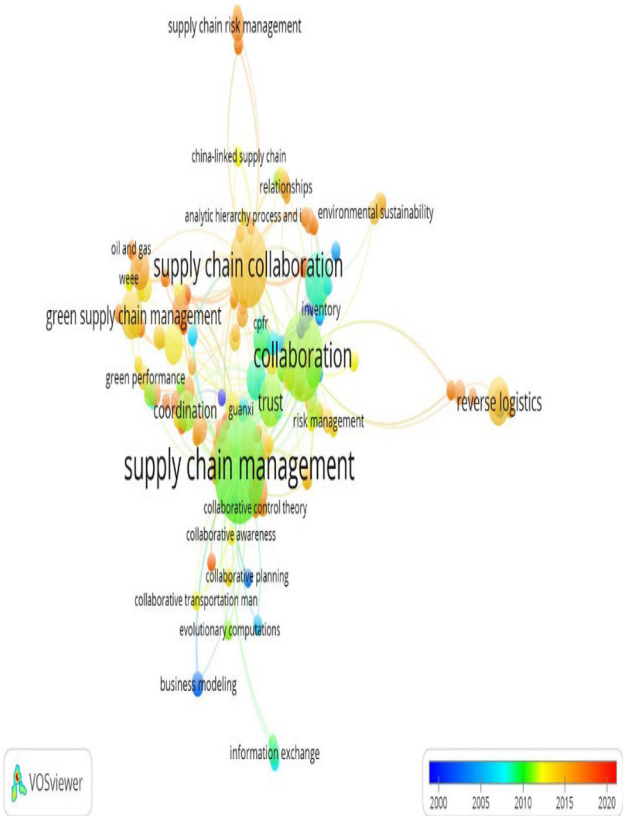
Source: This map can be web-started at: https://goo.gl/jDPKkv

related subtopics, as shown in Figure 2 (Vosviewer® analysis), revealing the complexity of the systematic literature review content analysis. Figure 3 presents the map type "Overlay Visualization"; in the option "Weight", "Occurrence and Scores: Average Publication Year" was selected.

The clusters and a large number of subtopics elicited, guided the adoption of two strategies of analysis in this Systematic Literature Review. Firstly, the 165 articles were segregated in two groups: one of the groups with 91 articles essentially deals with the theme collaboration and trust in supply chain management; the other group, counting 74 articles, emphasizes collaboration and trust on reverse logistics. The criteria for segregation of the papers, prioritized by *Methodi Ordinatio*, were the existence of the theme reverse logistics in the paper (performed at Nvivo®) and the opinion of four researchers from four different universities (three in Brazil and one in Iran), viewing to reduce bias (*Durach et al*, 2017). Second, after the segregation, each subgroup was analyzed under the information knowledge perspective from Gravier *et al.* (2008) and Gravier and Farris (2013).

Gravier and Farris (2013, p. 352) have based their research on a premise that the evolution of collaboration in supply chain management may be described by the knowledge-exchange perspective: "[. . .] business literature may be re-orienting towards a dominant logic founded on collaboration and knowledge as the sources of competitive advantage," and knowledge role is presented as a guideline to determine the degree of interfirm

Figure 3 Co-occurrence network analysis of the 165 papers in Vosviewer®

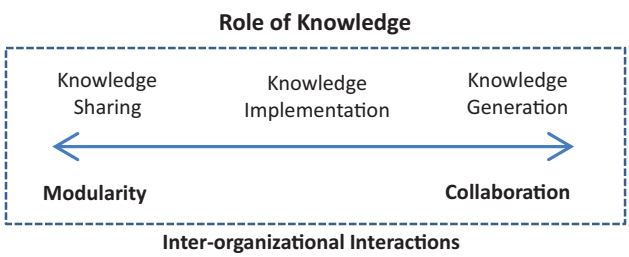


Source: This map can be web-started at: https://goo.gl/MpTbjn

collaboration (Figure 4). Hence, the three types of knowledge were used as units of analysis, orienting the classification of the types of collaboration in supply chain management (Section 4.1) and in reverse logistics (Section 4.2).

The more to the left Figure 4, the closer the reader will be to the concept of knowledge sharing and modularity. Modularity represents a strong focus on the individuality of each firm and less-operational dependence. The more to the right in (Figure 4), the closer the reader will be to a collaboration perspective. Collaboration attains collective goals via resource sharing and a common vision. Collaboration would represent the outcomes of

Figure 4 Role of knowledge in determining the degree of interfirm collaboration



Source: Gravier and Farris (2013, p. 353)

long-term relationships characterized by trust, as those needed when organizations generate knowledge collaboratively. The interactions concerning knowledge generation focus on the acquisition of information that pertains directly to the development of new products or services. Knowledge implementation, in its turn, occurs when firms deprive themselves of a non-core competency. Examples of the role of knowledge implementation are evidenced by the rise of the third-party logistics providers (3PL) and fourth-party logistics providers (4PL).

Sections 4.1 and 4.2 will present, respectively, the results of the content analysis of the 91 papers that focus collaboration and trust in supply chain management and the 74 papers that emphasize the collaboration and trust in reverse logistics, under the two strategies described in this section.

4.1 Collaboration and trust in supply chain management

The distribution of the 91 articles is presented in Figure 5. The profile of the number of articles in supply chain management almost overlaps the profile of the total articles (165), demonstrating their influence on the total. There has been a small increase in the number of publications on supply chain management collaboration from 2015 on.

Considering the nationality of the first author of the 91 articles, the continents are distributed as presented in Figure 6.

As observed in Figure 6, Asia is the continent with larger research in collaboration and trust in SC, followed by Europe and North America. The broad distribution suggests the importance given to investigation on these themes.

The 91 articles were also classified into qualitative and quantitative research. In the qualitative group, it was highlighted the search for joining theory to practice via case

Figure 5 Distribution of articles over time – supply chain management collaboration and supply chain management + reverse logistics collaboration

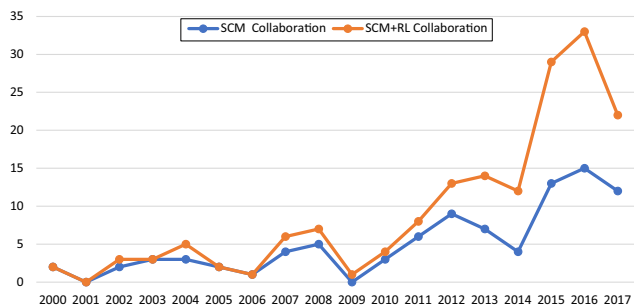
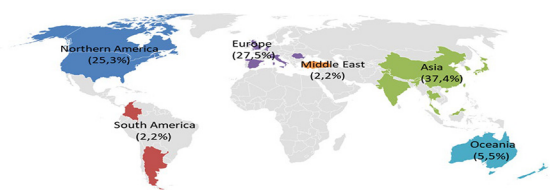


Figure 6 Frequency of publications on collaboration and trust by continent of affiliation of first author (supply chain management focus)



studies, the extensive theoretical proposition of the literature, theoretical models, and interviews. In the quantitative group, there is a predominance of structural equation modeling (SEM) studies and statistical tests were observed, such as ANOVA, regression, ordinary least squares (OLS), as can be seen in Table I. The number of quantitative researches is slightly higher than the number of qualitative investigations.

Not surprisingly, collaboration studies also included the application of multi-criteria decision aid methods such as decision-making trial and evaluation laboratory (DEMATEL), analytic hierarchy process (AHP), technique for order performance by similarity to ideal solution (TOPSIS), analytic network process (ANP), fuzzy sets and the combination of these methods for problem solving (Appendix 2).

After this first glance, the papers were analyzed under the knowledge exchange strategy.

4.1.1 The knowledge sharing perspective

Considering the 91 papers with the focus on collaboration and trust in supply chain management, knowledge sharing refers to the extent that organizations can access each other's established know-how and critical information and it is also named knowledge transfer or interfirm learning (Gravier *et al.*, 2008).

The analysis by NVivo® demonstrated that the term knowledge sharing was present in 22 references out of the 91, and the group of papers tends to reinforce the sense that soft issues such as communication, trust and common goals are the base of stability and the effectiveness of a network, independently of the governance mode it assumes (Chapman and Corso, 2005; Olorunniwo and Li, 2010; Ding *et al.*, 2011; Wu *et al.*, 2014). Governance mechanisms of networks can vary depending on appropriation concerns and coordination costs (Gulati and Singh, 1998). The greater the appropriation concerns and the higher the coordination costs, the more a hierarchical governance mode is likely to be chosen. The major governance modes, in hierarchical order, are joint ventures, contractual agreements, and non-contractual agreements. It is easy to notice how important these soft issues are for collaboration, but the theme is not restricted to them. The term knowledge sharing, for instance, brings out other relevant concepts presented next. A group of definitions causes a lack of clarity since the 2000s, as declared by Chapman and Corso (2005), reasons why they are described in Table II.

Table I Research methodology supply chain management collaboration

Methodology	Technical procedure	No. of papers
Empirical studies	Case studies	7
	Interviews	3
	Survey	13
Theoretical studies	Literature review	7
	Conceptual model	6
Modelling studies	Simulation, linear programming, and stochastic models	16
	Mathematical model	9
	MCDA	6
	Algorithm	2
	Structural equation modelling	22
Total		91

Considering a timeline, besides balancing workload capacity, the motivation for the above collaboration concepts and approaches from Table II are mutual learning, co-specialization, better information and resource flows, economies of scale, an organization of market structures with network members. The popularization of outsourcing, for instance, has brought about the buyer–supplier relationship described next.

4.1.1.1 Buyer–supplier relationship. Chapman and Corso (2005) comment that buyer–supplier relationship is the last step of a transition from open "market negotiation" through "co-operation" and "co-ordination" toward "collaboration". The importance of buyer–supplier relationship is noticed as it is a frequent topic of investigation in this collection of papers. Paulraj's *et al.* (2008) investigation, for instance, provides a strong support for the notion of inter-organizational communication as a relational competency that enhances buyer–supplier relationship performance. Wiengarten *et al.* (2013) explore the enabling role of e-business multiple dimensions to impact directly and positively on Supply Chain Collaboration across a buyer–supplier relationship and Hudnurkar *et al.* (2014) extended the Kraljic model's list of criteria for classification of suppliers in collaborative SC, like contractual agreements, complexity of specification, supplier selection, exclusivity of supplies, and power position. Villena's *et al.* (2011, p.561) investigation calls the attention to a dark side of the buyer–supplier relationship, in contrast to the various benefits of this relationship, considering a social capital perspective:

> [. . .] this study confirms that building social capital in a collaborative buyer-supplier relationship, positively affects buyer performance, but that if taken to an extreme it can reduce the buyer's ability to be objective and make effective decisions, as well as, increase the supplier's opportunistic behaviour.

All these authors highlight the social capital concept, arguing that it creates value for firms participating in collaborative buyer–supplier relationships (Narayanan *et al.*, 2015). Therefore, this topic is presented in the sequence.

4.1.1.2 Social Capital and trust. Villena *et al.* (2011, p. 562) define social capital (Table II) by three dimensions: cognitive, relational and structural. In the cognitive dimension, the keywords are shared meaning, shared culture, and understanding among actors:

> Shared culture refers to the degree to which norms of behavior govern relationships, whereas congruent goals represent the degree to which parties share a common understanding and approach to the achievement of common tasks and outcomes.

The social capital concept is broader and embraces trust in its relational dimension. Trust is one of the keywords from this systematic literature review, and the relational dimension includes trust, friendship, respect and reciprocity developed through a history of interactions. NVivo® analysis has revealed the strong association of collaboration and trust in supply chain as 61 out of these 91 papers mention the term trust in 1042 references.

In fact, Akkermans *et al.* (2004) reveal that the terms "collaboration and trust" are not dissociable. Day *et al.* (2013) argue that trust is an enabler and constraint between buyers and suppliers engaged in long-term relationships. Narayanan *et al.* (2015) reveal that the buyer-supplier

Table II Concepts concerning the knowledge sharing perspective

Concepts	Description	References
Network of companies	Strategy that emphasizes how companies share resources, like the management of a resource pool in a network of companies	Chapman and Corso (2005)
Virtual organization	Strategy for sharing out product orders to be more flexible and faster in answering marketing needs	Camarinha-Matos (2007; 2008)
Outsorcing	Popular activity conceived mainly for cost reduction and work load balancing although it may also offer opportunity for improvement and innovation	Langlois and Robertson, 2002; Jiao *et al.*, 2006; Zeng *et al.*, 2012
Byer-supplier relationship	Most common form of inter-company knowledge sharing is customer-supplier collaboration or buyer–supplier relationships	Chapman and Corso (2005)
Social capital	It is considered as the ties between firms, individuals and corporate actors that enable them to exchange benefits, resources, and perform mutual activities together	Chapman and Corso (2005); Coleman, (1988)
Relational capital and collective efficiency	Dimension of Social Capital for promoting the competitiveness and efficiency of Small and Medium Enterprises' clusters	Jardon and Pagani (2016)
Trust	Trust comprises the intangible attributes built over time to deal with the shared vulnerabilities in buyer/supplier relationships; it is a key antecedent of building relational capital with suppliers	Day *et al.* (2013) Fawcett *et al.* (2004); Moorman *et al.* (1993)
Vertical collaboration	When two or more organizations, such as the manufacturer, the distributor, the carrier and the retailer, share their responsibilities, resources, and performance information to serve relatively similar end-customers. They collaborate to achieve greater success. The benefits of such type of collaboration include reductions in transaction costs, increases in resource sharing, learning, and sharing knowledge	Chan and Prakash, (2012), Kumar and Nath Banerjee (2014), Scholten and Schilder (2015)
Horizontal collaboration	It is a business agreement between two or more companies at the same level in the supply chain or network to allow greater ease of work and cooperation toward achieving a common objective or greater innovativeness. It is also called external collaboration. Nevertheless, it presents some disadvantages, such as loss of flexibility, loss of control by individual SC members, high coordination costs as group members are competitors, and anti-trust problems	
Lateral collaboration	It combines the benefits and sharing capabilities of both vertical and horizontal integration. This collaboration is another name for information sharing. Firms are involved to gain more flexibility	

sourcing relationships can be positive, negative or neutral depending on the levels of trust, supplier asset specificity and requirements certainty. Wagner *et al.* (2011) investigation results reveal that trust during the project collaboration has a stronger influence on the future of buyer–supplier relationships than fair economic rewards or reputation. Cai *et al.* (2010) explore the role of institutional forces and trust in implementing Supply Chain information integration between buyers and suppliers of 398 Chinese companies, suggesting that government support affect trust, which subsequently influences two elements of information integration: information sharing and collaborative planning.

Rossi's (2012) study with 28 companies in the logistics sector revealed that trust was the most representative indicator and lack of trust was considered as a major barrier to collaboration among all organizations. The practices that were considered fragile by the companies in the collaboration were the following: customer information, sharing personal strategies, confidential data, and sharing of fair wins, in a win-win relationship.

Campos *et al.* (2017b) emphasize trust as a determinant of collaboration between networks of companies and point out barriers to trust building, based on elements such as culture and behavior; external aspects characterized by elements such as norms and beliefs, values and principles, contractual and non-contractual relations; elements that can facilitate the construction of trust as communication, competence, relational governance.

Figures 2 and 3 highlight the intricate relationship existent among trust, the concepts mentioned in this section and the dimensions of social capital either. Structural equation modeling studies play an important role to reveal the influences among all these variables explaining the number of these studies in this group of papers (Table I).

Back to the structural dimensions of the social capital concept, they involve the patterns of relationships between actors. In this regard, unlike cognitive capital, which is concerned about the pursuit of shared culture and congruent goals of the parties; the relational capital that refers to the strength of connections, the structural capital relies on the existence of connections and their configurations within a social structure. This last dimension was less explored in the 91 papers analyzed in this Systematic Literature Review.

Finally, Villena *et al.* (2011, p.561) found an inverted curvilinear relationship between social capital and performance. Their study confirm that:

> [. . .] building social capital in a collaborative buyer-supplier relationship positively affects buyer performance, but that if taken to an extreme it can

reduce the buyer's ability to be objective and make effective decisions, as well as, increase the supplier's opportunistic behavior.

This finding reinforces the idea that social capital in the buyer–supplier relationship is not always the solution but may be part of the problem.

The buyer–supplier relationship "Collaboration" is the expression of a higher level of integration, joint planning, and technology sharing among partners, bringing other important concepts: the "horizontal, vertical and lateral alliances" (see definitions in Table II).

4.1.1.3 Horizontal, vertical and lateral collaboration. The analysis in NVivo® has revealed that horizontal collaboration was cited in thirteen of the 91 references studied with more emphasis in five of them (Chan and Prakash, 2012; Touboulic and Walker, 2015; Van Lier *et al.*, 2010; Kumar and Nath Banerjee, 2014; Badea *et al.*, 2014).

Chan and Prakash (2012), and Kumar and Nath Banerjee (2014) explore three types of collaboration: vertical, horizontal and lateral collaboration (Table II), seeking to analyze the impact of horizontal collaboration and lateral collaboration on the inventory policy and on the costs such as holding cost, backorder cost and ordering cost. The results of the study indicate that horizontal collaboration is not very beneficial, as it has some drawbacks such as loss of flexibility, loss of control of individual supply chain members. The researchers concluded that lateral collaboration can reduce the overall cost of an supply chain and the enterprises involved can improve the real-time decision-making process by adopting a suitable inventory policy.

Badea *et al.* (2014) investigate how the vertical and horizontal concepts in supply chain can be influenced in practice by potential risk factors. The authors propose five alternatives for preventing crises in SC: information sharing collaboration, decision synchronization collaboration, incentive alignment collaboration, resource and skill sharing collaboration, knowledge management collaboration. Van Lier *et al.* (2016) study a particular type of horizontal collaboration, the collaboration across horizontal internal functions, in the case the warehousing functions, viewing transport cost savings. An interesting study of Formentini and Romano (2016) considers the direct involvement of the buyer and other supply chain entities in the supplier's pricing process, proposing a supply chain collaboration in business-to-business (B2B) pricing.

The buyer–supplier relationship might be classified as a vertical collaboration and the results of this systematic literature review show the emphasis the researchers have been given to understand the impact of this type of collaboration in the SC, as demonstrated in Section 4.1.1.1. The relevance of buyer-supplier relationship is expressed by the fact that 50 out of 91 papers mention buyer×–supplier relationship in 406 references. The threshold between the continuous improvement achieved by most of buyer–supplier relationship and a continuous innovation is difficult to visualize, as these concepts are overlapping. The small-step continual improvement activities are necessary, as well, the technological and market-based changes normally named innovation. Therefore, it is difficult to dissociate the concept of knowledge sharing from knowledge generation strategies, as demonstrates the investigation of Zeng *et al.* (2012).

4.1.2 The knowledge generation perspective

The research of Zeng *et al.* (2012) emphasizes the context of the focal manufacturer and their suppliers, due to massive outsourcing business, topics mentioned in the knowledge sharing section. However, the authors explore technologies that provide a secure collaboration in global industrial design and supply chain environment that is the context of knowledge generation.

The technologies are classified into four levels: infrastructure, information, agreement, and confidence. Four corresponding research problems are then formulated: information access control, information partitioning, legal information sharing, partner trust management and the correspondent solutions for each problem are presented. Their findings indicate that the horizontal and vertical collaborations in collaborative product development (CPD) are accomplished in three levels: communication, information and knowledge sharing and coordination of activities. They also describe technologies for horizontal and vertical collaboration that are summarized in Table III.

Gravier *et al.* (2008) define the knowledge generation focus on the acquisition of information that pertains directly to the development of new products or services. Knowledge generation in its various guises such as new product development and process innovation has a well-established record of boosting firm performance.

Considering the 91 articles, Chapman and Corso's (2005) paper, at the beginning of the 2000's, advocate that radical or discontinuous innovation opportunities would demand forms of networking as joint development and co-design as the most typical forms of networking, viewing to reduce risk and access to critical competencies. They reinforce the perception of Gravier *et al.* (2008) who affirm that alliances provide a primary vehicle for inter-organizational knowledge generation that leads to innovation, being powerful motivators for collaboration.

The CPD brings another actor to the collaboration scenario, the costumer, and papers mention the costumers in the supply chain either as a resource of innovation (Akkermans *et al.*, 2004) or viewing to better attend their demands (Rota *et al.*, 2018; Narayanana *et al.*, 2014). Sahay and Mohan (2003) reveals that the level of involvement of customers and suppliers differs across different supply chain processes and across different sectors. While the involvement of customers is high in demand management and product development, the involvement of suppliers is high in transportation and inventory management processes. Nevertheless, several studies indicate the customer involvement as a strategy of cooperation to increase supply chain efficiency and reduce resource consumption (Sana, 2012; Fu and Fu, 2015; Ahmad *et al.*, 2016; Dissanayake and Sinha, 2015). The concepts of agility in the product markets and enhancement of product portfolios are also supported by the strategic buyer-supplier outsourcing relationships and customer collaboration, viewing to increase customer responsiveness (Narayanan *et al.*, 2015).

Nucciarelli and Gastaldi (2008) explore the context of e-supply chain management and e-marketplaces in aviation, arguing that they have profoundly revolutionized the business model of worldwide carriers, along with internet and intranet. Their study reveals that B2C e-marketplaces strongly encourage competition among several travel

Table III Methods and technologies in CPD

Levels of horizontal and vertical collaboration	Methods and technologies for CPD
Communication	Concurrent engineering and Computer Supported Cooperative Work (CSCW). These technologies include different formats of content divided into two types: asynchronous component and synchronous component Asynchronous: mark up, annotation, forum, email, mail list and version control. Synchronous: contain instant messaging, text chat, voice chat, video conference and whiteboard
Intra and inter-organizational information and knowledge sharing	Several research efforts focus on information modelling and knowledge sharing. There are ontology-based model to explicitly and persistently represent engineering relations imposed in assembly design and information sharing; knowledge driven collaborative product development system architecture to address design requirements from different research and industrial partners; theoretical model of formal and informal socialization mechanisms in interorganizational knowledge sharing
Coordination of activities	Effective coordination of activities is a key to success of collaboration process. Models have been proposed by authors in the literature which include standardization, planning and mutual adjustment of coordination activities; other methods were developed to measure the dynamic existence of interdependencies among tasks and their relationship with actors

Source: Zeng *et al.* (2012)

solutions; they also contribute to reduce prices, develop travel packages at low prices and enhance quality standards. In fact, the authors highlight the role of collaboration in e-supply chain management: "(. . .) e-marketplaces can rapidly generate value for both firms and customers and strongly contribute to reaching high efficiency and efficacy standards":

> (. . .) collaboration helps generate a competitive advantage for both carriers and suppliers. Hence, collaboration emerges as one of the core resources of supply chain management because its output has to be quantifiably beneficial to each stakeholder.

"(. . .) good collaboration tools (e.g. demand forecasting, inventory management and product planning) enable users to achieve increased visibility across several tiers of the supply chain" (Nucciarelli and Gastaldi, 2008, p. 170). Finally, the authors demonstrate that Information and Communication Technologies (ICTs) have redesigned the aviation industry by means of websites and e-marketplaces that provide several services and constant attention do supply chain streamlining and customer-relations optimization. ICT has become a critical asset in product differentiation and day-to-day operations and strategic management.

At this point, it is important to call the attention to the cyclic dependence among all the concepts mentioned in the former sections. The study of Drake and Schlachter (2008) reveal that technological advancements in information systems have enabled firms to work with the major suppliers and customers in their supply chain to improve the performance of the entire channel. These authors defend that a sustainable collaboration is preferable, in contrast with a dictatorial one, because the parties share resources and engage in joint problem solving to improve the performance of the system as a whole. Therefore, the virtue-ethics analysis brings back the cognitive dimension of social capital, mentioned in Section 4.1.1.2.

4.1.3 The knowledge implementation perspective

Gravier and Farris (2013, p. 356) affirm that "the implicit and explicit costs associated with Generating and sharing knowledge generates certain costs and require varying levels of commitment and action on the part of the participating organizations." To avoid these costs or commitments, organizations may exercise the option to delegate certain activities to another organization. Firms that deprive themselves of non-core competencies are putting knowledge implementation to use, and in SCs, the rise of 3PL and 4PL are examples of organizations that not only coordinate logistics but all the supply chain functions, allowing the firms to focus on their core competencies.

Stevens and Johnson (2016) attempt to explain the development of Supply Chain Management and supply chain integration (SCI) in the past 25 years. They define SCI as the alignment, linkage, and coordination of people, processes, information, knowledge, and strategies across the supply chain between all points of contact and influence to facilitate the efficient and effective flows of material, money, information, and knowledge in response to customer needs. The authors consider SCI as the foundation of supply chain management including governance, organization structure, systems, relationship management, business strategy, process design, and performance management. Further, they declare that 3PL and 4PL is the fruit of focus in value-added activities and the rise in outsourcing of non-core activities to lower cost economies that took place in the 1990s. Sahay and Mohan (2003) highlight opportunities for joint planning of logistics in a collaboration approach, as the consolidation of inbound, interfacility and outbound shipments among business partners by accomplished through electronic sharing of information on shipment plans and availability of transportation resources; packaging; collaboration with 3PL with focus on productive use of facilities, labor and equipment to avoid overload a DC's receiving function or storage capacity; and 4PL joint venture or long-term contracts.

Nevertheless, Govindan and Chaudhuri (2016) discuss the logistics risk management as part of supply chain risk management, based on the assumption that some risks are associated with services provided by 3PL such as: lack of responsiveness to customer needs is cited as a problem of outsourcing of logistics functions; disruption to inbound flows, inadequate provider expertise, inadequate employee quality, inability of 3PL to deal with special product needs and emergency circumstances, incompatibility of information systems between shipper and 3PL, the failure of 3PL to meet a shipper's future growth needs and lack of security. Li *et al.* (2015) affirm that risk sharing mechanism improves financial performance

in SC. At the same time, 3PLs themselves face risks from their own operations, due to financial constraints and from shippers who transfer those risks to 3PLs. The investigation uses multi-criteria decision-making approach DEMATEL to analyze the interrelationships between those risks by collaboration between 3PLs and one of its customers. The analysis indicates that the 3PLs need to improve internal processes related to quality management, flexibility of its operations and geographical coverage of their services. Results also show that arms-length relationship between the customer and the 3PLs has strong influence on other risks and there is a need for collaborative relationships between 3PLs and its customers.

Considering other outsourcing strategies, Bhakoo *et al.* (2012) study the management of inventory in the health-care sector. They highlight the existence of a variety of collaborative outsourcing arrangements amongst supply chain partners such as the "Ward Box" system (a variant of the vendor managed inventory system – VMI) between wholesalers/distributors and hospitals. Application of collaborative arrangements between manufacturers and wholesalers/distributors would improve inventory management practices across the SCs. Moreover, learning from materials management departments could be transferable to pharmacy departments.

These are some examples of collaboration and trust in supply chain that are analyzed from the knowledge management perspective. Next section will reproduce similar analyzes for Collaboration and trust in Reverse Logistics.

4.2 Collaboration and trust in reverse logistics

The 74 articles selected in systematic literature review with an emphasis on collaboration and trust in the context of reverse logistics were analyzed, and the distribution of them over the period 2000-2017 is presented in Figure 7.

Considering the nationality of the first author of the 74 articles they are distributed by continent as presented in Figure 8. In comparison with results from the collaboration in the supply chain management (Figure 7), Europe still leads the number of publications in collaboration with a focus in Reverse Logistics. The number of papers in South America is doubled and Brazil is considered in the scenario. The Middle East is not present and the number of papers decreases in Northern America and Asia. Oceania practically maintains the number of publications.

Figure 7 Distribution of articles over time on collaboration and trust in reverse logistics

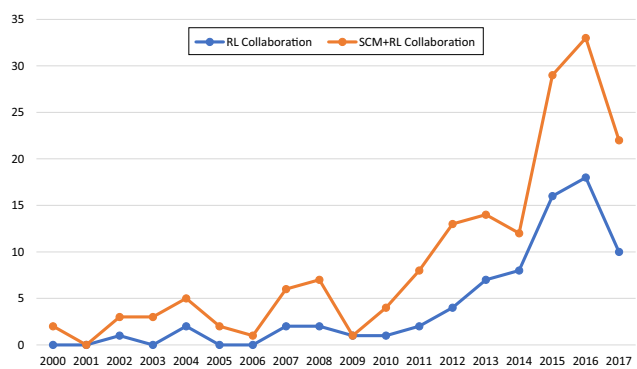
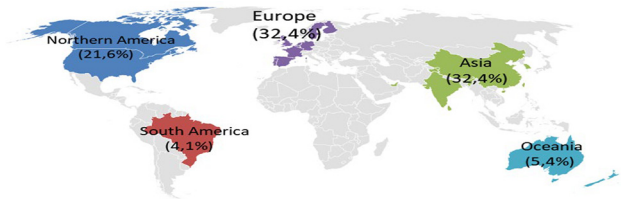


Figure 8 Frequency of publications by continent of affiliation of first author (focus on reverse logistics)



From the methodological point of view, the 74 papers were also categorized in qualitative and quantitative researches. In comparison with results from papers about Collaboration in Supply Chain Management (Table I), the types and numbers of paper by technical procedure were similar. A minor increase was observed in the number of case studies, interviews, literature reviews and multi-criteria studies. Systematic literature reviews were presented in this group and the qualitative researches surpassed the number of quantitative investigations, as it is depicted in Table IV. The main results and implications of these papers are both discussed in the sequence.

These papers were also analyzed under the knowledge exchange strategy, as described in section 4.

4.2.1 Reverse logistics, green supply chain management and sustainability

Considering the 74 papers analyzed, despite the term Reverse Logistics is present in papers since 2002, the increase of references is from 2010 on. Not surprisingly, the reverse logistics theme is equally associated with green supply chain management and sustainability or yet sustainable supply chain management, although reverse logistics by itself is not necessarily green. Notwithstanding, both mentioned issues were important issues either in the 74 or 91 papers, especially from 2010 on. Reverse logistics is considered a component of green supply chain management practices, along with environmental certification, pollution prevention, design for environment and life cycle analysis (Sharma and Gandhi, 2015; Yan *et al.*, 2016; Dai *et al.*, 2017). Authors such as

Table IV Methodological categories reverse logistic collaboration

Methodology	Technical procedure	No. of papers
Empirical studies	Case studies	10
	Interviews	6
	Survey	7
Theoritical studies	Literature review	10
	Conceptual model	7
	Systematic Literature Review	4
Modelling studies	Simulation, linear programming, and stochastic models	9
	MCDA	8
	Structural equation modelling	13
Total		74

Gunasekaran *et al.* (2015) evaluate that the cooperation with green purpose begins with the choice of partners with whom to establish long-term joint actions within the chain. In the sustainable aspects, the collaborative practices aim to reduce the asymmetry of risks and information to meet the objectives of performance with less investment.

Environmental collaboration in this sense can be described as the direct involvement of the organization with suppliers and customers to plan collaboratively solutions that aim to integrate actions for environmental management. In a sustainable vision, suppliers and customers plan and operational measures to reduce impacts on the environment (Vachon and Klassen, 2008).

As mentioned by Srivastava (2007, p. 54):

> The scope of Green Supply Chain Management ranges from reactive monitoring of the general environment management programs to more proactive practices implemented through various Rs (Reduce, Re-use, Rework, Refurbish, Reclaim, Recycle, Remanufacture, Reverse logistics, etc.).

The author in his seminal paper on green supply chain management considers reverse logistics as a part of supply chain management; thus, we understand that the barriers related to supply chain management as a whole regarding collaboration, can be also extended to the portion of reverse logistics. Although green supply chain management involves the design of the product to reduce raw materials and residues, the reverse logistics should also be planned, such as the other activities in direct flow of logistics, mainly in the cases that it is not possible to completely eliminate waste.

Zhang *et al.* (2012) reinforce this idea when state that the collection of residues for recycling, remanufacturing or reuse, which is the role of reverse logistics is necessary to mitigate the maximum, the residues at the end of the process, once that is not possible to eliminate completely the generation of waste. So, we understand that the reverse logistics is sustainable when it acts to manage the residues return and revalorization, considering that in the present context it is not possible to eliminate completely the residues in all productive processes.

4.2.2 The knowledge sharing perspective

The analysis by NVivo® demonstrated that the term knowledge sharing was present in 23 references out of the 74, proportionally more than it was present in the 91 papers. In fact, knowledge management and sustainability are close subjects in this group of papers. Kim *et al.* (2017) argue that Knowledge Management is a key enabler of sustainable supply chain management and the latter, in its turn, is a vital element for competitive advantage. Irani *et al.* (2017) reinforce this perception and explore 24 factors that influence green supply chain collaboration distributed in eight dimensions: strategic, managerial, organizational, technological, environmental, financial, human-socio and operational. Reverse logistics is mentioned in the operational dimension and the two-way relationship with knowledge sharing is declared: "[...] organizations focusing on Reverse Logistics systems are redesigning their structures and relationships, creating a knowledge chain that facilitates and improves data, knowledge sharing and coordination, decision-making and planning" (Irani *et al.*, 2017, p.692). It is important to mention that in the human-socio dimension, special attention is given to interpersonal trust, as one of the most frequently cited requisite of the supply chain management philosophy (Irani *et al.*, 2017; Pomponi *et al.*, 2015; Olorunniwo and Li, 2010).

Considering an intra-organizational perspective, knowledge sharing passes through all the dimensions encompassing the alignment of vision, knowledge and supply chain strategy, organizing collaboration seminars, scrutinizing overall supply chain performance and offering incentive structures to develop performance. Considering an inter-organizational alignment between supply chain initiatives for supply chain collaboration and sustainability, Blome and Paulraj (2013), affirm that the effects of alignment on performance measures are mediated by the firm's internal sustainable production, discussed in the last paragraph. In the context of inter-organizational perspective, high levels of commitment, trust an information sharing are key elements for developing collaboration in logistics (Pomponi *et al.*, 2015).

Muduli *et al.* (2013) reinforce revealing that mutual trust and respect lead to green motivation and Chapman and Corso (2005) affirm that any amount of ICT may overcome a lack of trust and ineffective goal setting between key partners involved in the cross-company projects. Green motivation leads to teamwork, which ultimately leads to green innovation. In the view of Ahmad *et al.* (2016), studies related to sustainable supply chain management practices in the industry do not include internal confidence factors and such element influences the sustainability strategies used by different functional areas of the SC. Their study took into account that the achievement of sustainable supply chains emerges from the development of an organizational culture that encourages team collaboration, and especially proactive behavior is an important element in the search for innovative solutions for sustainability. These findings refer to the cognitive dimension of a social capital concept mentioned in Section 4.1.1.2.

Firms and industries do not accomplish the goals of environmental sustainability in isolation and Reverse Logistics may be analyzed under the context of eco-industrial networks such as symbiosis networks, sustainable supply networks (synonym for green supply chain management), environmental issue networks and environmental solution networks (Patala *et al.*, 2014), that involve different types of knowledge.

While the sustainable supply network (green supply chain management) focus the manufacture and design of products to meet customer needs seeking to minimize waste and emissions along the supply chain, firms in industrial symbiosis (IS) networks, seek new opportunities to extract value from waste and by-products, which might be completely independent from the firms' main identities:

> The reuse of waste and by-products in IS networks is focused on the system-level reduction of environmental impacts, while, in Green Supply Chain Management, it is more focused on single firms and value chains (Patala *et al.*, 2014, p. 169).

Environmental issue networks refer to relative loose collaborative coalitions formed around specific issues such as environmental problems or policies. They are often temporary in nature, varying in length depending on the life-cycle of the focal issue. They also involve a diverse set of actors with asymmetrical power and resources, comprising private sector firms, governmental authorities, non-governmental organizations (NGOs) and even powerful individuals (Ritvala and Salmi, 2010). The fourth network form, environmental solution network, is located in the

boundaries of knowledge generation field as it involves combining knowledge, technologies and other resources across organizational borders to collaboratively create an eco-efficient solution. Therefore, it is presented in the next section.

4.2.3 The knowledge generation perspective

The environmental solution network has received less attention in the literature, with an emphasis on industrial marketing:

> [. . .] the solutions often require a combination of products and services from several suppliers that are combined, usually through a central actor which acts an integrator, to create a new marketable solution. The benefits of technological innovation and integration can lead to an offering that has lower environmental impacts in comparison to its alternatives (Patala *et al.*, 2014, p. 170).

The authors reinforce the potential and characteristics of network cooperation in addressing environmental problems, as something that is necessary.

In the context of knowledge generation, Chen *et al.* (2017) explore the concept of joint development orientation that includes, but is not limited to, interactions between users and developers such as discussions, interviews, and completion of surveys in the development of a Returns Management Software. They argue that Reverse Logistics management is dependent upon appropriate technologies to provide the information to make effective decisions. Returns Management Software can enhance Reverse Logistics by supporting the development of formalized processes and procedures and by providing crucial information support. In this case, the collaborative efforts were designed between software users and vendors, working together in joint development, to provide a software that effectively manages the complexity of returns and keep customers happy.

Sahay and Mohan (2003) explores the importance of customers as key elements in value creation. At that time studying India's organizations the author affirms that 50 per cent of the organizations surveyed indicated that suppliers and customers have little or virtually no role in the demand management, inventory management, and product development processes. Soosay and Hyland explore Latter, the B2C relationship (2015, p. 622) under the concept of "prosumerism", that means: to identify consumers' involvement in the design and development of products with producers. According to these authors, "[. . .] prosumerism is becoming increasingly important and can be applied to differentiate collaboration from a value chain perspective not only in product design or manufacture but also other functions in the SC. The value co-creation within the supply chain includes customer relationship management (CRM), supplier relationship management, demand management, order fulfilment, manufacturing flow management, product development and commercialization and returns management. Despite literature reveals some the product–service portfolio development through B2C and B2B in reverse logistics activities, the supply chain management literature currently lacks empirical research in B2C collaborations (Ta *et al.*, 2015).

According to the European Waste Hierarchy, prevention is a major strategy for sustainability, which considers product development that uses less raw and hazardous materials, and the possible reuse and remanufacturing at the end of product life cycles. Leigh and Li (2015) developed a framework that illustrates the areas and opportunities for supply chain parties to work collaboratively toward environmentally friendly activities, encouraging companies to apply Industrial Ecology and Industrial Symbiosis to develop their environmentally sustainable SCs. Concerning environmental management and manufacturing performance, Vachon and Klassen (2008) observed that upstream environmental practices were more closely linked with process-based performance (fast deliveries, reliable deliveries), while downstream collaboration, was associated with product-based performance (conformance to specifications and durability). The terms upstream, internal and downstream are categories of main supply chain processes such as customer relationship, manufacture, and procurement, respectively (Table V). Moreover, the authors stress that environmental collaboration is a form of proactive environmental management that should be linked to quality management practices, geared toward preventing failures rather than toward troubleshooting or appraisal activities.

Trust developed through continuous interaction and reciprocal knowledge are, once again, mentioned having a critical role in effective horizontal collaboration, similar to those established in joint solutions development. Pomponi *et al.* (2015) develop a framework to increase and deepen the knowledge to achieve effective horizontal collaboration in logistics and affirm the validity of collaborative Reverse Logistics. They propose three levels of trust in horizontal collaboration: agreement-driven trust, knowledge-driven trust, and collaboration-driven trust. They assume a minimal amount of mutual trust as a prerequisite for the cooperation to start happening.

According to Hingley *et al.* (2011, p.316), there is a paucity of literature considering horizontal collaboration among grocery retailers, suppliers, and 3PL. The environmental component of this practice is revealed by the sentence:

> [. . .] Such horizontal integration or collaboration may overcome financial barriers to trade and benefit society by reducing the number of trucks on the road and thus congestion and carbon dioxide emissions (Hingley *et al.*, 2011, p. 317).

These authors explore the benefits and barriers to the use of 4PL management as a catalyst for horizontal collaboration.

4.2.4 The knowledge implementation perspective

Considering 3PL and 4PL as a relevant subject in this knowledge dimension, 19 out of 74 papers mention these terms in contrast with 7 out of the 91 papers analyzed in Section 4.1. Selviaridis and Spring (2007) provide a taxonomy of 3PL research and, based on that, to develop a research agenda for this field of study. They comment that 3PL is usually associated with the offering of multiple, bundled services, rather than just isolated transport or warehousing functions. Contemporary 3PL arrangements are based on formal (both short- and long-term) contractual relations as opposed to spot purchases of logistics services (Murphy and Poist, 1998). In recent years, the term 4PL has also emerged to describe more advanced contracting arrangements.

Meade and Sarkis (2002) focus in the selection criteria of third-party providers, but affirm that retailers are hiring 3PL to implement reverse logistics programs designed to retain value, by getting products back in the most expeditious manner, so that can be speedily redistributed. Third-party Reverse Logistics providers include small and large companies specifically targeting products and industries including

Table V Technologies, practices and methods of collaboration gathered in 165 papers

		Emphasis of literature on technologies, practices and methods					
		Collaboration and Trust supply chain – 91 papers			Collaboration and Trust RL – 74 papers		
		Knowledge sharing	Knowledge generation	knowledge implementation	Knowledge sharing	Knowledge generation	knowledge implementation
*Structure of the characterization mode 1(CC mode 1)**							
Perimeter	**Management approaches**	Supply chain management approaches; supply chain resilience and performances approaches			SC sustainable management approaches; GSCM; SSCM; eco-industrial networks		
Downstream	**Supplier collaboration (Level of collaboration and integration of the suppliers in the purchasing process of components or raw materials of the company)**	Vertical collaboration Relational capital – communication and trust Cognitive capital – values, principles, norms, beliefs Structural capital – networks, social structure Supplier selection Framework for service-oriented	- Buyer Supplier outsourcing		Environmental issues – Joint environmental goal setting; shared environmental planning; working together to reduce pollution and environmental impact formal and informal periodical information	-supplier relationship management, -Green purchasing	
	Supply logistics (Activities bound to the traffic and to the storing of components or raw materials, from the supplier to the stocks of the focus company, and the associated management rules)	Sharing strategies win-win relationship Talent management Model		3PL and 4PL 3PSP Multi-criteria-decision tools - DEMATEL; - supplier selection criteria	Environ mental issues - Joint environmental goal setting; idem supplier collaboration		3PL and 4 PL supplier selection criteria share profits game theories Fuzzy analytic hierarchy process (FAHP) Multi-criteria decision-making tools
Internal	**Manufacturing management (Operations proposed to improve and to optimize the efficiency of the production of the focus company, including the work-in-progress)**	Cost service level optimization solution - Genetic algorithm for order distribution in CSC Cost collaborative multi-agent system (MAS) Risk analysis on data sharing Business model design on inter-organizational collaboration in supply chains	demand forecasting, inventory management and product planning Information and Communication Technologies - ICT *Lean technologies* Collaboration for e-commerce Multi-echelon production planning framework	Enterprise IT e-collaboration Cultural intelligence	- internal formal and informal periodical information - metrics for performance on collaboration (front end agreements, business strategy, processes, capacity utilization, adherence to plan, supplier, manufactures, inventory, service rate, feedback etc - develop pilot stage on collaboration - coordination of contracts -Waste management and Lean manufacturing tools	- Returns management - Returns management software -demand management, order fulfilment, manufacturing flow management, - Design for Environment (DfE); Lifecycle Analysis (LCA); - Quality tools - Collaboration-oriented performance model	Environmental management

(*continued*)

Table V

		Emphasis of literature on technologies, practices and methods					
		Collaboration and Trust supply chain – 91 papers			Collaboration and Trust RL – 74 papers		
		Knowledge sharing	Knowledge generation	knowledge implementation	Knowledge sharing	Knowledge generation	knowledge implementation
*Structure fo the collaboration characterization model (CC model)**							
Upstream	**Customer driven supply chain (Importance given by the company to its customers in its organization and mode of functioning "customer relationship management", "customer service management" and "order fulfilment")**		customer information CRM agile practices that involve the customer in NPD B2C e-marketplaces		-formal and informal periodical information	B2C value creation CRM joint development to improve conformance to specifications and durability of products	
	Transport and distribution (Means the activities bound to the traffic and to the storing of finished goods)	Transparency, free flow of data and information		Collaborative warehouse and transportation Collaborative Transportation Management	Environmental issues - Joint environmental goal setting; shared environmental planning; working together to reduce pollution and environmental impacts formal and informal periodical information	Joint development to enhance fast deliveries, reliable deliveries, risk analysis	
	Demand driven sales planning (Means the knowledge that the company have, about the customers' demand and the real impact of this information in its organization and mode of functioning)	e-sensors to avoid bullwhip effect Inventory management			Vendor Managed Inventory (VMI) Continuous Replenishment Program (CRP) Electronic Data Interchange (EDI) continuous product replenishment (CPR) Vendor managed ordering (VMO) Consortium - COPILOTES Forecast accuracy using AHP -Cluster agglomeration		- Cluster agglomeration
Cross Supply Chain	**Reverse Logistics (The activities bound to the reverse logistics, from customers to the company and from the company to its suppliers)**				- retailer Jointly developed closed-loop mechanism - IT tools to manage from the consumption point to the origin point (store data, communicate with data, share information, decision-making) - RFID - Radio Frequency Identification - Information and Communication Technologies - ICT	- Returns management - Returns management software - product-service portfolio development in B2B in reverse logistics activities -IoT visibility metrics	-share profits -Multi Criteria models do prioritize barriers of RL adoption -Metrics on RL

(*continued*)

Table V

	Emphasis of literature on technologies, practices and methods					
	Collaboration and Trust supply chain – 91 papers			Collaboration and Trust RL – 74 papers		
	Knowledge sharing	Knowledge generation	knowledge implementation	Knowledge sharing	Knowledge generation	knowledge implementation
*Structure fo the collaboration characterization model (CC model)**						
Integrated supply chain **management (Integration of activities and characteristics of suppliers and customers in the organization and the mode of functioning of the focus company)**	- Collaborative Planning Forecasting and Replenishment (CPFR) An economic order quantity/ economic production quantity model in three layers (manufacturer, vendor and retailer) supply chain management. - FTT - Fault Tolerance by teaming - Resilience by teaming framework (RBT)	Potential barriers to integration culture and behavior norms and beliefs values and principles contractual and noncontractual relations communication competence relational governance; Risk analysis	governance, organization structure, systems, relationship management, business strategy, process design, and performance management Game theory - cooperation	Idem demand driven sales planning	Environmental Solution network	financial ability, creativity and innovation ability, cooperation of companies and flexibility of supply chain, that comprise collaborative operational capabilities for 4PL
Product Design (Activities from the phase of design to the phase of commercialization of new products)		Concurrent Engineering CSCW Mark up forum, email, annotation, mail list, instant message, text chat, voice chat, video conference and whiteboard. technologies concerning product development - *CAD, CAM, Product Lifecycle Management; Product Data Management; Product visualization, other tools Management tools-*			GSCM - collaboration in manufacturing and designing of sustainable products	
Product Development and evolution (Activities of modification and evolution until their commercialization of the existing products)						

Notes: *Structure adapted from La Forme's *et al.* (2007); Italic: technologies added to the list by the authors(RL = Reverse Logistics; SC = Supply Chain; GSCM = Green Supply Chain Management; SSCM = Sustainable Supply Chain Management; CRM = Customer Relationship Management; NPD = New Product Development; CSCW = Computer supported cooperative work; IoT = Internet of Things)

electronics and office equipment, appliances, automotive parts, general items and retail markets.

Reverse logistics creates unique requirements if compared to forward logistics that define the criteria for selection of a 3PL. Meade and Sarkis (2002) propose a model to assist in selection considering four dimensions:

1 product lifecycle position (introduction, growth, maturity, decline);
2 the organization's strategic performance criteria (time, quality, cost, flexibility);
3 the reverse logistics process functions required by the organization (collection, packing, storage, sorting, transitional process, delivery); and
4 organization (environmental/customer/service) role of reverse logistics (reclaim, recycle, remanufacture, reuse, take-back and disposal).

The pharmaceutical industry recognizes the importance of 3PL providers as most of the reverse supply chain (RSC) activities are handled by these organizations (Weraikat *et al.*, 2015). The 3PL usually update their information technology and techniques, which are more flexible than insource logistics. Nevertheless, some companies might lose control inherent in outsourcing particular functions, due to the limited collaboration between the supply chain entities (Levi *et al.*, 2003). Studies reveal that to share the RSC's saving among the producer and the 3PL companies is a good practice. Weraikat *et al.* (2016) also explore the role of providing incentives to customers to facilitate leftover returns and improve the sustainability for a real pharmaceutical reverse supply chain, stimulating the end-of-use return of medications. If they are returned to the pharmaceutical producer before their expiry dates, they can be sold at subsidized prices or donated in such countries (Campos *et al.*, 2017a).

Mukhopadhyay and Setaputra (2006) propose the use of a 4PL as a return service provider and develops optimal decision policies for both the seller and the 4PL using a profit maximization model based on the Stackelberg-like game theory. Results showed that profits for the seller and 4PL both increase when the two parties cooperate, in the true sense of a strategic partner. For example, by advertising the return policy more or by redesigning their websites so that the return policy icon can easily be found, not only the retailer increased its profit but also that of the 4PL's.

Prakash and Barua (2016) evaluate and rank the barriers of Reverse Logistics implementation so that companies can design strategies to tackle them on a priority basis, using multi-criteria decision-making model based on fuzzy analytic hierarchy process (FAHP) to prioritize the barriers of Reverse Logistics adoption. Results indicate that customer acuity about Reverse Logistics, lack of coordination/collaboration with 3PL providers and uncertain quality and timing of return are the three most important barriers to Reverse Logistics adoption.

5. Discussion

The degree of contribution varied among the selected papers in responding to the RQs as demonstrated in Appendix 2. Another analysis would arise from the same group papers, but it would deviate from this research focus that is collaboration and trust in reverse logistics; therefore, they will be considered as future research.

It is indubitable that collaboration is a relevant subject either in supply chain or in reverse logistics. Responding to the *RQ1*, this systematic literature review has revealed some specificities that are examined, contrasting the evolution of collaboration in supply chain and in the literature concerning reverse logistics.

5.1 Specificities of collaboration and trust in supply chain and reverse logistics

Historically speaking collaboration was firstly explored in supply chain by the focal company perspective considering the natural downstream relationship existent between supplier's/supply logistics and manufacturers, viewing the reduction of transaction costs, innovation, and other competitive advantages. Considering the supply chain perimeter, Business for Social Responsibility – buyer–supplier relationship – is vertical collaboration type and research has evolved to the upstream side of SC, including other actors such as distributors, carriers, retailers, and customers, viewing other benefits. The supply chain performance and resilience is a consequence of the coordinated network of such actors and it seems natural that authors have dedicated their earlier efforts in understanding these relationships. This might explain the larger number of papers in the thematic buyer–supplier relationship as described in section 4.1.1.1 and a higher number of modeling studies to analyze the relationships among management variables and performance.

Still concerning the supply chain, the organizations have strived to obtain advantage also from the innovation developed with their competitors in a horizontal collaboration perspective. Either in the vertical or the horizontal collaboration, the degree of collaboration could vary from a simple knowledge sharing to knowledge implementation or knowledge generation, not only, but always depending on the grade of trust existent among the actors involved. The knowledge generation is explored in the supply chain mainly viewing to boost firm performance by the development of unique/innovative products. The collaboration with customers gain relevance along with trust. A structure of relationship and common values, compose the theory of social capital that influence the degree of collaboration that is established among supply chain actors. Therefore, trust gains a strong importance in all collaboration studies reviewed.

Nevertheless, two other subjects evolve from the scenarios: the technology necessary and the governance mode. Types of technologies and practices were described in each type of knowledge (sharing, implementation and generation) as described in Section 4.1.2. However, the higher the co-ordination costs these collaboration levels demand, the more a hierarchical governance mode is likely to be chosen, as joint ventures, contractual agreements, and non-contractual agreements. This aspect was less explored in the papers reviewed.

The literature investigation demonstrates that collaboration and trust are not fully explored in the specific context of Reverse logistics. Reverse logistics and the reverse supply chain management[3] are subsumed within broader sustainable management approaches such as green supply chain management and sustainable supply chain management (Koh *et al.*, 2012), highlighting the importance given to the function of "proper disposal" provided by reverse logistics. In fact, the

reason is that these sustainable management approaches embrace reverse logistics, adding the complexity of managing the direct and reverse flow of materials and products in the supply chain. Therefore, despite collaboration and trust are not discussed directly in reverse logistics context, it is indirectly discussed in the context of the sustainable management approaches that may include Reverse Logistics, what is relevant. These findings reveal an opportunity for specific future investigation.

A reverse logistics service provider, for instance, is part of the larger system, all aiming to minimize wastes in the Supply Chain (Koh *et al.*, 2012). The implication of this premise is that if one of these subsystems fails, the entire system fails either. It is important for the entire Green Supply Chain Management system's partners to understand the co-benefits and at the same time to avoid sub-optimal solutions. It is in such context that authors advocate the strong importance of collaboration and trust for the success of a sustainable management approach, would they, implicitly, be true for Reverse Logistics? Nevertheless, in contrast with the 91 group of papers, collaboration is posed as a mandatory practice in Green Supply Chain Management and trust receives as much relevance as received in the Supply Chain group of papers.

5.2 Disruptive business models on collaboration in reverse logistics

Considering *RQ2*, another specificity is that, concerning the perimeter of the supply chain, reverse logistics is considered as a "cross-supply chain activity", as demonstrated in the La Forme's *et al.* (2007) collaboration characterization model adapted (Table V), reinforcing the need of collaboration among reverse logistics' service providers and manufacturers. Most manufacturers do not have the reverse flows as a core business, in this sense 3PL and 4PL are potential return service providers. Therefore, the knowledge implementation dimension gains relevance in this group of papers and disruptive business models may arise from the opportunity for third-party service providers, to develop repair and refurbishing firms, renovation, reprocessing, cannibalization/harvesting or recycling services. Therefore, the function of "recapturing value" provided by Reverse Logistics is also mentioned, but mainly via the knowledge implementation perspective, concerning third-party service providers. The literature emphasizes that returns management can be a value creator, rather than a cost of business, as it has a positive environmental impact. It provides critical resources and customer value (Rogers *et al.*, 2002; Krikke *et al.*, 2013; Dissanayake and Sinha, 2015).

By another perspective, authors advocate that "for returns to be processed effectively and efficiently, they should usually be separated from the forward channel" (Rogers and Tibben-Lembke, 1998, p. 141) or treated as a different strategic business unit (Granlie *et al.*, 2013), what is an opportunity for manufacturers to develop startups, joint ventures or other collaborative endeavors.

Krikke *et al.* (2013) affirm that different channels may perform Reverse Logistics such as a forward distribution system, owned by OEM or retail; a dedicated Reverse Logistics system owned by OEM or retail; a distribution system third-party service providers; a dedicated Reverse Logistics system third-party service providers; or a free market/public company. Independently of the degree of dedication, relevant, up-to-date data on returns and return practices is already scarce. Literature on collaboration and trust in Reverse Logistics is concentrated in conceptual studies, as demonstrated in Table IV (section 4.2), opening possibilities for quantitative approaches that investigate the variables affecting collaboration and trust in Reverse Logistics, metrics for collaboration performance (Hall *et al.*, 2013) and impact of technologies (Olorunniwo and Li, 2010) in all the business models.

5.3 Innovative technologies, practices and tools for collaboration and trust in reverse logistics

Concerning *RQ3*, Table V and Appendix 2 summarize information gathered in the 165 papers regarding collaboration technology, practices, and tools.

While collaborative practices, technologies and methods are more concentrated in the knowledge generation and implementation dimensions of supply chain, in the group of papers concerning sustainable management approaches and Reverse Logistics the elements are concentrated in knowledge sharing and generation.

Considering Reverse Logistics technologies, the knowledge sharing perspective is relevant for development and maintenance of the closed loop mechanisms. IT tools are indicated to manage the information on the entire Supply Chain (Li, 2012), but concerning reverse logistics it must cover from the consumption point to the origin point including to store data, to communicate with data, information sharing, decision-making, including information and communication technology tools (Olorunniwo and Li, 2010). Other practices from supply chain may enhance and support Reverse Logistics. Radio frequency identification (RFID) has already demonstrated benefits in Supply Chain especially when the level of collaboration of participants is more intensive (Sari, 2010), suggesting its use in reverse logistics as well. The concept from supply chain is the collaborative planning Forecasting and Replenishment (CPFR). It has been adopted within supply chains to improve stock production and management involving small-scale or mass collaboration (Holmström *et al.*, 2002). The role of Information Communication Technology systems in supporting CPFR is critical in reducing overstocking, increasing time-savings, delivering increased transparency of real-time data within the supply chain and enhancing buyer–supplier relationships (Koloszyc, 1998). This can have a positive impact on the reverse logistics system, leading to a reduction in the return of stock for redistribution or safe disposal. Vendor management inventory (VMI) is another less explored Supply Chain practice (Gorane and Kant, 2016), that may be adopted in Reverse Logistics.

From the knowledge generation perspective, managers of reverse logistics systems, dedicated or not, should implement returns management practices and software. They could develop a collaboratively B2B product-service portfolio in reverse logistics activities. The perspective of sharing profits may be considered among other collaboration strategies and other practices that affect trust, like alignment of vision,

knowledge and collaboration strategy, organizing collaboration seminars, scrutinizing overall reverse logistics system performance and offering incentive structures to develop performance. Metrics on reverse logistics performance are important research field to be explored (Hazen *et al.*, 2015)

In the context of systems, this systematic literature review suggests that network is a keyword in reverse logistics collaboration. The forward logistics delivers the product to diverse sites demanding networks and collaboration with end-customers to make the way back to the origin, mainly in the case of returns later in the lifecycle (end-of-use/EOU and end-of-life/EOL). Would not be the role of end-customers in returns handling underestimated by researchers and practitioners? Soosay and Hyland (2015), Wang *et al.* (2007); Weltevreden (2008) mention that B2C in reverse logistics still emphasizes the design of e-commerce regulation for return or exchange of products in the case of returns early in the life cycle (commercial and warranty returns) but not for EOU or EOL products. Playing on words, would not there be a "C2B relationship" network to be explored? Few authors have analyzed the benefits of using networks of Local Collect post offices, supermarkets, and railway stations as Collection/Delivery Point (CDPs) (Song *et al.*, 2011).

Still in the context of networks, Soosay and Hyland (2015) argument that collaboration in supply chain is meant to achieve mutual benefits and win-win outcomes for all parties, therefore researchers need to reframe their RQs to address the entire supply chain in their studies. In the same rationale, considering the systemic context of reverse logistics, that pertain the supply chain, the customer is not the only stakeholder in the network. For instance, Krikke *et al.* (2013) give us a notion of the different channels for returns handling considering collection (customer drop off; retail/brand owner store; pick up at customer; free market; community service). They also name recovery options for third-party service providers, for example (as is – clean; reuse –repair/refurbish; harvest/cannibalize; recycle and disposal), in which diverse stakeholders and innovative business models gain relevance. However, how to boost these endeavors?

Part of the answer may be on the right side of Table V, considering the management's approaches. There the vertical and horizontal collaboration perspectives gain relevance via eco-industrial networks. The degree of coordination will vary among the eco-industrial networks demanding different governance mechanisms mentioned in Supply Chain literature. Reverse Logistics is a process inside these networks and specific studies on these and other types of networks and their governances are still necessary.

6. Final considerations

Reverse Logistics is hardly dissociated from broader sustainable supply chain management approaches and eco-industrial networks what make all considerations on collaboration and trust designed for these approaches, valuable and valid for reverse logistics. Collaboration and trust become mandatory in the sustainable supply chain management scenario and a strong emphasis is placed on literature in the development of joint collaboration strategies, either formally or informally. The degree of formalization will increase from knowledge sharing, through knowledge implementation and knowledge generation technologies, practices or methods' implementation, either demanding more or less hierarchical governance modes, such as joint ventures, contractual agreements, and non-contractual agreements.

In an upstream perimeter, disruptive business models, such as start-ups, may arise from collaboration between focal companies and third-party service providers in vertical or horizontal collaboration modes, attaining large markets. Depending on the degree of innovation envisioned and the nature of the Reverse Logistics business developed (clean; reuse, repair/refurbish; harvest/cannibalize; recycle or disposal) the collaboration technologies from the cross-supply chain/knowledge generation may be very useful (Concurrent engineering, Data management Product visualization, Design for Environment/DfE; Lifecycle Analysis/LCA; Quality tools etc.). Nevertheless, less innovative arrangements between the focal company and 4PL dedicated to Reverse Logistics systems will make good use of other collaboration technologies. For instance, literature revealed that mainly in Sustainable Supply Chain Management environments, inter-organizational collaboration is better achieved if intra-collaboration and quality are at high-performance levels. This information brings up the importance of internal practices and good manufacturing management practices at the focal company, the third-party service providers or the 4PL, such as Lean technologies; the adequate use of Information and Communication Technologies; metrics for performance on collaboration (front end agreements, business strategy, processes, capacity utilization, adherence to plan, supplier, manufactures, inventory, service rate, feedback) and others.

Another disruptive collaboration in Reverse Logistics may arise, depending on the type of returns in the life cycle, if early (commercial and warranty) or late (EOL/EOU). The early return is more concerned with collaboration with logistics providers mentioned in the last paragraph, while late returns with the end-customer. Again, innovative business models and networks may arise from this collaboration for different value-added purposes (recycle, refurbish, disposal, etc.). The development of strategies for upstream and downstream perimeters will give a broader perspective for Reverse Logistics.

In a downstream perimeter, the focal company may collaborate with suppliers and supply logistics to achieve better Reverse Logistics results in a model similar to those mentioned before, mainly developing a closed-loop lifecycle for products and parts. A major recommendation is to overcome barriers to relational practices and risk analysis and always developing a pilot stage of collaboration.

6.1 Implications of the research (practical, theoretical and methodological)

Regarding the *practical implications*, this research revealed practices and tools that may make the managers' task clearer in bringing collaboration and trust to the organization's management routine. In addition, it is important to point

out that it is hard to implement any practice without the collaboration of stakeholders involved, mainly considering practices involving logistics issues, which demand from supply chain a level of integration, commitment, trust and information sharing. In this context, the tools presented in this paper may be useful to aid managers to make systematized and reliable decisions, related to reverse logistics. Managers from public and private sectors, can use the research as new insights to implement tools and practices related to the context approached in this paper.

Second, in terms of *theoretical implications*, this research identified aspects that may be developed in future research. It has contributed to making a parallel discussion of the role of collaboration and trust in the interface between supply chain management and in reverse logistics, systematizing the existing knowledge and, identified disruptive innovation opportunities related to this thematic. Moreover, this research corroborates the research of Srisvatava (2017) who states that reverse logistics is a part of green supply chain management. In fact, this review allows us to go beyond, demonstrating that reverse logistics is part of the whole concept of sustainable supply chain management, that includes also the social dimension of sustainability. In this regard, it is essential to include the consideration of collaboration in the context of reverse logistics. To the best of our knowledge, no paper approached this issue yet, which establishes the novelty and contribution of this paper in the theoretical context.

Third, in terms of *methodological implications*, the literature on collaboration is broad and full of concepts. The strategies adopted for content analysis, the separation of groups of papers, the use of knowledge exchange theory and the software NVivo® proved to be efficient and may inspire further investigations on this subject. The group of papers may be subject of future analysis on other collaboration related topics (Appendix 2): risk analysis, decision-making tools, negotiation and contract, supply chain performance, metrics, forecast accuracy, game theory, resilience, multi-agent systems, circular economy, game approaches, value creation, efficient consumer response and life cycle assessment. Furthermore, papers based in systematic literature review can be useful to scholars since they allow the identification of research gaps and the stablishment of a research agenda. They are usuful to editors, as well, since they present a summarization of the mainstream of publications in the area. They reveal relevant issues to be considered in special editions and the evolution of the research in a given field. Therefore, this paper may help researchers to choose a relevant topic of study to focus on, as well as editors to decide, especially at the time of desk review, whether it is feasible to follow up the evaluation process of submitted papers.

Notes

1 https://clarivate.com/products/journal-citation-reports/

2 https://journalmetrics.scopus.com/

3 The main goal of Reverse Supply Chain Management is to accommodate two-way material flows across Supply Chain.

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Appendix 1

Table AI Table journals of 165 papers selected

Periodical	Papers	(%)	Impact Factor	SJR	ABDC Rank	AJG Rank
International Journal of Production Economics	17	10,30	3.493	2.216	A*	3
Supply Chain Management: An International Journal	14	8,48	4.072	1.864	A	3
Journal of Cleaner Production	13	7,90	5.715	1.615	–	–
European Journal of Operational Research	8	4,85	3.297	2.505	A*	4
International Journal of Operations & Production Management	7	4,24	3.339	2.191	A	4
Transportation Research Part E	7	4,24	2.974	1.694	A*	3
Computers in Industry	5	3.03	2.691	0.894	–	3
International Journal of Physical Distribution & Logistics Management	5	3,03	2.577	1.521	A	2
Journal of Operations Management	5	3,03	5.207	4.599	A	4*
The International Journal of Logistics Management	5	3,03	1.610	0.665	A	1
Benchmarking: An International Journal	4	2,42	–	0.436	B	1
International Journal of Production Research	4	2,42	2.325	1.463	A	3
Resources, Conservation and Recycling	4	2,42	3.313	1.160	–	–
Computers & Industrial Engineering	3	1,82	2.623	1.542	–	–
Industrial Marketing Management	3	1,82	3.166	1.830	A*	
Procedia - Social and Behavioral Sciences	3	1,82	–	–	–	–
Expert Systems with Applications	2	1,21	3.928	1.433	C	–
IIMB Management Review	2	1,21	–	–	B	–
Journal of Business Logistics	2	1,21	2.878	1.784	A	–
Journal of Business Research	2	1,21	3.354	1.815	A	–
Journal of Purchasing & Supply Management	2	1,21	3.240	1.925	B	–
Omega	2	1,21	4.029	3.674	A*	3
Production Planning & Control: The Management of Operations	2	1,21	2.369	1.073	B	3
Acta Scientiarum Technology	1	0,61	0.259	0.186	–	–
Applied Economics	1	0,61	0.586	0.464	A	2
Applied Mathematical Modelling	1	0,61	2.350	1.145	–	–
Asian Research Publishing Network	1	0,61	0.401	0.204	–	–
Business Horizons	1	0,61	2.157	0.844	C	–
Competitiveness Review	1	0,61	–	–	C	–
Construction Management and Economics	1	0,61	–	0.89	A	–
Discrete Dynamics in Nature and Society	1	0,61	0.711	0.266	–	–
Economic Modelling	1	0,61	1.481	0.959	A	–
Engineering Applications of Artificial Intelligence	1	0,61	2.894	1.047	–	–
Enterprise Information Systems	1	0,61	1.908	0.801	B	–
European Journal of Purchasing & Supply Management	1	0,61	3,240	1.925	–	–
European Management Journal	1	0,61	2.481	1.078	B	–
Global Business Review	1	0,61	–	0.266	C	–
Healthcare	1	0,61	–	0.718	–	–
Industrial Management & Data Systems	1	0,61	2.205	0.768	–	–
Information & Management	1	0,61	3.317	1.628	A*	
Int J Adv Manuf Technol	1	0,61	2.209	0.967	–	–
Int J Syst Assur Eng Manag	1	0,61	–	0.331	–	–
Int J. Integrated Supply Management	1	0,61	0.46	0.326	C	–
Int. J. Logistics Systems and Management	1	0,61	1.30	0.429	C	–
International Journal of Disaster Resilience in the Built Environment	1	0,61	–	–	–	–
International Journal of e-Collaboration	1	0,61	–	0.311	–	–
International Journal of Logistics: Research and Applications	1	0,61	1.018	0.512	B	1
International Journal of Productivity and Performance Management	1	0,61	–	0.607	B	1
Journal of Business Ethics	1	0,61	2.354	1.165	A	3
Journal of Environmental Management	1	0,61	4.010	1.141	A	3
Journal of Industrial Engineering and Management	1	0,61	–	0.315	–	1
Journal of Manufacturing Systems	1	0,61	2.770	1.349	B	1

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Table AI

Periodical	Papers	(%)	Impact Factor	SJR	ABDC Rank	AJG Rank
Journal of Supply Chain Management	1	0,61	5.789	4.98	A	–
Management Science	1	0,61	2.822	3.885	A*	–
Networks and Spatial Economics	1	0,61	2.662	1.561	C	–
Procedia Economics and Finance	1	0,61	–	0.40	–	–
Production and Operations Management	1	0,61	1.95	3.163	A	–
Renewable and Sustainable Energy Reviews	1	0,61	8.050	3.051	–	–
Robotics and Computer-Integrated Manufacturing	1	0,61	2.846	1.272	–	–
Scientia Iranica. Transaction A, Civil Engineering	1	0,61	–	0.24	–	–
Simulation Modelling Practice and Theory	1	0,61	1.954	0.616	–	–
Sustainability	1	0,61	1.789	0.146	–	–
Technology Analysis & Strategic Management	1	0,61	1.273	0.653	–	–
The Social Sciences	1	0,61	0.715	0.435	–	–
Transportation Journal	1	0,61	–	0.374	B	–
Transportation Research Part D	1	0,61	2.341	1.195	A	3
Work Study	1	0,61	–	0.607	B	1

Appendix 2

Table AII List of 165 papers selected in the systematic literature review

Group of papers	Contribution	Brief Description	Type of contribution	References
74	High	Proposes six elements: financial ability, creativity and innovation ability, cooperation of companies and flexibility of supply chain, that comprise collaborative operational capabilities in the use of 4PL for industrial cluster competitiveness	Practices Capabilities	Subramanian, N., Gunasekaran, A., Papadopoulos, T., & Nie, P. (2016). 4th party logistics service providers and industrial cluster competitiveness: collaborative operational capabilities framework. *Industrial Management & Data Systems, 116*(7), 1303-1330
74	Low	Focus in SSCM corporate social responsibility	Model Hsueh, C. F. (2015). A bi-level programming model for corporate social responsibility collaboration in sustainable supply chain management. *Transportation Research Part E: Logistics a nd Transportation Review, 73*, 84-95	
91	Medium	An economic order quantity/economic production quantity model in three layers (manufacturer, vendor and retailer) supply chain management	Model	Sana, S. S. (2012). A collaborating inventory model in a supply chain. *Economic Modelling, 29* (5), 2016-2023
74	Low	Simulation Model using Arena optimization - AHP - RL	Model	Arun Raja, A., Arjun, M., & Anish kumar, M. (2006). A collaborative application of AHP to enhance a routing model for logistics and reverse logistics
74	High	SLR on collaboration. Suggest future research fields	Future research	Soosay and Hyland (2015)
74	High	General framework based on a collaboration characterization model and a collaboration-oriented performance model, both based on main supply chain business processes	Framework	La Forme et al.. (2007)
74	Low	Literature review: potential future research on comprehensive strategic decision models for identifying conditions under which each alternative must be selected and on disposition decisions	Future research on RL	Agrawal *et al.* (2015)
91	High	Order distribution is to determine a demand allocation schedule of which order to which supplier. The goal of the CCS is to find a comprehensive optimal solution, which will minimize the total cost, improve the customer service level an d equal the utilization	Practice Cost- service level Optimization solution	Zhang, H., Deng, Y., Chan, F. T., & Zhang, X. (2013). A modified multi-criterion optimization genetic algorithm for order distribution in collaborative supply chain. *App lied Mathematical Modelling, 37* (14-15), 7855-7864
91	Medium	Presents an approach based on the Analytic Network Process (ANP) to manage collaborative relationships under an integrated approach by considering not only the inter-enterprise performance elements, but also the factors that influence collaboration	Model Multi Criteria approach	Verdecho *et al*. (2012)
74	High	This article proposes multi-criteria decision-making model based on fuzzy analytic hierarchy process (FAHP) to prioritize the barriers of RL adoption	Model Multi Criteria approach	Prakash, C., & Barua, M. K. (2016). A multi-criteria decision-making approach for prioritizing reverse logistics adoption barriers under fuz
91	Medium	Supply network resilience - collaborative networks - FTT - Fault Tolerance by teaming - Resilience by teaming framework (RBT)	Practice SCC and Resilience	Levalle, R. R., & Nof, S. Y. (2015). A resilience by teaming framework for collaborative supply networks. *Computers & Industrial Engineering, 90*, 67-85
91	Medium	Service-oriented framework for agent based simulation to support the analysis of collaborative interactions in SC	Framework	Dorigatti, M., Guarnaschelli, A., Chiotti, O., & Salomone, H. E. (2016). A service-oriented framework for agent -based simulations of collaborative supply chains. *Computers in Industry, 83*, 92-107
91	Low	The authors name barriers to success of SCM in construction	(Future research) Focus on construction supply chain management	Akintoye, A., McIntosh, G., & Fitzgerald, E. (2000). A survey of supply chain collaboration and management in the UK construction industry. *European Journal of Purchasing & Supply Management, 6* (3-4), 159-168
91	Low	Virtue ethics lens - suggest that sustainable collaboration is preferable to dictatorial collaboration both operationally and ethically in the long run	Model Dictatorial x sustainable collaboration models	Drake and Schlachter (2008)

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
91	Medium	Resilience - Integrated logistics capabilities were found to positively influence supply chain collaboration and supply chain visibility	Practice supply chain and Resilience	Mandal, S., Sarathy, R., Korasiga, V. R., Bhattacharya, S., & Dastidar, S. G. (2016). Achieving supply chain resilience: the contribution of logistics and supply chain capabilities. *International Journal of Disaster Resilience in the Built Environment, 7* (5), 544-562
91	Medium	Talent management model. In this approach, companies and suppliers share information and cooperate in the supply chain process - 4 phase model -	Model Talent management	Makarius, E. E., & Srinivasan, M. (2017). Addressing skills mismatch: Utilizing talent supply chain management to enhance collaboration between companies and talent suppliers. *Business Horizons, 60* (4), 495-505
74	Medium	Forecast accuracy using AHP model to rank the information needed to improve forecast accuracy. It can help the firms to make decisions on supply chain collaborative arrangements for information exchange	Model Forecast accuracy	Ramanathan, U. (2013). Aligning supply chain collaboration using Analytic Hierarchy Process. *Omega, 41* (2), 431-440
91	Medium	Multi-agent systems (MAS) for cost collaborative management (CCM) of supply chains. Automatic context awareness responses to coordinate inter-firm cost management and integrates self-learning, self-adaptation, and context awareness into the CCM in supply chains	Model Multi-agent system	Fu and Fu (2015)
91	Multi agent system	Multi-agent computational environments are suitable for dealing with a broad class of coordination and negotiation issues involving multiple autonomous or semiautonomous problem solving agents	Model Multi-agent system	Jiao, J. R., You, X., & Kumar, A. (2006). An agent-based framework for collaborative negotiation in the global manufacturing supply chain network. *Robotics and Computer-Integrated Manufacturing, 22* (3), 239-255
74	Medium	Fashion remanufacturing - collaboration among key players along the reverse supply chain is essential for business growth, the extent of this growth is dependent on the commitment and involvement of large fashion retailers and consumer	None (Future research)	Dissanayake and Sinha (2015)
74	Medium	Findings suggest that the sophistication of ICT implementation increases with the risks and value associated with medical devices. Operational attributes are derived from ICT implementations which can positively affect RE performance	Method RL exchange system	Xie, Y., Breen, L., Cherrett, T., Zheng, D., & Allen, C. J. (2016). An exploratory study of reverse exchange systems used for medical devices in the UK National Health Service (NHS). *Supply Chain Management: An Internat ional Journal, 21* (2), 194-215
74	High	Authors present a linear programming problem for the RL network developed under a collaborative framework which aims to maximize the total sustainable impact in the planning horizon. DEMATEL technique to identify the cause and effect gro ups	Method Decision-Making Tool - DEMATEL	Agarwal *et al.* (2016)
74	Medium	The results corroborate the assertion that information support capabilities and stated goals are antecedents to establishing metrics on RL	Practice Metrics on RL	Hazen *et al.* (2015)
74	Low	Apply decision support tool to evaluate the environmental performance of health-care suppliers	Method Multi Criteria approach	Malik, M. M., Abdallah, S., & Hussain, M. (2016). Assessing supplier environmental performance: Applying analytical hierarchical process in the United Arab Emirates healthcare chain. *Renewable and Sustainable Energy Reviews, 55*, 1313-1321
91	High	It shows that while trust mediates the impact of collaboration on agility performance, the indirect effect of collaboration on agility performance via trust is significant only beyond a threshold level of collaboration	Practice BSR Performance analysis	Narayanan *et al.* (2015)
91	Medium	Results show that the relationships among supply chain collaboration value innovation, supply chain capacity and competitive advantage can have a positive impact, and that supply chain capability is a full mediator. Moreover, supply chain echelons (upper, middle and downstream) have some moderating effects in these relationships	Practice Collaboration role on supply chain Capability	Liao, S. H., Hu, D. C., & Ding, L. W. (2017). Assessing the influence of supply chain collaboration value innovation, supply chain capability and competitive advantage in Taiwan's networking communication industry. *International Journal of Production Economics, 191*, 143-153

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
91	Medium	The study contributes to defining a method for designing specific collaboration indexes in different food and fiber chains. Factors emerged: information sharing, decision synchronization; incentive alignment (risk sharing and technical support)	Practice Metrics on collaboration index	Rota *et al.* (2018)
74	Medium	This paper analyzes supply chain crisis, the main blockage to effective supply chain collaboration. In the second moment demonstrates how AHP can be used to assess risk factors and alternatives as part of the framework to facilitate and support the right concept of application approach in collaborative supply chain	Model assessing risk factors	Badea *et al.* (2014)
91	Medium	This study examines how data sharing has the potential to create risk for enterprises in retail SCC and proposes a new algorithm to remove sensitive knowledge from the released database based on the intersection lattice of frequent item sets	Method Risk analysis on data sharing	Le *et al.* (2013)
91	Low	Interviews indicate some firms are beginning to manage value co-creation initiatives across multiple tiers of the supply chain. They also reveal awareness of integration's competitive potential is insufficient to mobilize resources and mitigate resistance to collaboration. Commitment is a superordinate enabler	Practice supply chain integration benefits	"Henry" Jin, Y., Fawcett, A. M., & Fawcett, S. E. (2013). Awareness is not enough: Commitment and performance implications of supply chain integration. *International Journal of Physical Distribution & Logistics Management, 43* (3), 205-230
74	High	They stress the importance of collaboration with 3PL and customers in RL	Practice Barriers RL	Prakash, C., Barua, M. K., & Pandya, K. V. (2015). Barriers analysis for reverse logistics implementation in Indian electronics industry using fuzzy analytic hierarchy process. *Procedia-Social and Behavioral Sciences, 189*, 91-102
91	Low	Barriers on RL on India: (1) Indian maritime legislation (especially sabotage rules); (2) issues in the infrastructure and procedures at port and port-centric areas; (3) underdevelopment of small ports; (4) lack of a collaborative culture among the various service providers involved in the logistics supply chain	Practices Barriers RL	Venkatesh, V. G., Zhang, A., Luthra, S., Dubey, R., Subramanian, N., & Mangla, S. (2017). Barriers to coastal shipping development: An Indian perspective. *Transportation Research Part D: Transport and Environment, 52*, 362-378
91	Medium	E-sensors are hardware-software capable of perceiving, reacting and learning from its interactive experience through the supply chain, rather than just searching for data and information through the network and reacting to it. E-sensor s can help avoid the "bullwhip" effect	Technology e-sensors	Rodriguez, W., Zalewski, J., & Kirche, E. (2007). Beyond intelligent agents: E-sensors for supporting supply chain collaboration and preventing the bullwhip effect. *International Journ al of e-Collaboration, 3* (2), 1
91	Medium	Cartelization becomes least beneficial for the upstream firm but most favored by the downstream firm and the chain. A Cost-sharing contract brings more profit to both members and the chain than a non-cooperative mode does, and a Cartelization is Pareto-improving among the three under certain conditions	Theoretical approach	Dai *et al.* (2017)
91	Low	SSC with retailers for limited shelf space	Practice Category captainship	Kurtulu\bcedil\s\ecedil\, M., & Toktay, L. B. (2011). Category captainship vs. retailer category management under limited retail shelf space. *Production and Operations Management, 20* (1), 47-56
74	Medium	Investigates a supply chain regarding e-commerce and express delivery industry, in which collaborative operations of enterprises are discussed. The profitability and collaboration capability acting as order parameters and the rest of the influential resources including logistics, fund, information, and commodity are selected with their interrelations being examined based on servo theory of synergetics	Practice e-commerce	Xu, Y., Zhang, X., Cao, J., Chen, Y., & Ye, X. (2016). Collaboration and Evolution of E-Commerce and Express Delivery Industry Supply Chain. *Discrete Dynamics in Nature and Society, 2016.*

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
91	Medium	"Ward Box" - Application of collaborative arrangements between manufacturers and wholesalers/distributors would improve inventory management practices across the supply chains. Also, learning from materials management departments could be transferable to pharmacy departments	Practice Inventory management	Bhakoo *et al.* (2012)
74	Low	A collaborative supply chain decision-making framework is formulated with environmental constraints and carbon caps; its objective is to maximize the net present value of an integrated supply chain as well as satisfy the interests of its individual members	Framework Decision-making	Ding, H., Zhao, Q., An, Z., & Tang, O. (2016). Collaborative mechanism of a sustainable supply chain with environmental constraints and carbon caps. *International Journal of Production Economics, 181*, 191-207
91	Medium	An integrated solution framework which combines scatter evolutionary algorithm, fuzzy programming and stochastic chance-constrained programming are combined to jointly take up the issue	Framework Multi-echelon for production planning	Zhang, G., Shang, J., & Li, W. (2011). Collaborative production planning of supply chain under price and demand uncertainty. *European Journal of Operational Research, 215* (3), 590-603
91	Low	It studies the impact of factors on their sustainability strategies of four key supply chain functions: supplier management, production management, product stewardship and logistics management. Companies must also develop an organizational culture that encourages team collaboration and proactive behavior to meet innovative sustainability solutions	Practices Factors for sustainable SC	Ahmad, W. N. K. W., Rezaei, J., Tavasszy, L. A., & de Brito, M. P. (2016). Commitment to and prepar edness for sustainable supply chain management in the oil and gas industry. *Journal of environmental management, 180*, 202-213
91	Medium	Game theory - One way to try to reduce these costs is through horizontal cooperation among shippers. He proposed app roach is illustrated with an example in which different cooperative game solution concepts are compared. Extensive numerical experiments have also been carried out to gain insight into the properties of the corresponding cost savings game and the behavior of the different solution concepts	Theoretical approach Game theory	Lozano, S., Moreno, P., Adenso-D\bacute \iéaz, B., & Algaba, E. (2013). Cooperative game theory approach to allocating benefits of horizontal cooperation. *European Journal of Operational Research, 229* (2), 444-452
74	Low	Coordination efforts are required from the supply chain entities, facing environmental regulations, to collect and recycle unwanted medications. Therefore, a bonus sharing technique is also proposed based on each entity's investment in the coordination process. It shows that up to 28% more products could be collected if companies coordinate their operations efficiently	Method Lagrangian relaxation method - negotiation	Weraikat, D., Zanjani, M. K., & Lehoux, N. (2016). Coordinating a green reverse supply chain in pharmaceutical sector by negotiation. *Computers & Industrial Engineering, 93*, 67-77
74	Medium	Our results indicate that being green internally is a prerequisite for collaboration into a green supply chain, internal EM contributes to increasing performance more than external EM, while performing the environment does not lead to a higher economic performance	Practices Environmental Management (EM)	De Giovanni, P., & Vinzi, V. E. (2012). Covariance versus component-based estimations of performance in green supply chain management. *International Journal of Production Economics, 135* (2), 907-916
74	High	Develops a conceptual model outlining the antecedents for a successful embeddedness of environmental directives - Waste Electrical and Electronic Equipment (WEEE) and Restriction of the use of certain Hazardous Substances (RoHS) - on greening a supply chain. This emerging theory explains why collaboration with supply chain partners is the key antecedent on greening a supply chain to gain co-benefits	Model WEEE environmental directives	Koh, S. C. L., Gunasekaran, A., & Tseng, C. S. (2012). Cross-tier ripple and indirect effects of directives WEEE and RoHS on greening a supply chain. *International Journal of Production Economics, 140* (1), 305-317
91	Medium	The results showed that with high demand variance, low demand correlation, and/or high demand covariance, the supply chain without the intermediate tier performed better than that with the intermediary. The simulation and analytical approaches presented in the paper can help firms make better decision on business model design and inter-organizational collaboration in supply chains	Method Discrete Simulation approach	Zhang, C., & Zhang, C. (2007). Design and simulation of demand information sharing in a supply chain. *Simulation Modelling Practice and Theory, 15* (1), 32-46

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
74	High	Explore the influence of collaboration and information technology (IT) on the RL competency of firms. Through collaboration, firms can improve their ability to handle returns, but this research introduces IT as providing a moderating influence over the impact of collaboration in the advancement of a reverse logistics competency	Technology IT on RL competency	Morgan, T. R., Richey Jr, R. G., & Autry, C. W. (2016). Developing a reverse logistics competency: The influence of collaboration and information technology. *International Journal of Physical Distribution & Logistics Management, 46* (3), 293-315
74	Low	The paper further illustrates the potential of the proposed cloud-based model in helping supply chain stakeholders to address the implications of managing life-cycle information and to improve the timeliness of their carbon footprint assessment	Method LCA platform	Xing, K., Qian, W., & Zaman, A. U. (2016). Development of a cloud-based platform for footprint assessment in green supply chain management. *Journal of cleaner production, 139*, 191-203
91	Medium	IT - The research (i) uncovered the importance of leveraging enterprise IT through supply chain collaboration; (ii) identified the relationship between enterprise ownership and enterprise technology use and supply chain collaboration i *n* China-linked supply chain and (iii) illustrated e\?\ects of supply chain collaborative activities on operational and market performance	Technology Enterprise IT	Li, L. (2012). Effects of enterprise technology on supply chain collaboration: analysis of China-linked supply chain. *Enterprise Information Systems, 6* (1), 55-77
91	High	This multitheoretical approach shows that reputation at the start of a project has a direct effect on a buyer's future collaboration intentions with suppliers. These results support that trust during the project collaboration has a stronger influence on the future of buyer–supplier relationships than fair economic rewards or reputation	Practice BSR	Wagner, S. M., Coley, L. S., & Lindemann, E. (2011). Effects of suppliers' reputation on the future of buyer-supplier relationships: the mediating roles of outcome fairness and trust. *Journal of Supply Chain Management, 47* (2), 29-48
74	High	This paper examines the role of KM in facilitating GrSCC. Through the identification of key factors extrapolated from the literature, a model for implementing GrSCC using a futures-based perspective is proposed.. Findings support a futures-based perspective that enhances understanding and refines forward-looking strategies for GrSCC	Method Knowledge Management	Irani, Z., Kamal, M. M., Sharif, A., & Love, P. E. (2017). Enabling sustainable energy futures: factors influencing green supply chain collaboration. *Production Planning & Control, 28* (6-8), 684-705
74	Low	This paper analyzes the differences existing in the relations between bottling/packaging firms belonging to the food and drinks sector and their suppliers (fundamentally bottle/jar manufacturers) and their customers (end consumers of the packaged or bottled products) in two European countries with different characteristics: Spain and Belgium	Practices Collaborative environmental friendly practice	Gonzalez-Torre, P. L., Adenso-D\?\az, B., & Artiba, H. (2004). Environmental and revers e logistics policies in European bottling and packaging firms. *International Journal of Production Economics, 88* (1), 95-104
74	Medium	This paper examines the impact of environmental collaborative activities on manufacturing performance. The influence of collaboration in each direction was empirically assessed and the benefits of collaborative green practices with sup pliers were broadest. In contrast, collaboration with customers yielded mixed outcomes	Practices Collaborative green practices (Packaging segment)	Vachon, S., & Klassen, R. D. (2008). Environmental management and manufacturing performance: The role of collaboration in the supply chain. *International journal of production economics, 111* (2), 299-315
91	Medium	Authors investigated the performance of CPFR. Retailers have traditionally played the hub role in supply chains to reduce the bullwhip effect, but our simulation confirmed that shifting the retailer (buyer-driven) collaboration to a manufacturer (supplier-driven) approach was a more viable option	Practice Collaborative Planning, Forecasting and Replenishment - CPFR	Chen *et al.* (2007)
74	Low	The purpose of this paper is to explore the peer-reviewed literature to identify future research directions with the help of an extensive literature review. As indicated by the literature review, there is a need to do a more detailed stud y that can pinpoint particular components of green supply chain practices that have a strong association with particular components of green supply chain performance. This paper attempts to achieve the aim by using a different connotation of these *t* wo constructs	Practices GSCM	Sharma, S., & Gandhi, M. A. (2016). Exploring correlations in components of green supply chain practices and green supply chain performance. *Competitiveness Review, 26* (3), 332-368

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
91	Medium	SCC Plays crucial role in stimulating organizational performance - future muti-partner information sharing among vital stakeholders, collaborative warehouse and transportation, distribution in SSNetwork. Transparency, free flow of data and information, high levels of trust and commitment enablers	Practice SSC evolution	Yi, W. S., Jamal, N. B. M., & Chin, T. A. (2016). Exploring supply chain collaboration: evolution, definition and benefits. *The Social Sciences, 11* (11), 2845-2851
91	High	This paper is aimed at providing a framework to help managers of a supply chain determine the appropriate operational and environmental conditions under which investing in radio frequency identification (RFID) technology is more beneficial. Result s from the simulation model show that integrating RFID technology within a supply chain provides significantly greater benefits when the level of collaboration between the participants is more intensive	Framework - Technology Radio Frequency identification (RFID)	Sari (2010)
74	High	Collaboration between manufacturing organization and their suppliers has been highly dominated. In very few papers, the downstream to manufacturing organization collaborations has been discussed. Research gap can be found to address the downstream supply chain collaboration as well as collaboration with more than one tier supplier. The main benefits of information sharing are; cost saving, inventory reduction, increase visibility, reduction in bullwhip effect etc	(Future research) Literature Review	Hudnurkar *et al.* (2014)
91	Medium	The findings imply that a concentrated customer base, which reflects a strong CSR as well as high switching costs, motivates suppliers to invest more in R&D and become more innovative. The results are robust to sophisticated econometric techniques that control for endogeneity and suggest heterogeneous effects of business partnerships on firm innovation	Practices Customer-Supplier Relationship (CSR)	Krolikowski, M., & Yuan, X. (2017). Friend or foe: Customer-supplier relationshi ps and innovation. *Journal of Business Research, 78*, 53-68
91	High	The importance of ICTs to such company networks is considered but research has shown that no amount of technology can overcome a lack of trust and ineffective goal setting between key partners involved in the cross-company projects. Different governance models may also impact on the success or otherwise of the network. This paper provides an overview of the main topics considered in this Special Issue	Technology ICT	Chapman and Corso (2005)
91	Medium	Results provide strong support for the hypothesized links between sustainability commitment and both intra- and inter-firm collaborative capabilities; and between inter-firm collaborative capabilities and environmental and social, and cost performance. Authors reflect on both confirmatory and conflicting findings in relation to theory and practice, before examining the study's limitations and opportunities for future research	Practices Capabilities	Luzzini, D., Brandon-Jones, E., Brandon-Jones, A., & Spina, G. (2015). From sustainability commitment to performance: The role of intra-and inter-firm collaborative capabilities in the upstream supply chain. *International Journal of Production Economics, 165*, 51-63
91	Low	The study thus focuses on Taiwanese manufacturing firms as an example case, and empirically probes the relationships among these dimensions and their effects on these processes. To accommodate the vagueness of human opinions, the fuzzy Decision Making Trial and Evaluation Laboratory (DEMATEL) technique is applied to examine this issue, and to produce a causal relations map. This study also provides a discussion and insights for supply chain practitioners	Method Decision-Making Tool - DEMATEL	Jeng (2015)

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
91	Medium	The results suggest that the practices of collaborative planning for procurement quantity and accurate fulfillment by suppliers are significantly related to cost effectiveness and shipping time efficiency. Although the price negotiation of upstream raw materials for the collaborative suppliers has no statistically significant benefit to the shipping time efficiency, the shared cost reduction of component procurement is significantly positive for supply chain collaboration among green manufacturers	Practices	Yan, M. R., Chien, K. M., & Yang, T. N. (2016). Green component procurement collaboration for improving supply chain management in the high technology industries: A case study from the systems perspective. *Sustainability, 8* (2), 105
74	Medium	The discussion begins with evolution of green supply chain collaborations and few contributions made so far. The editorial piece introduces the special issue papers which address the green collaboration challenges and offers a general green collaboration research framework suggesting pathways for future research. The article ends with the open RQs in green supply chain collaborations and incentives	(Future research) Editorial	Gunasekaran *et al.* (2015)
91	Low	When ECR comes to collaborative change, technology is often important but not more than people and process. These ones make it happen, technology makes it easier. Integrated information processes	Practice Efficient Consumer Response (ECR)	Frankel, R., Goldsby, T. J., & Whipple, J. M. (2002). Grocery industry collaboration in the wake of ECR. *The International Journal of Logistics Management, 13* (1), 57-72
91	Low Value creation and performance -health. Using a service dominant logic (SDL) lens, the study aims at establishing SCC as an antecedent to value co-creation (VCC); where VCC acts as a mediator in the relationship between SCC with firm perf ormance. The study also aims at introducing the conceptual construct of relationship complexity level and attempts at investigating its influence on the framework relationships	Practice Value Creation and performance	Chakraborty, S., Bhattacharya, S., & Dobrzykowski, D. D. (2014). Impact of supply chain collaboration on value co-creation and firm performance: a health-care service sector perspective. *Procedia Economics and Finance, 11*, 676-694	
91	Low	Investment in adaptive supply chain collaboration is shown to increase demand forecast accuracy. However, the choice of collaboration intensity should account for life cycle stage, retailer type and product category	Practice Demand forecast	Nagashima, M., Wehrle, F. T., Kerbache, L., & Lassagne, M. (2015). Impacts of adaptive collaboration on demand forecasting accuracy of different product categories throughout the product life cycle. *Supply chain management: an international j ournal, 20* (4), 415-433

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
91	Medium	Government support and importance of guanxi significantly affect trust, which subsequently influences two elements of information integration, namely, information sharing and collaborative planning. Furthermore, the importance of guanx i has a direct, positive impact on information sharing, and government support has a direct, positive effect on both information sharing and collaborative planning	Technology Information integration	Cai *et al.* (2010)
91	Low	Physician led clinical teams empowered to lead change achieved substantial supply chain cost savings in an academic health system. The model of combining clinical communities with supply chain offers hope for an effective, practical, and scalable approach to improving value and engaging physicians in other academic health systems	Practice	Ishii, L., Demski, R., Lee, K. K., Mustafa, Z., Frank, S., Wolisnky, J. P., . . . & Unger, A. S. (2017, March). Improving healthcare value through clinical community and supply chain collaboration. In *Healthcare* (Vol. 5, No. 1-2, pp. 1-5). Elsevier
91	Low	The paper illustrates strategic motivation; both corporate and local, of the companies involved. The principal theoretical outcome of the research, ``A Partnering Change Model", provides a structure for analysis. The case describes the outcomes according to this analysis and, finally, conclusions and managerial implications are presented	Model	Wagner, B. A., Macbeth, D. K., & Boddy, D. (2002). Improving supply chain relations: an empirical case study. *Supply Chain Management: A* n *International Journal*, *7* (4), 253-264
74	High	The developed framework illustrates the areas and opportunities for supply chain parties to work collaboratively toward environmentally friendly activities. The developed framework contributes to the environmentally sustainable supply chain management literature and encourages companies to apply Industrial Ecology and Industrial Symbiosis to develop their environmentally sustainable supply chains	Framework Eco-industrial networks	Leigh, M., & Li, X. (2015). Industrial ecology, in dustrial symbiosis and supply chain environmental sustainability: a case study of a large UK distributor. *Journal of Cleaner Production, 106*, 632-643
74	High	The results revealed that the type of IT used per se did not have a differential impact on a company's performance in RL. However, IT operational attributes positively affected RL performance and information sharing and collaboration are critical to RL performance	Technology IT on RL performance	Olorunniwo and Li (2010)
91	Medium	This study considers four key social exchange issues, trust, commitment, reciprocity, and power and to be antecedents of information sharing and collaboration. Empirical findings show that SET-based issues are important to determine in formation sharing and collaboration and both information sharing and collaboration indicate partial mediation effect on supply chain performance	Practice Information sharing and performance	Wu *et al.* (2014)
91	Low	The paper focuses on analyzing the value created from information sharing by decreasing inventory level and on investigating the collaborative mechanism of providing incentive to retailer by upstream partner via sharing profit gained information sharing in the context of three-echelon supply chain system. Game approach	Practice Information sharing and performance - Game approach	Ding, H., Guo, B., & Liu, Z. (2011). Information sharing and profit allotment based on supply chain cooperation. *International Journal of Production Economics*, *133* (1), 70-79
91	Medium	This paper investigates strategic actions and grand strategies in the aviation industry. Integration and co-operation seem to be the appropriate competences to create durable competitive advantages. This paper does not attempt to consider the full range of e-tools developed in the aviation industry, but at the same time it highlights the impact of information and communication technologies on customer relations and supply chain management	Technology Collaboration e-Tools	Nucciarelli and Gastaldi (2008)

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
74	Low	The aim of this paper is to gain insight into how requirements for transitioning to circular economy creates new organizational forms in inter-firm collaborations, and ultimately how they stimulate the emergence of new institutions enhancing sustainability	Practice Requirements and Circular economy	Fischer, A., & Pascucci, S. (2017). Institutional incentives in circular economy transition: The case of material use in the Dutch textile industry. *Journal of cleaner production, 15 5*, 17-32
91	Low	Findings determine that lack of integration, improper planning and scheduling, poor production timing, poor coordination, lack of good communication among parties, wrong deliveries, and poor control and supervision are the major issues wi thin the precast supply chain	Technology Prototype - Focus on Construction SC	Abedi, M., Fathi, M. S., Mirasa, A. K., & Rawai, N. M. (2016). Integrated collaborative tools for precast supply chain management. *Scientia Iranica. Transaction A, Civil Engineering, 23* (2), 429
91	Medium	The authors formalize a model for the dynamics of SCM change. The authors also synthesize a number of models of SCM that extend the original, highly cited work. These include goal-oriented networks and devolved, collaborative supply chain clusters. The authors also find the associations between the evolution of SCM and measures of firm financial performance over time to be equivocal	Model Improve efficiency in SC	Stevens and Johnson (2016)
74	Medium	This article emphasizes the importance of horizontal collaboration using fourth-party logistics structures as horizontal intermediary conduits, who act independently between retailers and suppliers to facilitate collaborative and relational activity	Practice Horizontal collaboration	Hingley, M., Lindgreen, A., & Grant, D. B. (2015). Intermediaries in power-laden retail supply chains: An opportunity to improve buyer-supplier relationships and collaboration. *Industrial Marketi ng Management, 50*, 78-84
91	High	Inter-organizational communication is proposed as a relational competency that may yield strategic advantages for supply chain partners. Results provide strong support for the notion of inter-organizational communication as a relational competency that enhances buyers' and suppliers' performance. Implications for future research and practice are offered	Practice Inter-organizational communication	Paulraj *et al.* (2008)
91	Medium	This paper analyzes the interrelationships between risks faced by third-party logistics service providers (3PLs) in relation to one of its customers using DEMATEL. Results show that arms-length relationship between the customer and the 3PLs has strong influence on other risks and there is a need for collaborative relationships between 3PLs and its customers	Method Decision-Making Tool - DEMATEL	Govindan, K., & Chaudhuri, A. (2016). Interrelationships of risks faced by third part y logistics service providers: A DEMATEL based approach. *Transportation Research Part E: Logistics and Transportation Review, 90*, 177-195
91	High	The present study examines manufacturing supply chain collaboration on the basis of holding cost, backorder cost and ordering cost. The results show that the efficacy of lateral collaboration outperforms horizontal collaboration due to having the individual supply chain members at more liberty to make decisions	Model Simulation on ARENA	Chan, F. T., & Prakash, A. (2012). Inventory management in a lateral collaborative manufacturing supply chain: a simulation study. *International Journal of Production Research, 50* (16), 4670-4685
91	High	The results provide justification for the modelling of EB in multiple dimensions. Furthermore, some EB applications impacted positively on supply chain collaboration whilst some did not. The results also proved that EB enabled collaboration impacted directly and positively on the multiple dimensions of operational performance tested	Technology e-Business	Wiengarten, F., Humphreys, P., McKittrick, A., & Fynes, B. (2013). Investigating the impact of e-business applications on supply chain collaboration in the German automotive industry. *International Journal of Operations & Production Management, 33* (1), 25-48
91	High	Joint problem solving and measurement are critical in developing collaborative culture and executing effective planning. Joint planning at operation level is very important in culture development. This research contributes in developing collaborative culture and making SCC effective. Finally managerial insights and future scope are highlighted	Practice Joint planning	Kumar, G., Banerjee, R. N., Meena, P. L., & Ganguly, K. K. (2017). Joint planning and problem solving roles in sup ply chain collaboration. *IIMB Management Review, 29* (1), 45-57

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
91	Medium	The results suggest that both risk information sharing and risk sharing mechanism improve financial performance, and the effectiveness of the former is strengthened by relationship length and supplier trust, while that of the latter is strengthened by shared SCRM understanding. We contribute to research and practice by identifying two useful joint SCRM practices and ascertaining the conditions under which each of the practices is particularly effectively	Practice Risk management and performance	Li, G., Fan, H., Lee, P. K., & Cheng, T. C. E. (2015). Joint supply chain risk management: an agency and collaboration perspective. *International Journal of Production Economics, 164*, 83-94
74	Medium	The research result indicated that learning organization, information/knowledge sharing, joint knowledge creation, information technology and knowledge storage are amongst the highest driving and dependence powers. These attributes are deemed to be most effective to enhance the performance of firms	Practice Joint knowledge creation and performance	Lim, M. K., Tseng, M. L., Tan, K. H., & Bui, T. D. (2017). Knowledge management in sustainable supply chain management: Improving performance through an interpretive structural modelling approach. *Journal of cleaner production, 162*, 806-816
74	Medium	The study assesses the link between the constructs of collaboration/integration and risk/performance through research embedded in literature reviews, pinpointing research gaps and potential future research directions in the field	Practice Collaboration, risk and performance	Kache, F., & Seuring, S. (2014). Linking collaboration and integration to risk and performance in supply chains via a review of literature reviews. *Supply Chain Management: An International Journal, 19* (5/6), 664-682
74	Medium	The agglomeration into a logistics park positively impacts collaboration, and more specifically transportation capacity sharing. We also demonstrate that training positively impacts collaboration between cluster residents, both in term s of transportation capacity sharing and resource sharing, as well as the provision of value added services	Practice Cluster and collaboration	Rivera, L., Sheffi, Y., & Knoppen, D. (2016). Logistics clusters: The impact of further agglomeration, training and firm size on collaboration and value added services. *International Journal of Production Economics, 179*, 285-294
74	Low	Most of the published work use an empirical instrument drawn from the resource-based view to explore firm level supply chain collaboration and strategy. This suggests a positivist research tradition within logistics. There is a shortage of studies conducted on the supply chain as a network of enterprises	(Future research) Literature Review	Wu, Y. C., Goh, M., Yuan, C. H., & Huang, S. H. (2017). Logistics management research collaboration in Asia. *The International Journal of Logistics Management, 28* (1), 206-223
91	Low	The study reveals the dynamic nature of supply chain relationships for sustainability and that collaboration can be developed through time thanks to investment in both formal relationship building mechanisms and more relational aspects. The main contributions of the paper lie in its nuanced view of collaboration for SSCM and systematic application of relational theory in SSCM	Practice Relational theory	Touboulic and Walker (2015)
91	Low	To propose an integrated framework based on multi-agent collaboration and case-based reasoning that can resolve various collaboration issues in the supply chain. To show the framework's feasibility, authors implemented a prototype system: MACE-SCM. MACE-SCM provides more flexible and extensible solutions to help address emerging uncertainties	Model Multi-agent system	Kwon, O., Im, G. P., & Lee, K. C. (2007). MACE-SCM: A multi-agent and case-based reasoning collaboration mechanism fo *r* supply chain management under supply and demand uncertainties. *Expert Systems with Applications, 33* (3), 690-705
74	Medium	Results indicate that when the manufacturer facilitates the back flow of unused or defective goods from its retailers through reverse logistics collaboration, a greater likelihood for manufacturer stock outs is observed. This process disrupts the manufacturer's inventory management; retailers are less concerned with unused product and, consequently, order more. Manufacturers can reduce the severity of this problem by closely tracking the outflow and backflow of product and setting appropriate limits on the amount of product shipped to specific retailers	Practice Collaborative Planning, Forecasting and Replenishment - CPFR	Kulp, S. C., Lee, H. L., & Ofek, E. (2004). Manufacturer benefits from information integration with ret ail customers. *Management science, 50* (4), 431-444

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
74	Low	The aim of this paper is to provide results of trust and collaboration that lead to the mitigation of the bullwhip effect in supply chain management through a systematic literature review. Most of them focused on operational and quantitative aspects. These results indicate the need for studies on behavioral aspects in mitigating the bullwhip effect, where trust and collaboration among those involved in the supply chain need to be developed and organized	(Future research) Literature Review	de Almeida, M. M. K., Marins, F. A. S., Salgado, A. M. P., Santos, F. C. A., & da Silva, S. L. (2015). Mitigation of the bullwhip effect considering trust and collaboration in supply chain management: a literature review. *The International Journal of Advanced Manufacturing Technology, 77* (1-4), 495-513
91	Low	The critical importance of mitigation processes in building supply chain resilience is highlighted. The generic supply chain resilience framework represents a valuable guide for managers when directing resources and planning for building the capabilities required in each phase of disaster management, while remaining strategically focused. The value of the framework is demonstrated by a retrospective analysis of aid operations in response to Hurricane Katrina	Framework supply chain and Resilience	Scholten, K., Sharkey Scott, P., & Fynes, B. (2014). Mitigation processes-antecedents for building supply chain resilience. *Supply Chain Management: An International Journal, 19* (2), 211-228
91	Low	Retailer supplier collaboration	Model	Ramesh, A., Banwet, D. K., & Shankar, R. (2008). Modelling the enablers of supply chain collaboration. *International Journal of Logistics Systems and Management, 4* (6), 617-633
74	High	Although, many of the practitioners were unaware of the model per se, they labeled their suppliers as per the types stated in the Kraljic model. They mentioned 26 criteria for supplier classification; five of which do not have any reference in the extant literature. The degree of presence of these criteria provides a multi-criteria framework for supplier classification that has been further extended based on prior models	Framework Multicriteria Decision	Hudnurkar, M., Rathod, U., & Jakhar, S. K. (2016). Multi-criteria decision framework for supplier classification in collaborative supply chains: Buyer's perspective. *International Journal of Productivity and Performance Management, 65* (5), 622-640
91	Medium	A comprehensive simulation model representing two popular supply chain initiatives, that are collaborative planning, forecasting and replenishment (CPFR) and vendor-managed inventory (VMI), is constructed. In addition, a traditionally managed supply chain (TSS) is also included in the model as a benchmark. The results indicate that benefits of CPFR are always higher than VMI. However, we also realize that under certain conditions, the gap between the performances of CPFR and VMI does not rationalize the additional resources required for CPFR	Practice Collaborative Planning, Forecasting and Replenishment - CPFR	Sari, K. (2008). On the benefits of CPFR and VMI: A comparative simulation study. *International journal of production economics, 113* (2), 575-586
91	Medium	Computational results from a validated system dynamics simulation model with different implementation sequences of e-collaboration tools and different financial scenarios show that local financial constraints can also severely impact operational and financial performance of the entire supply chain	Technology E-collaboration	Marquez, A. C., Bianchi, C., & Gupta, J. N. (2004). Operational and financial effectiveness of e-collaboration tools in supply chain integration. *European Journal of Operational Research, 159* (2), 348-363
74	Medium	The study proposes four generic measurement categories for operationalizing the concept of use-visibility: experience, consumption, interaction and depletion, which together address the use of different household resources. The explorative case demonstrates how these measures can be operationalized to achieve visibility of the context of use in the home. The potential of such use-visibility for reverse supply chains is discussed. Research limitations/implications - This explorative case study is based on an in-depth study of the bathroom which illustrates the application	Technology IoT and RL	Parry, G. C., Brax, S. A., Maull, R. S., & Ng, I. C. (2016). Operationalisin IoT for reverse supply: The development of use-visibility measures. *Supply Chain Management: An International Journal, 21* (2), 228-244

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
74	Low	A novel partial collaborative transportation scheduling strategy is proposed based on two special kinds of transportation nodes which have integrated the self-support vehicle and 3PL vehicle resource. Then, depending on the transport mode of each kind of transportation nodes, a modified Ant Colony Optimization with negative selection operation (ACO-nso) with varying dimension matrix encoding and modified transition probability operation method has been presented	Practices 3PL and transportation vehicle scheduling	Xu, S., Liu, Y., & Chen, M. (2017). Optimisation of partial collaborative transportation scheduling in supply chain management with 3PL using ACO. *Expert Systems with Applications, 71*, 173-191
91	Medium	This paper proposes a joint replenishment program coupled with a channel coordination practice, to investigate their effect on supply chain improvements. We formulated several supply chain models, with a manufacturer supplying a family of products to a retailer, and the products sharing a common production facility. The models illustrate the challenge of integrating multi-items with multi-echelon production and replenishment	Practice Joint replenishment	Chen, T. H., & Chen, J. M. (2005). Optimizing supply chain collaboration based on joint replenishment and channel coordination. *Transportation Research Part E: Logistics and Transportation Review, 41* (4), 261-285
74	Low	By focusing on the coordination by contracts of the forward and reverse supply chains, the intention of this paper is to (1) present an overview of contracting literature and (2) suggest a classification of coordination contracts and contracting literature in the form of classification schemes	Practice Coordination of contracts	Govindan, K., Popiuc, M. N., & Diabat, A. (2013). Overview of coordination contracts within forward and reverse supply chains. *Journal of Cleaner Production, 47*, 319-334
74	Low	A data convergence-oriented enterprise networks integration architecture with relative enabling technologies is developed in the paper. to collect, transfer and fuse data from different data sources, Data Portal (DP) and Collaboration Agent (CA) concepts are introduced, which present a lightweight and loosely coupled infrastructure for enterprise networks integration	Practice Information sharing	Li, Q., Luo, H., Xie, P. X., Feng, X. Q., & Du, R. Y. (2015). Product whole life-cycle and omni-channels data convergence oriented enterprise networks integration in a sensing environment. *Computers in industry, 70*, 23-45
74	Low	This paper highlights that an improvement in green performance will require attention to quality management, environmental management maturity, and green supply chain	Method Green Supply Chain	de Sousa Jabbour, A. B. L., Jabbour, C. J. C., Latan, H., Teixeira, A. A., & de Oliveira, J. H. C. (2014). Quality management, environmental management maturity, green supply chain practices and green performance of Brazilian companies with ISO 14001 certification: Direct and indirect effects. *Transportation Research Part E: Logistics and Transportation Review, 67*, 39-51
91	Low	This paper refines the notion of risk in supply chains and proposes a model of supply chain risk system which is able to convey a risk-based view of partnerships in global supply chains. A simulation program has been developed with aim to demonstrate the practical feasibility of the proposed model. Implemented in simulation, two sets of experiments have been conducted for testing the model in actual business scenarios. The experimental results manifest high consistence with the analytical prediction	Practice Risk management and partnership	Zeng, B., & Yen, B. P. C. (2017). Rethinking the role of partnerships in global supply chains: A risk-based perspective. *International Journal of Production Economics, 185*, 52-62
74	High	We develop and test propositions on the drivers, volumes and value of different returns along the life cycle; show the inefficiencies in current return practices leading to value destruction instead of the advocated value creation; and compare return practices in different regions and industries	Practice Returns practices	Krikke, H., Hofenk, D., & Wang, Y. (2013). Revealing an invisible giant: A comprehensive survey into return practices within original (closed-loop) supply chains. *Resources, Conservation and Recycling, 73*, 239-250
74	Medium	The present research attempts to explore various behavioral factors affecting GCSM practices and their interactions which help to attain green-enabled needs	Practice Factors affecting GSCM	Muduli *et al.* (2013)

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
91	High	This paper aims to collect and analyze systematically the existing scattered research of secure collaboration in global design and supply chain environment, and to give a comprehensive literature review to summarize the problems and the corresponding solutions. By applying the Environment-based Design (EBD) methodology, the existing methods and technologies are classified into four levels: infrastructure, information, agreement, and confidence. Four corresponding research problems are then formulated: information access control, information partitioning, legal information sharing, and partner trust management	Method Environment-based Design	Zeng *et al.* (2012)
91	Low	This study is conducive to node enterprises of supply chains to recognize and apply the scale-free networks and the strength theory of ties to analyze the properties of supply chain networks, and to improve the capacity to cope with disruption risk	Theoretical approach Disruption risk	Chen, Y., Shu, T., Chen, S., Wang, S., Lai, K. K., & Gan, L. (2017). Strong-weak collaborative management in coping supply chain disruption risk transmission based on scale-free networks. *Applied Economics, 49* (39), 3943-3958
74	Low	This study provides scientific value by revealing the role of communication capabilities, identifying the importance of supplier perspective, and exploring green supply chain management in the context of the construction industry	Practice Communication capabilities and GSCM	Woo, C., Kim, M. G., Chung, Y., & Rho, J. J. (2016). Suppliers' communication capability and external green integration for green and financial performance in Korean construction industry. *Journal of Cleaner Production, 112*, 483-493
91	Low	This paper aims to develop a theoretical framework for profit allocation, as a mechanism for aligning incentives, in collaborative supply chains. We provide evidence of drawbacks derived from classical solutions to the profit allocation problem. Real-world collaborative supply chains need of robust mechanisms like the one tackled in this work to align incentives from the various actors	Theorectical approach Game theory	Ponte, B., Fern\bacute\aéndez, I., Rosillo, R., Parre\bt l\n\etl\o, J., & García, N. (2016). Supply chain collaboration: A Game-theoretic approach to profit allocation. *Journal of Industrial Engineering and Management, 9* (5), 1020
91	Low	Results indicate that firms that focus on flexibility, quality, and delivery should develop strategic collaboration with suppliers to achieve market and innovation improvement. Cost- and quality-focused firms should develop operational collaboration to achieve resource efficiency. The model allows managers to understand the right alignment of external suppliers while working on their own order-winners being pursued to win business performance	Model supply chain collaboration and capabilities	Banchuen, P., Sadler, I., & Shee, H. (2017). Supply chain collaboration aligns order-winning strategy with business outcomes. *IIMB management review, 29* (2), 109-121
74	High	The study shows that an alignment between supply chain initiatives does pay off. Results show that the effects of alignment on performance measures are mediated by the firm's internal sustainable production. Particularly the paper shows that sustainable supply chain collaboration needs to be operated at an ideal profile in collaboration with advanced internal practices to generate improved performance	Practice Collaboration and sustainability	Blome, C., Paulraj, A., & Schuetz, K. (2014). Supply chain collaboration and sustainability: a profile deviation analysis. *International Journal of Operations & Production Management, 34* (5), 639-663
74	High	The purpose of this study is to investigate how collaborative relationships enhance continuous innovation in the supply chain using case studies. The findings demonstrate how differing relationships can impact on the operation of firms and their capacities to innovate	Practice supply chain collaboration and capabilities	Soosay, C. A., Hyland, P. W., & Ferrer, M. (2008). Supply chain collaboration: capabilities for continuous innovation. *Supply Chain Management: An International Journal, 13* (2), 160-169
91	Medium	It conceptualizes supply chain collaboration as seven interconnecting elements: information sharing, goal congruence, decision synchronization, incentive alignment,	(Future research) Literature review	Cao, M., Vonderembse, M. A., Zhang, Q., & Ragu-Nathan, T. S. (2010). Supply chain collaboration: conceptualisation and instrument development. *International Journal of Production Research, 48* (22), 6613-6635

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
		resource sharing, collaborative communication, and joint knowledge creation		
91	Low	Surprisingly, some of the demand factors specified as very important by the case company are not found to be highly significant for actual sales. The paper uses the identified demand factors to suggest levels of collaboration	Model Forecast accuracy	Ramanathan, U. (2012). Supply chain collaboration for improved forecast accuracy of promotional sales. *International Journal of Operations & Production Management, 32* (6), 676-695
74	High	Results indicate that research about supply chain collaboration for the purpose of sustainability is gaining growing attention in the business field; however, environmental and economic considerations still dominate the research, while there is a lack of consideration about social concerns such as child labor and personal development. In addition, the collaboration partners under investigation have mainly been the company and its customers and suppliers, whereas competitors and other horizon tal collaboration partners have received little attention	(Future research) Literature review	Chen *et al.* (2017)
91	Medium	The results of the analysis confirm that the factors of collaboration impact the success of supply chains that will lead to future collaborations. Collaborative execution of supply chain plans will also have an impact on future collabo rations. Companies that are interested in supply chain collaborations can consider engaging in long-term collaboration depending on the success of current collaborations. This will help supply chain partners to make investment decisions particular to collaboration	Practice Collaboration practices	Ramanathan, U., & Gunasekaran, A. (2014). Supply chain collaboration: Impact of success in long-term partnerships. *International Journal of Production Economics, 147*, 252-259
91	Low	The results indicate that supply chain collaboration improves collaborative advantage and indeed has a bottom-line influence on firm performance, and collaborative advantage is an intermediate variable that enables supply chain partners to achieve synergies and create superior performance	Practice Collaboration practices and performance	Cao, M., & Zhang, Q. (2011). Supply chain collaboration: Impact on collaborative advantage and firm performance. *Journal of operations management, 29* (3), 163-180
74	Low	Supply chain collaboration index is computed as 40.44 on a scale of 1-100. The study also arranges collaborative activities in decreasing order of importance	Practice Metrics on SCC	Kumar, G., & Nath Banerjee, R. (2014). Supply chain collaboration index: an instrument to measure the depth of collaboration. *Benchmarking: An International Journal, 21* (2), 184-204
91	Low	In our research, we looked at implementations across several industries and countries, and our findings show that the slow progress to date may be due to a lack of common understanding of these concepts, and the difficulty of integrating external collaborationEfficient Consumer Response (ECR) in the fast moving consumer goods sector, for example, or Vendor Managed Inventory (VMI) and Collaborative Planning, Forecasting and Replenishment (CPFR) initiatives more generally provide a ri ch continuum of strategies for collaborating amongst supply chain partners	Practice Collaborative Planning, Forecasting and Replenishment - CPFR	Holweg, M., Disney, S., Holmström, J., & Sm\?\ros, J. (2005). Supply chain collaboration: : Making sense of the strategy continuum. *European management journal, 23* (2), 170-181
74	Medium	From the case study, it is recognized that the collaborating members in the supply chain are not able to visualize all possible benefits of collaboration. To surmount this issue, the paper proposes a framework to study the performance o f companies involved in initial and advanced stages of collaboration	Framework Metrics on SCC	Ramanathan *et al* (2011)

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
91	Medium	The paper reveals that the level of involvement of customers and suppliers differs across different supply chain processes and also across different sectors. While the involvement of customers is high in demand management and product development, the involvement of suppliers is high in transportation and inventory management processes	Practice Value Creation and performance	Sahay, B. S. (2003). Supply chain collaboration: the key to value creation. *Work study, 52* (2), 76 -83
74	Low	Test results indicate that collaboration and integration interact to form higher order resources that collectively influence firm performance outcomes through interfirm coordination technologies	Technology Coordination technologies	Adams, F. G., Richey, R. G., Autry, C. W., Morgan, T. R., & Gabler, C. B. (2014). Supply chain collaboration, integration, and relational technology: How complex operant resources increase performance outcomes. *Journal of Business Logistics, 35* (4), 299-317
91	Low	There is significant confusion regarding the term SCM integration and thus the paper proposes a definition of supply chain management integration. The findings, and the authors' effort to structure and define the term supply chain management integration, can facilitate organizational developments in this area	(Future research) Literature review	Näslund, D., & Hulthen, H. (2012). Supply chain management integration: a critical analysis. *Benchmarking: An Internation al Journal, 19* (4/5), 481-501
91	Low	The results show that each area of collaboration effectively reduces its respective supply chain risk, but only the mitigation of process risk and demand risk has a direct effect on supply chain performance	Model Risk analysis	Chen, J., Sohal, A. S., & Prajogo, D. I. (2013). Supply chain operational risk mitigation: a collaborative approach. *International Journal of Production Research, 51* (7), 2186-2199
74	High	The practices, namely, organizational culture, customer relationship, information and communication technology, benchmarking and performance measurement, lean manufacturing, agile manufacturing, supplier relationship are highly penetrate d practices in Indian manufacturing organizations. The practices, namely, outsourcing, information sharing, just in time manufacturing, green supply chain management are moderately penetrated practices, while the practices, namely, reverse logistics, postponement, vendor managed inventory, radio frequency are least penetrated practices in Indian manufacturing organizations	Practices supply chain practices	Gorane and Kant (2016)
91	Low	Two scenarios are compared. In the traditional scenario, the distributor is unaware of the suppliers inventory decisions and merely makes its own inventory decisions according to the available information. In the second scenario with supp ly-side collaboration, the distributor considers the suppliers inventory policy (r,Q) and the planned service level as provided by the supplier	Model Performance evaluation	Fu, Y., & Piplani, R. (2004). Supply-side collaboration and its value in supply chains. *European Journal of Operational Research, 152* (1), 281-288
91	Low	The collaboration approach looks at internal co-loading of the three product categories of the company with the objective to increase the fill level of the trailers/containers under current planning restrictions. To this purpose, a discre te event simulation is performed to evaluate a scenario where outbound product flows are brought together in a hypothetical cross-dock located on site next to the three DC's. External transport cost savings of the resulting freight bundling potentia l are calculated	Practice Horizontal collaboration	van Lier, T., Caris, A., & Macharis, C. (2016). Sustainability SI: Bundling of outbound freight flows: Analyzing the potential of internal horizontal collaboration to improve sustainability. *Ne tworks and Spatial Economics, 16* (1), 277-302
74	Low	We find that leading strategic indicators, including technological innovativeness, technological complementarity, and flexibility are positively related to higher levels of collaboration and logistics service quality at the operational level in retail firms	Practice Metrics on SCC	Richey, R. G., Adams, F. G., & Dalela, V. (2012). Technology and Flexibility: Enablers of Collaboration and Time\?\Based Logistics Quality. *Journal of Business Logistics, 33* (1), 34-49

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
74	Medium	Study results revealed that, the agglomeration of logistics firms provides several key benefits to companies. Specifically, it was found that logistics clustering facilitates collaboration-related benefits, offering of value added services, career mobility for the logistics workforce within the cluster, and promotes job growth at multiple levels within the cluster. The authors offer a rich description of these benefits and the mechanisms that facilitate these outcomes	Practice C luster and collaboration	Rivera, L., Gligor, D., & Sheffi, Y. (2016). The benefits of logistics clustering. *International Journal of Physical Distribution & Logistics Management, 46* (3), 242-268
74	High	To be effective in matching demand with supply manufacturers and retailers on food, toys, computers that have short lifecycle need collaboration in the SC	Practice SCC practices	Simatupang, T. M., & Sridharan, R. (2002). The collaborativ e supply chain. *The international journal of logistics management, 13* (1), 15-30
91	High	This study confirms that building social capital in a collaborative BSR positively affects buyer performance, but that if taken to an extreme it can reduce the buyer's ability to be objective and make effective decisions as well as incre ase the supplier's opportunistic behavior. Our study also examines how a buyer can delay the emergence of the dark side	Practice BSR and Social Capital	Villena, V. H., Revilla, E., & Choi, T. Y. (2011). The dark side of buyer-supplier relationships: A social capital perspective. *Journal of Operations management, 29* (6), 561-576
74	Low	The findings show that a firm's green performance and external green collaboration act as mediator variables between internal green practices and firm competitiveness, and they influence firm competitiveness positively. We also discuss in this paper the managerial implications for container shipping firms to improve their green performance and competitiveness	Method GSCM and performance	Yang, C. S., Lu, C. S., Haider, J. J., & Marlow, P. B. (2013). The effect of green supply chain management on green performance and firm competitiveness in the context of container shipping in Taiwan. *Transportation Research Part E: Logistics and Transportation Review, 55*, 55-73
91	Low	The findings reveal that both organizational awareness (competency at the individual level) and supply network competency (competency at the organizational level) have significant and positive effects on collaborative awareness. The impor tance of inter-organizational competencies is supported by the significant positive effect that collaborative awareness has on investment in strategic planning. Implications for human resource managers and supply chain managers are also provided	Pr actice Collaboration and performance	Barnes, J., & Liao, Y. (2012). The effect of individual, network, and collaborative competencies on the supply chain management system. *International Journal of Production Economics, 140* (2), 888-899
74	Low	Logistics outsourcing can have an ambiguous effect on the SCV of shippers and is influenced by other internal and external factors. Shippers may use the framework to revise their risk management strategy and actively use logistics outsourcing to decrease SCV. Logistics service providers can tailor their services specifically toward clients and thus both can be better prepared for future supply chain disruptions	Practice Risk management and outsourcing	König, A., & Spin ler, S. (2016). The effect of logistics outsourcing on the supply chain vulnerability of shippers: Development of a conceptual risk management framework. *The International Journal of Logistics Management, 27* (1), 122-141
91	Low	(1) the differential effects of two types of interorganizational systems (IOS)-open and closed-on firms' use of SCC; (2) the impact of a country's uncertainty avoidance and social trust on firms' use of SCC; and (3) the moderating role of uncertainty avoidance and social trust on the firm-level relationships between open/closed IOS and SCC. Analysis suggests that, not only uncertainty avoidance and social trust affect SCC directly, but uncertainty avoidance also moderates the relationship between open IOS and SCC at the firm level	Practice SCC and interorganizational systems- IOS	Qu, W. G., & Yang, Z. (2015). The effect of uncertainty avoidance and social trust on supply chain collaboration. *Journal of Business Research, 68* (5), 911-918
91	Medium	This paper presents a classification of "managerial spaces" where multiple trading partners share critical information using e-collaboration tools and assesses the possible local and global impact on the supply chain (SC) performance. This is made by means of a supply chain model conceptualization and a simulation study with system dynamics	Technology E-collaboration	Ovalle, O. R., & Marquez, A. C. (2003). The effectiveness of using e-collaboration tools in the supply chain: an assessment study with system dynamics. *Journal of Purchasing and Supply Management, 9* (4), 151-163

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
91	Medium	The dynamic delivery ability and order point which are caused by demand disruption in the CTM supply chain are investigated. The results indicate that CTM can significantly reduce costs and improve the flexibility of companies in handling demand disruption problems. It is suggested that CTM is an efficient mechanism to manage supply chains, especially under a demand disruption environment	Technology Collaborative Transportation Management	Li, J., & Chan, F. T. (2012). The impact of collaborative transportation management on demand disruption of manufacturing supply chains. *International Journal of Production Research, 50* (19), 5635-5650
91	Low	This study examines the relationship between cultural intelligence (CQ) and supply chain collaboration and its impact on organizational performance. The results indicate that CQ proficiency enhances managerial performance and significantly improves supply chain collaboration outcomes	Practice Cultural Intelligence and performance	Asree, S., Gopalan, S., & Zain, M. (2016). The impact of cultural intelligence on supply chain collaboration. *International Journal of Integrated Supply Management, 10* (3-4), 246-263
91	Low	It is found that the key subcontractor resources affected by this off-site technology are human, financial, intellectual and social and that subcontractors will need to pursue strategies which develop new skills, knowledge, networks and deeper supply chain collaborations if they are to turn the potential risks associated with off-site into potential opportunities to achieve competitive advantage	Practice Focus on construction supply chain management	Goh, E., & Loosemore, M. (2017). The impacts of industrialization on construction subcontractors: a resource based view. *Construction Management and Economics, 35* (5), 288-304
74	Medium	Aspects of behavior toward partners of supply chain companies can mitigate the operational causes of the bullwhip effect by improving information and knowledge sharing, demand forecasting, replenishment policy, and reducing the risk coordination among the chain participants	Practice Collaboration and trust	Kaibara de Almeida, M. M., Silva Marins, F. A., Pedro Salgado, A. M., Almada Santos, F. C., & da Silva, S. L. (2017). The importance of trust and collaboration between companies to mitigate the bullwhip effect in supply chain management. *Acta Scientiarum. Technology, 39* (2)
91	Medium	The purpose of this paper is to explore the influence of hospital's visibility for sensing (VFS), learning, coordinating and integrating on hospital-supplier collaboration. Second, it explored the influence of hospital-supplier collabo ration on hospital supply chain performance. An insignificant influence of hospital's visibility for coordinating was noted on hospital-supplier collaboration. The study argued hospitals to invest more for enriching their dynamic capabilities to diagnose the changes in the environment so as to sustain their collaborative relationships leading to positive performance implications	Practice SCC and capabilities	Mandal, S. (2017). The influence of dynamic capabilities on hospital-supplier collabo ration and hospital supply chain performance. *International Journal of Operations & Production Management, 37* (5), 664-684
91	Medium	The results confirm that SCC has positive impacts on collaborative advantage, which in turn helps to improve port performance. The finding indicates that collaborative advantage has a full mediation effect on the link SCC-port performance. This work invites managers to recognize the positive outcomes of interorganizational SCC practices in enhancing collaborative advantage and port performance within port supply chain	Practice Collaborative advantage	Seo, Y. J., Dinwoodie, J., & Roe, M. (2016). The influence of supply chain collaboration on collaborative advantage and port performance in maritime logistics. *International Journal of Logistics Research and Applications, 19* (6), 562-582
91	Medium	SCC positively affects organizational responsiveness. Both outside-in and spanning IT capability positively moderates this relationship, whereas inside-out IT capability has a negative moderating effect on this relationship	Technology IT and capability	Cai, Z., Huang, Q., Liu, H., & Liang, L. (2016). The moderating role of information technology capability in the relationship between supply chain collaboration and organizational responsiveness: evidence from China. *Internati onal Journal of Operations & Production Management, 36* (10), 1247-1271

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
74	Low	Based on the results from regression analysis, it was found that external SCI contributes more positively to operational performances. Positive interactions between similar internal and external SCI components were also noted. The result indicates that firm performances can be maximized from establishing closer relationships with supply chain partners. Additional performances can also be realized from synergies that are generated from performing similar internal and external SCI activities	Practice supply chain Integration and performance	Yuen, K. F., & Thai, V. V. (2016). The relationship between supply chain integration and operational performances: A study of priorities and synergies. *Transportation Journal, 55* (1), 31-5 0
91	Medium	Key findings show how specific collaborative activities (information-sharing, collaborative communication, mutually created knowledge and joint relationship efforts) increase supply chain resilience via increased visibility, velocity and flexibility	Practice SCC and resilience	Scholten and Schilder (2015)
74	Low	We develop a conceptual framework of three levels of supply chain collaboration for environmental sustainability to help companies improve their level of collaboration between suppliers and buyers in terms of meeting their environmental objectives. The proposed framework will serve as a base model for the companies using or considering supply chain collaboration to achieve their environmental agendas, in line with governmental green regulatory requirements	Framework Collaboration and CO2 reduction	Ramanathan, U., Bentley, Y., & Pang, G. (2014). The role of collaboration in the UK green supply chains: an exploratory study of the perspectives of suppliers, logistics and retailers. *Journal of Cleaner Production, 70*, 231-241
74	Low	Seven broad categories of constraint type are observed: constraints due to the nature of the market; due to scale and the nature of products; constraints related to employment and skills; institutional constraints; constraints in supply c hain relationships; certification, policy and regulatory constraints; and constraints around personal beliefs and anthropomorphism. Each is described as to its origin, its limitation to business and where possible, how it might be remedied. The constraints point to some counter-intuitive results as far as common perceptions of local food are concerned but suggestions for improvement are made through collaborative producer efforts, alternative institutional intervention, supply chain re-engineering and logistics innovation	Practice Theory of constraints	Oglethorpe, D., & Heron, G. (2013). Testing the theory of constraints in UK local food supply chains. *International journal of operations & production management, 33* (10), 1346\en \1367
74	Medium	The review reveals that 3PL research is empirical-descriptive in nature and that it generally lacks a theoretical foundation. Survey research is the dominant method used, reflecting the positivist research tradition within logistic s. It identifies certain knowledge gaps and develops five propositions for future research	(Future research) 3PL Literature review	Selviaridis and Spring (2007)
74	Low	First, we delve into the non-collaborative case where the retailer imposes a minimum requirement on the level of eco-effcient innovation effort to be invested by supplier. Second, we study the profit/cost implications of collaboration between two parties for upstream eco-effcient innovation by scrutinizing two types of contracts: a cost-sharing agreement wherein the retailer shares a fraction of the supplier's upfront cost of investment in innovation; and a revenuesharing agreement under which the retailer shares a fraction of his revenues generated by the supplier's eco-effcient innovation effort	Practice Negotiation and contracts	Yenipazarli, A. (2017). To collaborate or not to collaborate: Prompting upstream eco-efficie nt innovation in a supply chain. *European Journal of Operational Research, 260* (2), 571-587

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
91	Low	Authors investigate two collaboration mechanisms: `Too Little' and `Too Late', depending on the timing of information sharing between the manufacturer and the retailer. The research results indicate that early collaboration as in the `Too Little' mechanism leads to a stable production schedule, which decreases the need of production adjustment when production cost information becomes available; whereas a late collaboration as in the `Too Late' mechanism enhances the flexibility of production adjustment when demand information warrants it	Practice Collaboration mechanisms	Xu, K., Dong, Y., & Xia, Y. (2015). `Too Little'or `Too Late': The timing of supply chain demand collaboration. *European Journal of Operational Research, 241* (2), 370-380
74	High	The paper presents important insights on the operational logic for each of these network forms and the dimensions of their network architecture. The main implications of this comparison are that policymakers and practitioners need to become aware of the various mechanisms through which interorganizational networks can reduce environmental load	Framework Eco-industrial networks	Patala *et al.* (2014)
91	Low	This paper analytically examines the improvement of supply chain coordination (SCC) through more selective information exchange and consistent forecasting. It shows the negative impact that independent actions taken by members of a conventional supply chain typically have on order release volatility and forecast error volatility. Such increases in variation are argued to pose tremendous planning and utilization problems	Practices supply chain Coordination	Xu, K., Dong, Y., & Evers, P. T. (2001). Towards better coordination of the supply chain. *Transportation Research Part E: Logistics and Transportation Review, 37* (1), 35-54
91	High	The authors provide a critical synthesis and discussion structured in four streams clustered around two dimensions, i.e. the "extension" of the collaboration in the pricing process along the supply chain and the "direction" of collaboration	Practice SCC and B2B pricing	Formentini, M., & Romano, P. (2016). Towards supply chain collaboration in B2B pricing: A critical literature review and research agenda. *International Journal of Operations & Production Management, 36* (7), 7 34-756
91	Low	A theoretical model of the interactions between trust and transparency is presented, based upon a review in the literature. This model is then explored in an analysis of the collaborative planning case	Theoretical approach	Akkermans *et al.* (2004)
74	Low	Feasible to preserve the positive dynamics of capitalism while simultaneously improving collaboration between industry, landowners, and environmentalists to optimize return on profits for companies, to provide royalties to landowners, and to satisfy environmentalists using TBL accounting in a secure SCM ICT environment	Practice SCM and triple Bottom line	Rodger, J. A., & George, J. A. (2017). Triple bottom line accounting for optimizing natural gas sustainability: A statistical lin ear programming fuzzy ILOWA optimized sustainment model approach to reducing supply chain global cybersecurity vulnerability through information and communications technology. *Journal of cleaner production, 142*, 1931-1949
91	High	Authors use a case-based methodology to explore whether trust is an optimizing phenomenon in key supplier relationships. Two cases where trust development processes demonstrate a paradox of trust-building behaviors cultivate different outcomes constraining value co-creation	Practice Trust and Relational capital	Day *et al.* (2013)
74	High	The proposed tool organizes horizontal collaborations within three steps for each of the two levels of classification: trust and extent of the cooperation. The organizational theories reviewed play different roles to help in different stages of the horizontal collaboration. Additionally, for each combination of trust/extent of the cooperation coherent pairs of aims of the collaboration and assets that are to be shared are defined	Practice Trust and Horizontal collaboration	Pomponi *et al.* (2015)

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Table AII

Group of papers	Contribution	Brief Description	Type of contribution	References
74	High	This research investigates the effect of having a proper coordination method between a producer of medications and third-party logistics (3PL) companies, responsible for collecting unwanted medications from customer zones. Results on a re al case study indicate that introducing incentives to customers could decrease the amount of uncollected medications from 18% up to 6.5%. Furthermore, having a proper coordination with 3PL companies could guarantee a full medication recover	Practice SCC and RL	Weraikat, D., Zanjani, M. K., & Lehoux, N. (2016). Two-echelon pharmaceutical reverse supply chain coordination with customers incentives. *International Journal of Production Economics, 176*, 41-52
74	Low	Value manifestations of four types of value, namely economic, environmental, information and customer value, are identified. Value adding concepts from the forward- and reverse supply chain may leverage the process of value creation. They are classified into six subclasses, namely partnerships and collaboration, product design characteristics, service concepts, IT solutions, supply chain processes and organizational characteristics. We present a conceptual framework on a strategic level	(Future research) Literature review	Schenkel, M., Cani\b2dot\e\2dot\ls, M. C., Krikke, H., & van der Laan, E. (2015). Understanding value creation in closed loop supply chains-Past findings and future directions. *Journal of Manufacturing S ystems, 37*, 729-745
74	High	Large LSPs can establish 4PL management but the significant investment required to do so is a deterrent. Interviewees believed 4PL would negatively influence the grocery retailer-supplier dynamic but simultaneously would provide key potential benefits. Retaining supply chain control means more to grocery retailers than cost efficiencies realized through horizontal collaboration	Practice 4PL and horizontal collaboration	Hingley *et al.* (2011)
74	Low	To deal with the vagueness of human being's perceptions, this study utilizes the fuzzy set theory and decision-making trial and evaluation laboratory method to form a structural model to find out the cause and effect relationships among criteria	Method Decision-Making Tool - DEMATEL	Lin, R. J. (2013). Using fuzzy DEMATEL to evaluate the green supply chain management practices. *Journal of Cleaner Production, 40*, 32-39
74	Medium	The method combines lean manufacturing tools, such as value stream mapping with cleaner production and material flow cost accounting strategies. The empirical data showed that the WFM method is adequate for current state analysis of waste material efficiency potentials, especially when multiple organizations are involved. However, further development and specific methods are needed such as, for example, logistics inefficiencies, root cause analysis, implementation guidelines for best practice and systems for performance monitoring of actors	Practice Waste flow mapping and sustainability of waste management	Kurdve *et al.* (2015)
74	Low	The findings of the qualitative research indicate that four primary drivers of SCS exist: government, customers, competitors, and society	Practice Supply Chain Security	Williams, Z., Lueg, J. E., Taylor, R. D., & Cook, R. L. (2009). Why all the changes? An institutional theory approach to exploring the drivers of supply chain security (SCS). *International Journal of Physical Distribution & Logistics Management, 39* (7), 595-618
91	Low	This study builds and describes a taxonomy of relational resistors. The authors then explore how sociological and structural resistors reinforce each other to undermine collaborative behavior. Specifically, the interplay among resistors: obscures the true sources of resistance; exacerbates a sense of vulnerability to non-collaborative behavior that reduces the willingness to invest in relational architecture; and inhibits the development of essential relational skills and organizational routines	Practices Relational resistors	Williams, Z., Lueg, J. E., Taylor, R. D., & Cook, R. L. (2009). Why all the changes? An institutional theory approach to exploring the drivers of supply chain security (SCS). *International Journal of Physical Distribution & Logistics Management, 39* (7), 595-618