

Supply chain information sharing and performance improvements

Le partage d'information et l'amélioration de la performance de la chaîne logistique

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ABSTRACT

In a frequent changing environment, characterized by an increased level of uncertainties and demand requirements, firms can no longer achieve competitive advantage alone. To survive, the only rescue would be to adhere to a supply chain membership, and share information with their trading partners. Furthermore, the adoption of IT has increased the exchanges of information between firms, which is leading them to think about the pay-offs of implementing technologies and the extent of sharing information. However, even if the majority of the state of the art agreed on the positive impact of information sharing on supply chain performance, there still is a need of understanding the factors that reinforces such outcome. Hence, in order to disclose the drivers of supply chain performance, by sharing information, we conduct a systematic literature review. The findings reveal that supply chain collaboration is a technique "par excellence" that boosts the impact of information sharing and improves supply chain performance.

Keywords: Information sharing, Collaboration, Literature review, Performance, Supply chain.

RÉSUMÉ

Dans un environnement en changement fréquent, caractérisé par un niveau accru d'incertitudes et d'exigences de la demande, les entreprises en elles seules, ne parviennent plus à obtenir un avantage concurrentiel. Afin de survivre, elles sont amenées à adhérer à des chaînes logistiques, et d'échanger des informations avec leurs partenaires d'affaires. Aussi, l'adoption des technologies d'information à renforcer les échanges d'informations entre les entreprises, ce qui les pousse à considérer davantage les avantages d'implantation de nouvelles technologies et l'étendue du partage d'information. Cependant, si la littérature s'entend en majorité sur l'impact positif du partage d'information, sur la performance de la chaîne logistique, il demeure encore nécessaire de cerner les facteurs qui renforce ce résultat. Par conséquent, afin de comprendre les facteurs d'amélioration de la performance de la chaîne logistique, à travers le partage d'information, nous avons mené une revue de littérature systématique. Les résultats révèlent que la collaboration dans la chaîne logistique, est une technique par excellence » qui renforce l'impact du partage d'informations et améliore la performance de la chaîne logistique

Mots clés : Partage d'information, Collaboration, Revue de littérature, Performance, Chaîne logistique.

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1. INTRODUCTION

The advancement of information technology (IT) has been seen as an important enabler of supply chain management improvements (Fuchs et al., 2018; Chang et al., 2019) making the environment more conducive to improvements (Cao et al., 2017). IT implementation has allowed the availability of a huge amount of timely and reliable information (Shen & Chan, 2017), which increased the number of products (with shorter deliveries) and level of services (Chang et al., 2019).

As a result of globalization, rapid IT development, higher costs and uncertainty (Panahifar et al., 2015), companies are facing large competition that they cannot handle alone (Chang et al., 2019). To reinforce their competitiveness, firms need to integrate their supply chain. Hence, the competition is between supply chain but no longer between firms.

Companies are becoming aware of the difficulty to compete in isolation as it is not guaranteeing their development or their survive in the incessant changing environment (Panahifar et al., 2015). Hence, this raised their awareness to join their efforts to their partners in order to achieve a better performance and survive longer (Pamulety et al., 2017).

As supply chain managements practices include the integration of activities within firms and between their trading partners. It is providing practices to enhance the long-term competitiveness and organizations' collaboration (Kaliani Sundram et al., 2016; Mahadevan, 2017). Besides, by seeking superior supply chain performance, companies are contributing to their organization performance improvements. Supply chain performance has been recognized to be correlated to firm performance (Hove-Sibanda & Poee, 2018).

Supply chain collaboration is one of the strategies allowing the maximization of both chains' and firms' profit level (Chang et al., 2019). Information technology is undoubtedly allowing the exchange of information sharing and the coordination of activities within and between chain actors (Fuchs et al., 2018; Zhang et al., 2016).

Sharing information is critical to supply chain success (Ojha & al., 2019; Szymczak & al., 2018). Although many firms are still hesitant (Ryu et al., 2009), the outcomes from sharing information have been well recognized (Hall & Saygin, 2012; Yu et al., 2010; Yue & Liu, 2006; Zhao & Li, 2018; Zhao & Xie, 2002). Being a supply chain member, firms can easily communicate and measure their global performance (Szymczak et al., 2018). Information sharing is proposed to improve the forecasting of demand (Fuchs & al., 2018). It is as a technique of mitigating the bullwhip effect, and reducing total costs and uncertainty (Pamulety et al., 2017).

However, many companies are still unwilling to share information with their trading partners (Hove-Sibanda & Poee, 2018; Mahadevan, 2017). They do not only fear the risks and the costs that this can bring (Hove-Sibanda & Poee, 2018), but they still don't recognize the perceives payoffs (Ojha et al., 2019) in the presence of errors in practice (Kwak & Gavirneni, 2015) and potential opportunistic behaviors (Hove-Sibanda & Poee, 2018). The question is: does information sharing between supply chain members enhances, the overall performance?

We conduct a systematic literature review of papers threatening this topic. The literature revealed, that the information sharing is not sufficient, but the supply chain collaboration is also required to enhance the effectiveness and efficiency of supply chain. The virtue of collaboration is well presented, in enhancing the quality of decision made and performance (Kumar & al., 2016). Zhang et al., (2016) declare that information technology helps to integrate supply chain practices (information sharing and collaboration).

Also, Mahadevan, (2017) highlighted that both information sharing and supply chain collaboration are the key factors that contribute the supply chain performance improvements.

2. METHODOLOGY

We aim in this work, to synthesize the literature about information sharing and performance in the supply chain context. We followed a structure method of literature review, called systematic literature review (Tranfield et al., 2003). The systematic literature review is known as a method allowing to present a comprehensive structured analysis that could contribute to the knowledge in a specific research domain (Briner & Denyer, 2012).

To conduct our systematic literature review we followed the steps used by Seuring & Müller, (2008) and Chen et al., (2017). Their work was based on a process of four steps: (i) data collection, (ii) descriptive analysis; (ii) categorization analysis, and (ii) data evaluation and interpretation.

Data collection :

This present paper is synthesizing 63 papers collected from the literature established during the period of 1999- 2019. We first looked for papers containing the keywords (information sharing, performance, collaboration) in the title and abstract. Our research encompasses the peer-reviewed articles published in the time span defined previously. We then searched for papers using the web of science, since it covers with Scopus 95% of the research base (de Oliveira et al., 2017). From 770 papers, we excluded papers that are not focusing on performance and information sharing in the supply chain domain. Also, we exclude papers that are not far from the business economics or managements' field. Further we selected documents such as: article and review, written in English. We finally obtained 63 papers after rapid reading of the abstracts of the 98 papers left from the exclusion phase. The 63 articles were used for following steps of the systematic literature review (descriptive and categorization analysis).

3. RESULTS

At this step we began by exploring the evolution of research over time and the distribution of the papers among the various countries. We also, gathered the papers based on the underpinning theory. We then, defined the research method used for each of the chosen articles.

3.1. Evolution of literature over time

Supply chain management, appeared at the end of the 1980, however, the literature about its information sharing started to get published at the end of the 90's. The number of publications increased in a noticeable way from 1999 till 2003. Then the research volume has decreased, to augment again at the 2004. The articles were published in an unsteady line in 2015. Then, the line got increased to reach 6 publications on the topic in 2017. The negative trend showed up again, to continue at the 2019. This shows that even if the topic appeared earlier, it still gains the interest of researchers by reaching higher number of papers compared to previous periods (see figure 1).

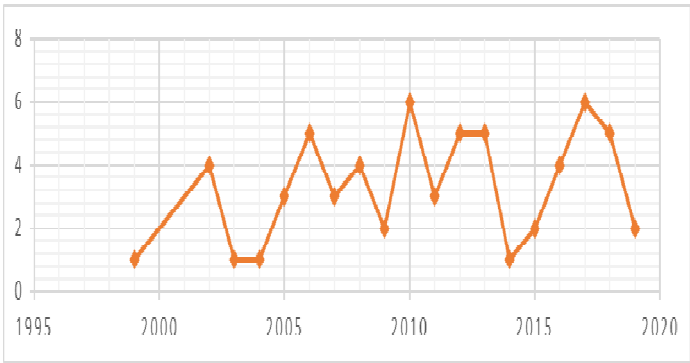


Figure 1. Total number of papers published between 1999 and 2019

3.2. Geographic distribution

We classified the selected papers and attached each work to the localization of the field study (country). The research literature is widely spread among the world. we noticed that 22% of the studies was undertaken in Asia. Then, USA enriched the research field with 11% of the total number of publications about information sharing and performance in supply chains. The rest of the four regions left (Europe, Middle east, Australia, and Africa) contributed with 3% each. While the majority of the papers, did not specified the country of application of the study (see figure 2).

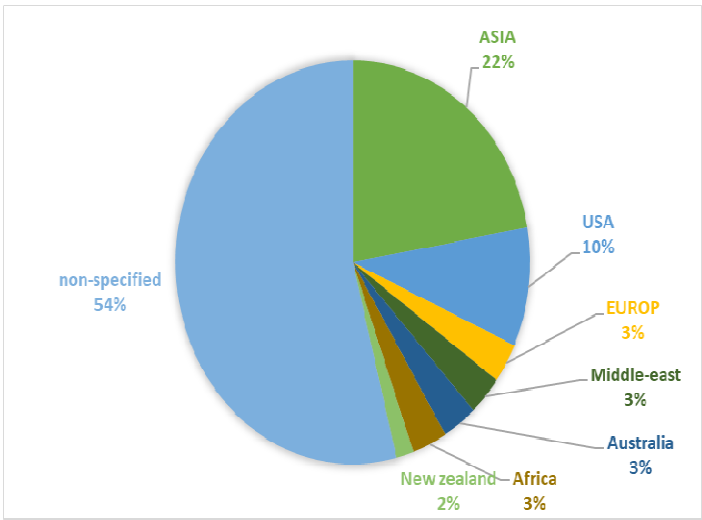


Figure 2. Publications in each geographical location between 1999 and 2019

3.3. Underpinned theory

The research foundation was based on a variety of theories that tried to explain the basis of the information sharing, and supply chain performance. Most of the papers was grounded on the resource based theory (Charan, 2012; Fuchs et al., 2018; Gunasekaran et al., 2017; Hove-Sibanda & Poee, 2018; Kaliani Sundram et al., 2016; Narasimhan & Nair, 2005; Zhang et al., 2016). While the transaction cost theory was at the second rank, with 7% among the whole theories. The social exchange theory, and the relational view that encompassed all the aspects of the social theory, was widely used to explain the importance of considering the social factors such as trust (Inderfurth et al., 2013), dependence and commitment, in

maintaining long lasting relationships in a supply chain context. However, the rest of the papers were divided in two groups: 55% did not specify the theory underpinned by the research, and the 15% left was supporting other theories (eg. Processing theory, resource dependency theory...) (see the table 1).

Theory	Total Frequency	%
Non-specified theory	39	55%
Resource based view	7	10%
Transaction cost theory	5	7%
Social exchange theory	4	6%
Relational exchange theory	4	6%
Information processing theory	2	3%
Resource dependence theory	2	3%
Institutional theory	2	3%
Evolutionary theory	1	1%
Principal agent theory	1	1%
Competence based view	1	1%
Organizational theory	1	1%
Process view	1	1%
Learning and knowledge perspective theory	1	1%
Total	71	100%

Table 1. Frequency of underpinning theories in each publication between 1999 and 2019

3.4. Research method

The main research method applied in the gathered literature, is the quantitative approach. Almost 43% of the studies used the survey-based approach by sending questionnaires to the firms. However, 25% of the papers used the simulation study, followed by the mathematic modelling that was cited in 17% of the publications studied. The fourth most applied method in the selected research is the qualitative method, where the authors used case studies in two articles and the interview in one paper. Furthermore. By combining both qualitative and quantitative approach the mixed method was applied in two studies. Similarly, the literature review was used twice by the authors (See the table).

Method applied	Number of papers
Quantitative method	27
Qualitative	3
Mixed method	2
Simulation study	16
Mathematic modelling	11
Literature review	2
Others	2
Total	63

Table 2. Classification of research methods between 1999 and 2019

4. CATEGORISATION BASED ON TOPIC AREAS

The content analysis enabled us to define the most highlighted areas of research from the selected papers. At this stage we processed to a deep reading of articles. We found that the main issues cited by the authors can be classified into:

4.1. Information technology

The development of IT has been a fruitful change for the companies. It is providing managers with tools that connects them to their business partners, and to get a real time information needed (Fawcett et al., 2007). Omar et al., (2010) study, showed that companies are aware of the necessity of the adoption of technological tools in the supply chain context. However, firms are still questioning the benefits of IT implementation regarding their costs (Zhao et al., 2002).

Prajogo & Olhager (2012) explained that the availability of the IT isn't enough, but they need to be associated with the social connectivity of the members which is translated in exchanging information's. They reclama that technical capabilities are useful when they allow the members binding. IT are not only helping firms to share information with their external partners, but it helped them to strengthen their internal innovation capabilities (Ganotakis et al., 2013). IT allowed firms adopting it to share information and to make their decision making process more effective (Baihaqi & Sohal, 2013). IT systems improves the supply chain performance by allowing the diffusion of high quality of information at the right place Fuchs et al., (2018). It is also facilitating the quick definition of strategies of supply chain, which is making the chain more transparent to its actors (Chang et al., 2019).

4.2. Information sharing

Information sharing is one the supply chain management practices (Kaliani Sundram et al., 2016; Thonemann, 2002; Zhang et al., 2016). Due to the emergence of the IT, a huge amount of information is being shared (Teo et al., 2018). For Huong et al. (2016), it can be defined as the level of providing relevant and critical information, and the approval of the firms to communicate their data to the supply chain members. Information sharing is the cure for companies that aims to satisfy the changing market needs and to reinforce their linking with their partners (Zhang et al., 2016). Lowering the uncertainty level is the main goal of organizations seeking to exchange information with their chain members (Fuchs et al., 2018; Hung et al., 2011). Information helps firms to synchronize their operations along the supply chain (Baihaqi & Sohal, 2013). It is offering both the advantages of recognizing the customers' needs for each supply chain player, and enhancing decision making process (Huong et al., 2016). Thus, the Bullwhip Effect is mitigated when the members share information, and as consequence the performance gets improved (Cho & Lee, 2010; Fiala, 2005; Gavirneni, 2006; Ojha et al., 2019; Zhou & Benton, 2007). Resulting in greater performance, Information sharing, as facilitated by IT, should be taken as a prerequisite to the collaborative efforts (Baihaqi & Sohal, 2013; Byrne & Heavey, 2006; Kulp et al., 2004; Yee, 2005). Pibernik et al., (2011) and Teo et al. (2018) defined the information sharing as the stimulus of collaboration. One important detail in the information exchange is the necessity of delivering an information with high quality (Al-Shboul et al., 2017; Baihaqi & Sohal, 2013; Kaliani Sundram et al., 2016).

4.3. Collaboration

To be competitive, supply chain needs not only to be effective but also collaborative (Narasimhan & Nair, 2005; Zhu et al., 2009). Collaboration refers to the joint effort of planification and supply chain operations' execution by at least two firms, which is promising higher success than when they act individually (Baihaqi & Sohal, 2013). Literature shed light on factors that empower collaboration. Kaliani

Sundram et al., (2016) indicated that both performance and collaboration are improved when the information technology and sharing information were practiced among supply chain members. Wu et al., (2014) clarified that it is the technology of information that boosts the exchange of the information needed to establish the adequate atmosphere for collaboration. Collaboration is a technique if optimizing the chains' operations by allowing the reduction of the costs (Eng, 2006) by mitigating the bullwhip effect (Cannella & Ciancimino, 2010). It is just required to offer in advance higher levels of communication (Voigt & Inderfurth, 2012) capabilities to obtain the operational excellence through collaboration (Sheu et al., 2006). Narasimhan & Nair (2005) result's confirmed that collaboration does enhance the performance of the supply chain.

4.4. Organizational and supply chain performance

As Supply chain management aims to manage the global operations of supply chain in an optimized way (Strader et al., 1999), the effective management of supply chains is perceived as crucial factor to obtain competitive advantage (Al-Shboul et al., 2017; Sezen, 2008; Sohn & Lim, 2008; Stone & Love, 2007). Supply chain performance denotes the evaluation of supply chain management (Hsin Chang et al., 2013) by assessing the efficiency and effectiveness of supply chain activities (Kaliani Sundram et al., 2016). The performance measurement is indicating whether the supply chain activities are done in an effective manner (Ghosh & Fedorowicz, 2008). Previous studies prone the use of quantitative measures such as cost, and customer needs to assess the performance of the chain (Sezen, 2008; Wu et al., 2014; Wu et al., 2011). As supply chain performance does not only encompasses the financial activities, it was necessary to consider other indicators (Wu et al., 2014) that complete the evaluation by measuring tangible and intangible aspects : flexibility and efficiency (Elwan Ibrahim & Ogunyemi, 2012; Hsin Chang et al., 2013, 2019; Zhang et al., 2016). Successful measuring of supply chain should inform about both the financial health and the excelling of members in their delivered services (Kaliani Sundram et al., 2016). Supply chain performance is providing the top managers and operators of the chain with indications that could satisfy their management needs (Mahadevan, 2017). However, supply chain measurement should be aligned with strategy and unified along the chain, to reflect the strategic goals with a minimum potential conflicts (Szymczak et al., 2018). By seeking the optimization of the overall supply chain, firms will maximize their own performance surplus (Zelbst et al., 2010). Al-Shboul et al., (2017) results indicated how supply chain improvement (in terms of enhancing practices such as information sharing) lead to enhancing the organizational performance.

5. SYNTHESIS

The results of the content and descriptive analysis indicate that the impact of information sharing on supply chain performance have gained authors attention. Studies tested empirically the link, by applying the quantitative approach in the first place. Doing so, their results confirmed the positive linking between the two key words (Eyaa et al., 2010).

For Ojha et al. (2019), information sharing does improve the performance by reducing the bullwhip effect. Chang et al. (2019) and Al-Shboul et al., (2017) stated that sharing information with high quality is found to increase the supply chain performance. Fu-ren Lin et al. (2002) simulation study's shed light on the importance of detailing the information to lower the costs. Wu et al. (2011) sharing information with partners influence the performance of the whole chain. Lau et al. (2008) demonstrates that this improvements are translated in terms of cost reductions and service level improvements. Ghosh & Fedorowicz (2008) show how information sharing makes the chains operations more flexible and response to the change faster. Zelbst et al. (2010) and Fuchs et al. (2018) results not only indicated that the positive

linking between the sharing of information and the performance, but it also confirms that IT are empowering the exchange of information.

The results are all in the same line, confirming that organizations are aware of the importance of implementing IT, as a facilitator of the whole chain connection. It is also useful since it allows the availability of the information for members in order to make decisions based on up-dated data. As a prerequisite IT makes the exchange of information easier and feasible in less time. Information sharing makes the information exposed to the members. However, the results indicated that the information should be accurate and timely to serve the members. It is also, recommended to build collaborative relationships with partners, to increase information exchange outcomes. Both information sharing and collaboration are seen as resource capabilities. Information indicates the operations' situation at the right time, and collaboration help firms to access to their partners resources. When collaboration accompanied information sharing the performance surplus is greater for the whole supply chain. The literature highlighted that the optimization of the whole chain performance results in the maximization of firms' individual performances.

6. CONCLUSION

Both globalization and customers requirement changes, are making pressure on companies. They are forced to offer products with low price in less time. Supply chain compete with each other and firms can no longer face the competition alone. Doing so they are willing to implement the IT capabilities and information exchange with their supply chain partners. The main goal is to enhance their supply chain performance and hence their own profitability. The present literature review made it clear that information sharing is found to be useful for supply chain performance improvements. It divulgates that the hidden fact for the superior surplus for the chain is offered by the collaborative efforts of the supply chain actors.

Nevertheless, more empirical studies on the positive linking of supply chain information sharing and performance are required in other contexts, as the results showed the dominance of some geographic areas more than the rest of the world.

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