THE EFFECTS OF SUPPLY CHAIN INNOVATION, DYNAMIC CAPABILITIES ON SUPPLY CHAIN PERFORMANCE IN FASHION INDUSTRY

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The Effects of Supply Chain Innovation, Dynamic Capabilities on Supply Chain Performance in Fashion Industry

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CERTIFICATE OF ORIGINALITY

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_______________________________ (Signed)

Wong Tak Way David (Name of student)

Abstracts

The supply chain is seen as a source of competitive advantage, and its innovation has become a critical research topic in business-to-business marketing and production. However, the main obstacle to empirical research on supply chain innovation is the lack of validated and well-developed measurement scales for supply chain innovation. Therefore, it is necessary to develop the measurement of the supply chain innovation construct. By collecting primary quantitative and qualitative data, a multi-item measurement scale of supply chain innovation was developed using the 10-step validation procedure of MacKenzie et al. (2011). Supply chain innovation was then operationalized as a multidimensional construct with three aspects, marketing, technology development, and logistics-oriented innovation activities, resulting in 29 measurement items. Business-to-Business marketers can apply this empirically validated scale to evaluate their supply chain innovation efforts and identify areas for improvement.

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Chapter 1 Literature review

This chapter aims to systematically review the supply chain innovation literature over the last 20 years. The review covers the period from 1999 to the present, 1999 marking the publication of the first leading paper on the innovation supply chain (Desbarats, 1999). It examines the development and current state of supply chain innovation research in management and identifies research gaps. A literature review is conducted to identify and analyze publications in peer-reviewed academic journals that include contributions from different strands of management research. Firstly, this chapter analyzes the theoretical contributions of the supply chain innovation literature using Gregor's (2006) framework of theory classification. It also evaluates the levels of analysis of the literature using the structural view model proposed by Skinner et al. (2006). The identification and analysis of relevant articles highlighted the need to conceptualize the supply chain innovation construct and develop measurement scales to operationalize it.

1.1. Review of supply chain innovations

Supply chain innovations are a combination of information and related technology developments and new marketing and logistic procedures to enhance service effectiveness, improve operational efficiency, increase revenue, and maximize joint profits (Bello et al., 2004). Based on this definition and a resource-based view, supply chain innovations consist of three key innovation activities: logistics-oriented, marketing-oriented, and technological development-oriented innovation activities.

Logistics-oriented innovation activities pertain to logistics-related services that are helpful and new to a specific target audience. This audience can be external, wherein innovations serve customers better, or internal, wherein innovations improve operational efficiency (Flint et al., 2005; Grawe, 2009). According to Chen and Paulraj (2004), logistics that a) provides firms with space utilities and time, b) guarantees the quantity of goods needed at the right time and in the right place, and c) reduces organizational slack requires a close, intensive, and coordinated information exchange between supply chain partners. Eschenbacher et al. (2011) illustrated that supply chain innovation processes are a good example of inter-organizational and distributed innovation processes (DIPs). Indeed, the outside world is integrated into the innovation processes that lead to DIPs. Meanwhile, innovations are coordinated by a supply chain hub and this function is usually executed by a large company with full control.

Marketing-orientated innovation activities are inspirational customer research and innovative marketing-related services that meet customer needs (Desbarats, 1999; Chen and Paulraj, 2004). Desbarats (1999) further elaborated that marketing fulfills the core strategic responsibility of the customer supplier relationship. The integration and collaboration of suppliers play a critical role in achieving supply chain innovation goals. If suppliers are not interested in innovations, companies are less likely to achieve supply chain innovations (Jajja et al., 2017).

Technological development-oriented innovation activities involve the creation of new knowledge and technical skills that can contribute to the development of new services and/or products for customers (Lee et al., 2011). Storer et al. (2014) pointed out that supply chain innovations often involve partnerships and collaborative relationships, particularly when using industry-wide and industry-led innovations, such as information systems and new technologies, that can be mutually beneficial.

According to Lee et al. (2014), supply chain innovations help organizations achieve supply chain efficiency for effective customer value creation, including rapid patient care processing, medical error reduction, and efficient data management, to positively influence organizational performance. Ireland and Webb (2007) further elaborated that firms tend to maximize these efficient relationships rather than seeking new or additional partners to increase their effectiveness. Cai et al. (2009) specified that an innovative supply chain pattern meets the needs of supply chain innovations. This is especially relevant for supply chain companies, which usually produce innovative products and face an uncertain market.

The in-depth literature review was conducted in different stages to explore the supply chain innovation construct in each reviewed journal. Appendix A lists the 155 journals found in our literature review. First, the theoretical contributions of the supply chain innovation literature were analyzed using Gregor's (2006) framework of theory classification to identify the type of theory used in the literature. Second, I evaluated the levels of analysis of the literature using the structural view model proposed by Skinner et al. (2006). In addition to the individual, group, and organizational levels proposed by Skinner et al. (2006), following Smith et al. (2011), the societal level was included to study supply chain innovations across cultural or national regions.

1.2. Gregor's (2006) theory classification in supply chain innovation research

By adapting Gregor et al.'s (2006) proposed framework to classify theories, I analyzed the theoretical contributions of the supply chain innovation articles, which identify different types of theories, i.e. analyzing, explaining, predicting, explaining/predicting, and design/action. Table 1 presents their definitions, which have been adapted for our research.

Table 1. Contributions to theory: definitions (adapted from Gregor et al. 2006)

Theory	Type Definition
Analyzing	Describe the state of supply chain innovation or the need for supply chain innovation research.
Explaining	Explain what is occurring but do not provide testable predictions.
Predicting	Provide testable predictions without well-developed causal relationships
Explaining and Predicting	Explain what is occurring and provide testable predictions with causal explanations.
Design and Action	Specifically design a framework/ tool for evaluating supply chain innovation.

Figure 1 and Appendix B show the coding of each article in our review of theoretical contributions and Table 2 summarizes Appendix B in terms of theoretical contributions to supply chain innovation research. First, I found that supply chain innovation research has largely focused on explaining and predicting theoretical contributions, followed by an explanation of these theoretical contributions. In addition, only few articles discussed contributions of design and action. Although research on supply chain innovations has increased, which can be largely attributed to the astronomical efforts needed to develop and validate constructs and measures of supply chain management, a comprehensive approach to construct development and measurement remains non-existent (Chen and Paulraj, 2004). Govindarajan and Kopalle (2006) argued that without formalizing the concept of innovativeness with a reliable and valid measure, it will be difficult to conduct rigorous research to uncover the causes of the innovator's dilemma and identify mechanisms to help incumbents develop such innovations.

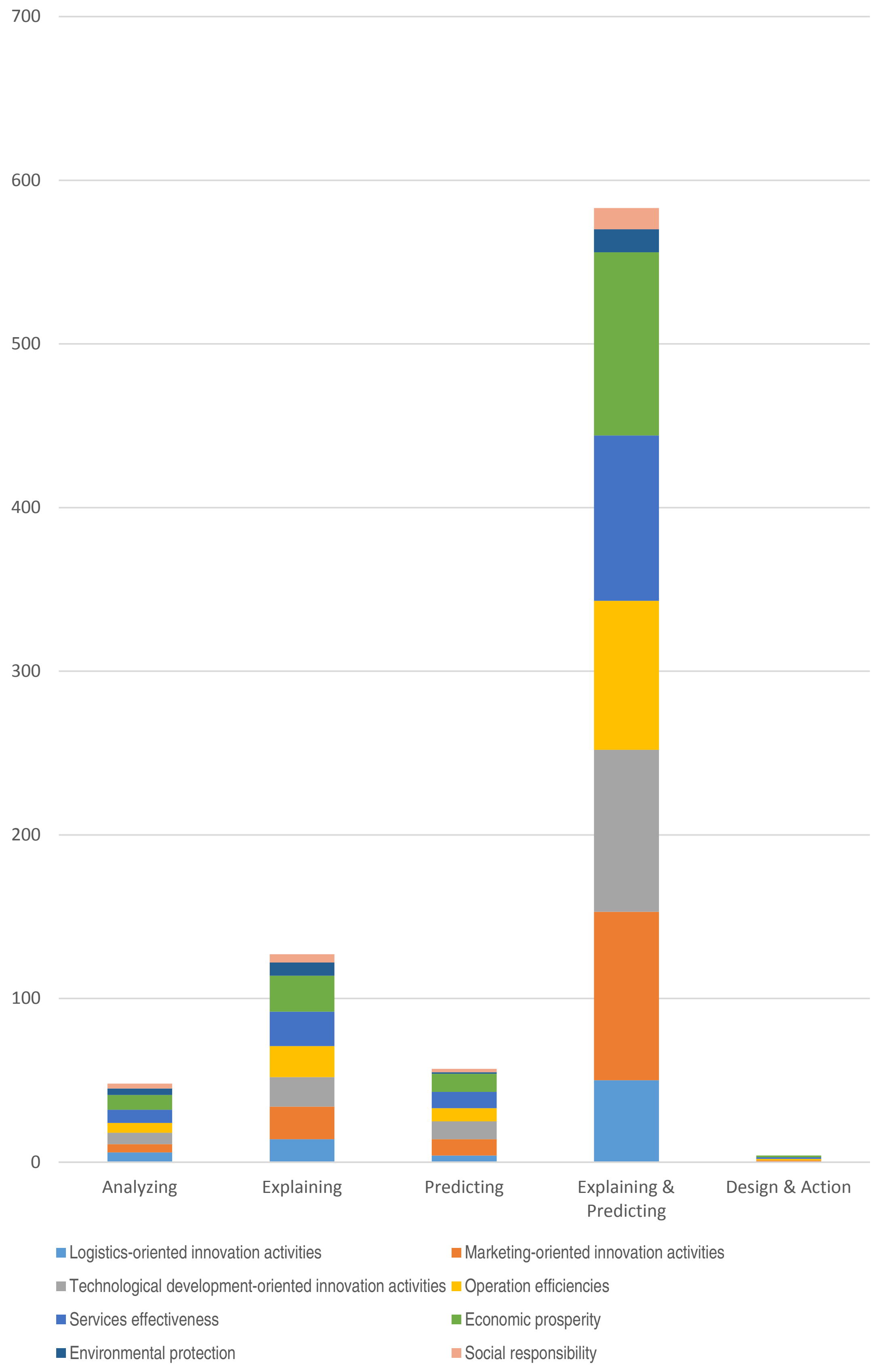


Figure 1. Summary of theoretical classifications for supply chain innovation literature

As shown in Table 2, most research in logistics-oriented innovation activities, marketing-oriented innovation activities, technological development-oriented innovation activities, operational efficiency, service effectiveness, economic prosperity, social responsibility, and environmental protection has focused on explaining and predicting theories, with previous work mainly focusing on the development and testing of instruments (Cao and Zhang, 2010). Gregor et al. (2006) pointed out that theory development begins with domain analysis and continues with explaining and predicting theories. Supply chain innovation research has benefited from this approach as there are no standardized instruments for measuring supply chain innovations.

Table 2. Theoretical contributions in supply chain innovation literature (adapted from Belanger and Crossler, 2011)

Theory type	**Topic areas***							
	Organizational action			Outcome				
	Logistics-oriented innovation activities	Marketing-oriented innovation activities	Technological development-oriented innovation activities	Operation Efficiencies	Services Effectiveness	Economic Prosperity	Environment Protection	Social Responsibility
Analyzing	6	5	7	6	8	9	4	3
Explaining	14	20	18	19	21	22	8	5
Predicting	4	10	11	8	10	11	1	2
Explaining & Predicting	50	103	99	91	101	112	14	13
Design & Action	0	1	0	1	1	1	0	0
Number of (total) occurrence	74	139	135	125	141	155	27	23

* Some articles counted more than once because they cover more than one topic.

Huo et al. (2013) revealed that supply chain innovations will be adopted because of economic advantages, which may explain why economic prosperity is highest in

Table 2. I also found a high portion of articles on the study of environmental protection and social output published since 2007. This finding can be explained by firms' growing concern for their sustainable development and the measurement of the stable performance of supply chains, which can create transparency and initiate supply chain innovations (Beske-Janssen et al., 2015). Indeed, firms tap into their resources and capabilities to detect the potential of supply chain innovations to sustain development and often struggle to capitalize on supply chain innovations. Apple Inc. and Samsung are good examples (Gualandris and Kalchschmidt, 2016).

I found that the number of outputs for operational efficiency and service effectiveness was comparatively high and consistent with economic prosperity, as both operational efficiency and service effectiveness can lead to fruitful economic outcomes (Bello et al., 2004). In Table 2, I also obtained the same number of outputs for logistics-oriented innovation activities, marketing-oriented innovation activities, and technological development-oriented innovation activities when analyzing the theory type. Moreover, the number of outputs for logistics-oriented innovation activities was half that of marketing-oriented innovation activities and technological development-oriented innovation activities when explaining and predicting the theory type. This phenomenon is largely due to the analysis of technological development using patent reports, information that is easily accessible and publicly available (Benner and Tushman, 2002; Trautrims et al., 2017). Desbarats (1999) explained that new products are delivered to the economy by professional teams from different disciplines. For example, marketing and sales teams focus on customers, whereas technical and creative teams focus on product specifications. Chen and Paulraj (2004) also argued that meeting customer needs is the main goal of marketing and the central purpose of any business. Moreover, Sarkis et al. (2012) proposed that supply chain innovations from knowledge flows are especially pertinent to small supply chain organizations, which typically lack knowledge resources about environmental actions for their operations. Archer et al. (2008) illustrated that both customers and suppliers of small- and medium-enterprises prefer to pursue traditional product issues (price, quality, support, reliability) and not the process issues that motivate supply chain innovations (value engineering, e-business, value analysis, time to market, R&D, and procurement expertise). All of these factors may hinder the number of occurrences for logistics-oriented innovation activities. I believe and expect to find more explanation/prediction contributions in future supply chain innovation research. For example, Ferrer et al. (2011) pointed out that to pursue a continual value adding process and create supply chain innovation capacity, inter-organizational relationships resulting from cooperative and collaborative outcomes must be controlled. In terms of social aspects, He et al. (2017) suggested that although business practices are in urgent need of guidance and directions on how to create "real" sustainable supply chains, researchers are lagging behind. Therefore, there is a need for forward (deductive) research to predict new business trends and direct new sustainable supply chain innovations. In terms of environmental aspects, Melnyk et al. (2009) emphasized the need for further research in various areas, such as supply chain and environmental performance, the role of supply chain design/redesign to improve competitiveness, the role of supply chain in product/process/supply chain innovations, and realigning performance measures across the supply chain.

A sustainable supply chain is one that can generate profits over an extended period without harming the social or natural system (Pagell and Wu, 2009). In such a supply chain, customers are willing to do business forever (Schaltegger and Burritt, 2014). Masoumik et al. (2014a; 2014b) further elaborated that the core values of future positioning and supply chain innovations can be generated by the innovative sustainable supply chain. Previous studies have highlighted that key areas, such as logistics and customers, contribute significantly to achieving sustainable supply chains. Markley and Davis (2007) illustrated that logistics is crucial in implementing environmental strategy, from storage to transportation of raw materials to the delivery of products to the market. Svensson and Wagner (2012) further proposed that consumer perception of the sustainable supply chain is essential for a company. Pagell and Wu (2009) pointed out that organizational capacity to innovate is important to create a sustainable supply chain, as firms in a sustainable supply chain seek new market opportunities by redefining their supply chain or developing new radical products/processes (Pagell and Wu, 2009; Klassen and Vereecke, 2012; Marshall et al., 2015). As a result, radical sustainable supply chains and innovative business strategies are generated, providing win-win solutions for businesses (Khalid et al., 2015).

Gregor et al. (2006) emphasized that design and action theories will be followed by explaining and predicting theories. Our review revealed their occurrences in published supply chain innovation journal articles for marketing-oriented innovation activities, logistics-oriented innovation activities, technological development-oriented innovation activities, operational efficiency, service effectiveness, economic prosperity, environmental protection, and social responsibility. For example, Cao and Zhang (2010) showed that a scale to measure supply chain collaboration is beneficial. In addition, it is always advantageous to convert conceptual frameworks into real tools and then products because of the more practical implications for tools than frameworks. Holmstrom and Partanen (2014) used the F-18 Super Hornet as an example of integrating digital manufacturing technology to produce a subsystem. In fact, researchers must have access to tools to advance their work instead of constantly reinventing the wheel. Storer et al. (2014) shared a similar viewpoint. Basole et al. (2017) presented another visual analytic approach, arguing that researchers and decision makers are able to see patterns, digest data, identify outliers, and spot trends effectively and rapidly, thereby improving memory, comprehension, the hypothesis-generating process, decision-making, and facilitating the proposition-generating process. To enable research to build on previous work, supply chain innovation research should be done in an open source environment, the advantage being that the code designed by one group can be expanded to others (Belanger and Crossler, 2011).

Researchers should explore ways to solve outcome issues (such as economic prosperity) for future commercial applications and services. For example, Hult et al. (2010) discussed three examples, explaining how Benetton, Whirlpool, and HP redesigned their supply chain processes to reduce supply chain costs for their own benefit. Similarly, Sawhney et al. (2006) pointed out that Zara redesigned its supply chain process to reduce inventory by showing up-to-date apparel styles for economic benefits.

Categorizing the type of innovation by supply chain stage in supply chain innovation research

Appendix B presents a classification of the supply chain innovation literature, wherein studies are categorized by type of innovation according to the supply chain stage. Table 3 presents a summary of the journal articles.

Table 3. Summary of topic areas per supply chain stage in supply chain innovation research

Supply chain stage	Topic areas*							
	Organizational action			Outcome		Output		
	Logistics-oriented innovation activities	Marketing-oriented innovation activities	Technological development-oriented innovation activities	Operation Efficiencies	Services Effectiveness	Economy	Environment	Social
Supplier	9	32	31	25	30	33	4	2
Manufacturer	25	38	33	39	39	44	11	10
Retailer	7	9	7	8	10	10	1	2
Customer	2	3	3	3	3	3	0	0
Supplier + Manufacturer	9	19	18	17	18	21	7	5
Supplier + Retailer	3	3	3	2	2	3	0	1
Supplier + Customer	3	7	9	5	9	9	1	0
Manufacturer + Retailer	2	3	6	5	3	6	0	1
Supplier + Manufacturer + Retailer	2	7	7	7	7	7	0	0
Supplier + Manufacturer + Customer	7	10	9	9	10	10	3	1
Supplier + Retailer + Customer	1	2	2	1	2	2	0	0
Supplier + Manufacturer + Retailer + Customer	4	6	8	5	8	8	0	1
Number of (total) occurrence	74	139	135	125	141	155	27	23

* Some articles are counted more than once because they cover more than one topic.

Table 3 reveals that supply chain innovations have mainly occurred at the manufacturer, supplier, and “supplier + manufacturer” stages, with about 57% of the studies conducted at these stages. Only 9% of the studies have been conducted at the retailer and customer stages. This finding demonstrates that customers have more negotiating power than suppliers in general and identifies a tendency to shift downstream customer pressures to upstream suppliers (Yi et al., 2011). As shown in Table 3, supply chain innovations have mainly occurred in the areas of marketing-oriented innovation activities (64%), technological development-oriented innovation activities (61%), and logistic-oriented innovation activities (60%) at the supplier, manufacturer, and "supplier + manufacturer" stages. As a result, upstream suppliers or manufacturers transform their business models through supply chain innovations to regain competitive advantages (MacCarthy et al., 2016). They also improve their organizational process by using new technologies to meet their customers' needs (Lee et al., 2011).

Another finding of the review was that different supply chain stages can work together to achieve better and more prosperous economic results, such as "supplier + manufacturer + retailer" (5%), "supplier + manufacturer + customer" (7%), or even "supplier + manufacturer + retailer + customer" (5%). This finding may be the result of the growing globalization of the market, which forces supply chain competition to expand to interfirm competition. This situation requires collaboration between downstream distributors and upstream suppliers. Therefore, the concept of innovation should be extended from manufacturing to supply chain scenarios. A well-managed innovation process is important for a company. The shared processes of many firms within that company's supply chain network bring about the supply chain innovation concept by covering all innovative activities that increase the effectiveness of the company's supply chain and give the company a competitive advantage (Roy et al., 2004).

1.3. Sample characteristics in supply chain innovation research

To classify the supply chain innovation literature, I examined the samples used for conceptual research by identifying the respondent type (manufacturing companies versus non-manufacturing companies), or the context used for conceptual research by identifying the respondent origin. As explained below, I revealed that supply chain innovation research has largely relied on manufacturing firm-based samples and U.S. samples, limiting the generalizability of the findings. Appendix D presents the detailed results.

Type of respondents

Supply chain innovation research has used samples from manufacturing firms typically used by business-to-business marketers to investigate different phenomena in the same situation. I found that 83% of previous studies used samples from manufacturing firms. Droge et al. (2003) pointed out that the business-to-business marketing literature tends to focus on the performance implications of supply chain innovations, and that innovation performance can be measured in terms of innovative inputs, such as R&D expenditures, or innovation outputs, such as patenting frequency. These arguments may explain the high number of articles found in the review. This can also help provide information on the locations of supply chain innovations (Trautrims et al., 2017)

I found that out of 79 empirical studies, eight focused on the automotive industry (10%) and six on the electronics industry (8%). One possible explanation is that supply chain innovations can satisfy customers and build brand loyalty (Aitken and Harrison, 2013). Ettlie and Pavlou (2006) further explained that the automotive industry is driven by complex new product introductions and a trend toward changing the locus of innovation in this sector of the economy that moves upstream in the supply chain from assembly (buyer) firms, such as General Motors Corporation and Toyota, to first-tier suppliers, such as Delphi and Visteon.

Laursen and Salter (2006) illustrated that biotechnology is an example of a single source of utmost importance in the context of radical innovations, in which universities are arguably the key source. Another example is scientific instruments, in which lead users play a key role, as almost 50% of innovations come from them. Business-to-business marketers often discuss how using samples from non-manufacturing firms can improve generalizability. I argue that studies focusing on manufacturing firms should be pursued as they provide valuable data and manufacturing firms are important stakeholders in supply chain innovations. However, manufacturing firms may have different concerns than retailers or wholesalers and may have different behaviors in supply chain innovations.

Origin of respondents

A comparatively large number of supply chain innovation studies have focused on the U.S. Indeed, I found that 40% of the studies were conducted on U.S. samples. I argue that different perceptions of supply chain innovations and their effects can be obtained as individuals from different countries have different values, laws, and cultures. In addition, Anderson et al. (2014) demonstrated that team innovation has some cognitive styles that may facilitate idea generation, inhibit it, or facilitate idea implementation. Jajja et al. (2017) also suggested that longitudinal analysis across industries and countries can help understand whether the maturity and evolution of supply chain innovation processes and supply chain relationships differ or follow those observed in developed economies.

Yaibuathet et al. (2008) stated that the regulatory element of the institutional environment is delicate and limits the ability of domestic and foreign firms to adopt supply chain innovations in China. Our findings did not fully support this argument, as 8% of the studies were conducted using samples from China. Yaibuathet et al. (2008) also argued that managers in Japanese firms are unwilling or unable to accept the adaptive and flexible arrangement with non-members required by supply chain innovations, because of the reliability and centralized control of dominant firms on group loyalty in Japanese culture. Our findings supported this argument, as only 2% of the studies used samples from Japan.

I noticed that previous studies have also used samples from Taiwan (1%) and Thailand (1%). Jean et al. (2012) explained that members of the Taiwanese electronics industry actively participate in the world economy, are pioneers in the development of information technology, and champion cross-border relationships with European and U.S. industry leaders, thereby offering a valuable empirical context. Wong et al. (2013) also justified the choice of the Thai automotive industry as their research sample, as Thailand is one of the largest motor vehicle manufacturing bases in the world in terms of gross output and export value.

One interesting finding was that 80% of samples from other countries (vs 20% of U.S. samples) addressed environmental protection, and 77% of samples from other countries (vs 23% of U.S. samples) addressed social responsibility. I assume that both cases include a large portion of developing countries. Jajja et al. (2017) explained that expanding the analysis to emerging economies will enable the identification of patterns and diversities in the evolution of supply chain innovation practices across environments.

This section demonstrates that innovation research has largely relied on manufacturing firm-based samples and U.S. samples, limiting the generalizability of the findings on supply chain innovation practices, consequences, and attitudes One possible explanation is the type of journal sample used in our investigation, as only English language journals were included (Wong and Ngai, 2019). .

1.4. Structural view of supply chain innovations

Appendix C presents a classification of the supply chain innovation literature based on the levels of analysis (using the structural view model proposed by Skinner et al. (2006)), and Table 4 provides a summary of the journal articles. In addition to the individual, group, and organizational levels proposed by Skinner et al. (2006), following Smith et al. (2011), the societal level was included to study supply chain innovations across cultural or national regions. I used the same concept as MIS studies to analyse supply chain innovation research. First, I found that most supply chain innovation research has been examined at the organizational level compared with other levels. Second, I found that supply chain innovation research has mainly been conducted at the "individual + organizational" level, even though it can be conceptualized as a multilevel concept.

Table 4. Summary of topic areas per levels of analysis in supply chain innovation research

Level of analysis	Topic areas*	
	Organizational action	Outcome

Demographics	Logistics-oriented innovation activities	Marketing-oriented innovation activities	Technological development-oriented innovation activities	Operation Efficiencies	Services Effectiveness	Economic Prosperity	Environment Protection	Social Responsibility
Individual	0	0	0	0	0	0	0	0
Group	0	0	0	0	0	0	0	0
Organization	37	69	69	62	67	78	12	14
Societal	0	0	0	0	0	0	0	0
Individual + Group	0	0	0	0	0	0	0	0
Individual + Organization	31	63	58	56	66	69	12	5
Individual + Societal	0	0	0	0	0	0	0	0
Group + Organization	0	1	1	1	1	1	1	1
Group + Societal	0	0	0	0	0	0	0	0
Organization + Societal	1	2	2	1	2	2	0	0
Individual + Group + Organization	1	1	1	1	1	1	0	0
Individual + Organization + Societal	1	0	1	1	1	1	1	1
Individual + Group + Societal	0	0	0	0	0	0	0	0
Group + Organization + Societal	1	1	1	1	1	1	0	1
Individual + Group + Organization + Societal	2	2	2	2	2	2	1	1
Number of (total) occurrence =	74	139	135	125	141	155	27	23
* Some articles counted more than once because they cover more than one topic.								

Levels of analysis in supply chain innovation research

Table 4 shows that supply chain innovation research has been conducted mainly at the organizational level or the "individual + organizational" level, with about 97% of the studies conducted at these levels. This may be due to the fact that collecting and analyzing data from a large number of individuals and organizations is easier through surveys or interviews. As shown in Table 4, I found that no studies have been conducted at the individual, group, "individual + societal," "group + societal," or "individual + group + societal" level of analysis for supply chain innovations. I also found that the number of outputs for the organizational level was slightly higher than that of the "organization + individual" level. These differences can be explained by various supply chain innovation concepts that are conceptualized and understood at the organizational level. For example, most people think that supply chain innovations occur at the organizational level. In addition, most papers at the "individual + organizational" level of analysis may be related to the management of the organization's development. Therefore, managers must understand the importance of good timing in managing the diffusion of innovations and cannot wait too long before shifting to new technologies and services because learning curves are steep (Lyytinen and Rose, 2003). Clearly, future research has many avenues. For example, I expect involvement of the CEO or top management in R&D to enhance supply chain innovations. In addition, metrics are needed to evaluate supply chain innovations from the perspective of the organization, as discussed in the following sections.

Table 4 presents two papers analyzed at the "individual + group + organizational + societal" level, which are not empirical studies. One interesting finding was that no studies have focused on the societal level of analysis for supply chain innovations, and only a few on the "organizational + societal" level of analysis. I believe that additional studies on supply chain innovations should be conducted at both levels. In such studies, one should prioritize the importance of the end customer due to low demand and strong competition at the international level against global competitors. The fact that international retail is an emerging discipline in the manufacturing sector, especially since the economic crisis of 2008, must also be considered (Caniato et al., 2014). Yaibuathet et al. (2008) stated that management and technological knowledge differ in developed and developing countries, although both factors are essential for industrialization and modernization. Mechanized structures and cultures that are functionally oriented tend to discourage communication across functions and encourage the creation of measures optimized locally instead of globally (Pagell et al., 2004). All these points may encourage business-to-business marketers to deepen their knowledge at the societal and “organizational + societal” levels.

Another finding of the review was that in the supply chain innovation literature, few studies have focused on the “group + organization” or “group + organization +societal” level of analysis. I suggest that further studies be conducted in this category, for example, examining the unwillingness to change and doubts about unfamiliar practices among domestic channel members, resulting in inefficient and ineffective supply chain management when viewed from the supply chain innovation perspective (Yaibuathet et al., 2008). This may be due to the fact that members of a collective culture are more likely to subordinate their personal goals to those of the group and to prioritize the interests of the collective (Huo et al., 2013). Scholars have even argued that supply chain innovations may not be adopted because of these normative elements (Yaibuathet et al., 2008). I believe that there is a need for further studies and in-depth analyses of the effects of group culture and organizational culture on supply chain innovations (Miles and Huberman, 1994; Myers et al., 1997).

Other research has typically provided or discussed the types of organizations that can be adopted in supply chain innovations. For example, Samiee et al. (2008) demonstrated that by requiring their channel members to share benefits from supply chain innovations, Sony has created an efficient supply chain management system within and across its units, which incorporates upstream suppliers and downstream distributors and retailers. Similarly, Roy et al. (2004) illustrated that Dell and Toyota motivate their suppliers to seek new business opportunities and derive competitive strength from upstream supply chain innovations, creating sustainable buyer-seller relationships.

To conclude this section, I argue that future research should adopt a multilevel perspective and not solely an “individual + organizational” perspective. Several levels should be taken into account simultaneously. Establishing a multilevel theory building reveals supply chain dynamics and implications (Matthyssens et al., 2006). Gupta et al. (2007) proposed that the multilevel theory helps better understand how phenomena at one level of analysis are linked to those at another level. In doing so, I can provide a rich and comprehensive perspective of a given phenomenon, such as innovation. The introduction and implementation of SAP systems at Ralph Lauren (based on the Ralph Lauren Corporation Annual Report, April 1, 2017, 16) and ECCO (Munksgaard et al., 2014) are examples of supply chain innovations at the "individual + group + organizational" level, as staff, teams, and the entire organization are involved in process improvement by using new technologies to enhance operational efficiency and service effectiveness. Moreover, the IKEA GROUP's approaches to sustainability (based on the IKEA GROUP Sustainability Report FY16, August 31, 2016, 6), 3M, and Henkel (Hansen et al., 2009) are illustrative examples of supply chain innovations at the "individual + organizational + societal" level. Their CEOs involvement in the supply chain innovation process, especially for sustainability issues, are key to saving money and energy, which in turn benefits society.

Yin et al. (2018) also used concrete examples, such as Henry Ford who introduced the use of mass production assembly to address the shortage of supply in product volumes, and Taiichi Ohno who developed the Toyota production system to meet different customer interests in product variety. These are examples of supply chain innovations at the "individual + group + organizational + societal" level, as the introduction of new technologies not only brings organizational and supply chain improvements, but also benefits the entire automotive industry. Supply chains have evolved into a complex adaptive system from a linear structure to adapt to environmental changes (Wycisk et al., 2008). According to Wu et al. (2016), a smart supply chain is an interconnected business system. Guo et al. (2015) also argued that a smart supply chain is an instrumented and intelligent system. A smart supply chain is the outcome of supply chain innovations, some of which are innovations of processes, networks, systems, or technology (Wu et al., 2016). The volume of innovations and innovation-related activities are positively influenced by supply chain performance and supplier-customer collaborations (Modi and Mabert, 2010; Henke and Zhang, 2010). The characteristics of a smart supply chain, such as intelligent infrastructure, smart machines, Internet of Things, and its capabilities, such as interconnectivity and real-time communication, are features that fully enable data collection at all levels of the supply chain (Wu et al., 2016). Business intelligence software and a responsive decision-making system can help provide better services to customers.

1.5. Theories and models applied to supply chain innovation research in the literature

Theories and models can be used to explain a phenomenon or topic under study. They also work as paradigms to underpin a research design. As shown in Appendix D, many theories and models have been used in previous supply chain innovation research. Some of the most essential theories/models have been used for further analysis, accounting for 64% of occurrences in the reviewed articles. I found that five major theoretical perspectives have been used in previous research, namely, resource-based view (21%), transaction cost economics (16%), relational theory (12%), knowledge-based theory (6%), and organizational theory (6%). Appendix E provides a brief introduction to these five theoretical perspectives.

1.6. Summary of chapter

Supply chain innovations are a complex construct of great interest to business-to-business marketers. The previous literature has shown that this construct has received more attention in the areas of practice and research for business-to-business marketing because of its potential to affect organizational outcomes, such as operational efficiency, service effectiveness, economic prosperity, environmental protection, and social responsibility. Based on the theoretical contributions of the supply chain innovation literature, few studies have focused on the conceptualization of the supply chain innovation construct and no studies have discussed the development of measurement scales to operationalize this construct. Insufficient research may be due to the lesser importance of supply chain innovations compared with traditional innovation topics, such as radical innovation, incremental innovation, or administrative innovation. I also believe that inconsistencies in the conceptualization and operation of supply chain innovations in the extant literature may have contributed to the slow progress in these areas. As the need for reliable and valid instruments to assess supply chain innovations has become crucial with firms relying more and more on innovations to help them effectively and efficiently compete, researchers should consider developing an empirically reliable and valid instrument for measuring supply chain innovations. Conceptualization and development of the supply chain innovation construct are discussed in detail in the next chapter.

Chapter 2 Conceptualization, Instrument Development of Supply Chain Innovation

This chapter conceptualizes and develops the measurement of the supply chain innovation construct. By collecting primary quantitative and qualitative data, a multi-item measurement scale of supply chain innovation was developed using the 10-step validation procedure of MacKenzie et al. (2011). Supply chain innovation was then operationalized as a multidimensional construct with three aspects, marketing, technology development, and logistics-oriented innovation activities. Supply chain managers can apply this empirically validated scale to evaluate their supply chain innovation efforts and identify areas for improvement.

MacKenzie et al. (2011) presented a comprehensive construct conceptualization, measurement scale development, and validation process. As shown in Figure 2, this procedure consists of 10 steps. Each step is based on the scale development literature (DeVellis, 2016; Straub, 1989; Straub et al., 2004) and integrates various methodological strategies for the development and validation of constructs and measurement scales. In this study, I used the same guidelines and 10-step procedure as MacKenzie et al. to validate and develop the construct and conceptualization of supply chain innovation. However, I modified part of the procedure sequence to better fit my study (Bassellier and Benbasat, 2004).

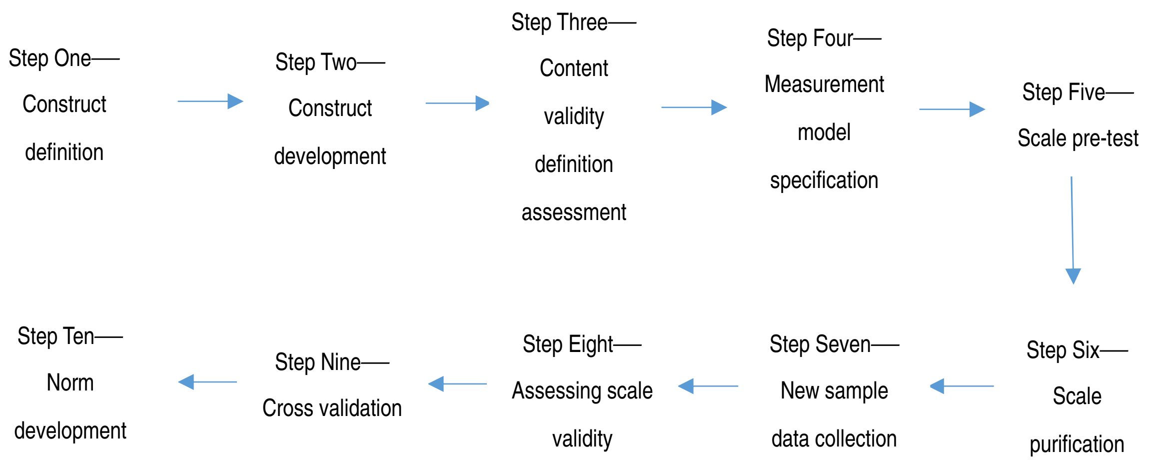


Figure 2. 10-Step validation procedure—Adapted from MacKenzie et al. (2011)

2.1. Conceptualization of supply chain innovation

The resource-based view refers to all of the resources of a firm (Priem and Butler, 2001b). This theory has been widely advocated (Barney, 2001; Barney, 1991), and scholars have considered a firm's internal technology resource base as the main driver of innovation (Hoskisson et al., 1999; Hitt et al., 2001; Benner and Tripsas, 2012). Therefore, firms with scarce, valuable, and non-substitutable resources can help scholars gain a sustainable competitive advantage. By using the resource-based view, firms can obtain complementary capabilities and resources from their supply chain partners to promote innovation (Zimmermann et al., 2016; Shou et al., 2018). Although the resource-based view states that firms need to develop capabilities to gain a competitive advantage and overcome difficulties, capabilities are not clearly delineated in changing environments. In addition, there is no clear explanation as to why and how firms gain a competitive advantage in an uncertain environment.

Dynamic capabilities are defined as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al., 1997, p. 516). The dynamic capabilities view, based on Schumpeter's (1934) innovation-based competition, refers to a firm's ability to integrate, build, and reconfigure its knowledge and resources to cope with environmental uncertainty (Teece et al., 2007; O'Reilly and Tushman, 2008). Anacona et al. (2001, p. 658) further explained that dynamic capabilities "are rooted in the streams of innovation—in simultaneously exploiting and exploring." Previous studies have shown that the dynamic capabilities view can be viewed as an extension of the resource-based view (Wernerfelt, 1984; Barney, 1991). The dynamic capabilities view fills the gap of the resource-based view by organizing appropriate capabilities and resources to deal with situation-specific changes (Eisenhardt and Martin, 2000), taking into account contingency characteristics. To succeed in the global market, firms must be able to simultaneously create variations through exploratory innovation and to explore current resources and technologies to ensure efficiency (March, 1991; Teece et al., 1997; Yalcinkaya et al., 2007).

According to Eisenhardt and Martin (2000), dynamic capabilities are strategic and organizational routines that enable firms to reach new resource configurations to create and adapt to market changes. Product development routines are an example of dynamic capabilities used in the literature (Eisenhardt and Martin, 2000; Wheeler, 2002). Bello et al. (2004) defined supply chain innovation as a combination of technology and information technology development, combined with new marketing and logistics procedures to improve service effectiveness, revenue, joint profits, and operational efficiency. According to this definition and the dynamic capabilities view, supply chain innovation consists of three main innovation activities: marketing-oriented innovation activities (MOIA), technological-development-oriented innovation activities (TDOIA), and logistics-oriented innovation activities (LOIA). A conceptual definition of supply chain innovation was evaluated by carrying out a content analysis of the supply chain innovation literature. It included the application of techniques to concisely describe and systematically analyze the content of the literature. Content analysis was used to support the current theory regarding the definition of supply chain innovation sub-constructs, i.e. the three supply chain innovation sub-processes in Bello et al. (2004). In addition, it was applied to expand the theory by exposing other vital activities of supply chain innovation.

Given the diversity of definitional choices accessible to researchers, it is necessary to interpret and explain the point of view of the operationalization of definitions into measures. Based on different perspectives on the subject, this research focused on three typical views (see Appendix A) applied by theorists to define the supply chain innovation concept: the demographic perspective, the organizational action perspective, and the outcome perspective. Templeton et al. (2002) examined four arguments in favor of centralizing operationalization efforts from the perspective of social action, which I borrowed for my organizational action perspective: 1) it accesses active levels of analysis in supply chain innovation; 2) it provides the means of evaluation used by members of the organization to formulate supply chain innovations; 3) it has the greatest potential for usefulness in supply chain innovation research; and 4) it currently has a cumulative tradition of acceptance in the field. All of these justifications are intended to facilitate managerial practices in supply chain innovation.

The ontological specification process (Templeton and Snyder, 1997) was used in the content analysis of the literature review in this study. It consisted of four steps: 1) select the theme; 2) designate concepts for the entire construct; 3) transmit to a reusable method; and 4) apply concepts to labeling origin. I conceptualized the supply chain innovation construct as follows:

Supply chain innovation refers to a set of actions (marketing-oriented innovation activities (MOIA), technological-development-oriented innovation activities (TDOIA), and logistics-oriented innovation activities (LOIA)) within the firm that unintentionally and intentionally influence ~~positive~~ supply chain changes.

The literature review (as mentioned in section 2) provided significant support for the supply chain innovation components described in the taxonomy of Bello et al. (2004), resulting in a definition similar to that of Bello et al. (2004). As a result, a definition of the organizational action perspective of supply chain innovation was provided, but not its hypothetical links. This definition described supply chain innovation as an ongoing process and an organizational-level construct.

2.2. Operationalization of supply chain innovation

2.2.1. Developing a framework for supply chain innovation

The aim of this study was to identify all innovation activities that make up supply chain innovation and lead to higher supply chain performance. The literature has recognized that more supply chain innovation is needed for firms to develop better supply chain performance with their supply chain partners (Roy et al., 2004; Modi and Mabert, 2010; Henke and Zhang, 2010). However, what constitutes supply chain innovations and the construct structure have not been clearly defined. As mentioned in sub-section 3.1, there are three categories of innovation activities: (1) MOIA, (2) TDOIA, and (3) LOIA. These three categories include other areas of innovation activities. As a result, my proposed taxonomy was built on a reorganization and integration of suggestions from various studies of innovation activities of supply chain professionals, shown on the right side in Table 5. As previously mentioned, different labeling, coverage, categories, and frameworks have been proposed in different studies, listed on the left side in Table 5. However, the literature review revealed a research gap, with no study testing all components of MOIA, TDOIA, and LOIA, as illustrated in Table 5.

Table 5. Proposed taxonomy of supply chain innovation and review of studies on the innovation activities of firms

Author	Marketing oriented innovation activities (MOIA)			Technological-development oriented innovation activities (TDOIA)			Logistics oriented innovation activities (LOIA)		
	Customer orientation	Market knowledge acquisition	Product innovation	Information management	Innovation orientation	IT Infrastructure flexibility	Logistics flexibility	Logistics process innovation	Logistics social responsibility
Allred et al. (2011)	Developing customer-fulfillment process								
Bharadwaj (2000)						Flowing information among partners creating values			
Bhatt et al., 2010)						Business values created by information flow between partners			
Broadbent et al. (1999)						Business process redesign			
Byrd & Turner (2001)						Information flow between partners creating business values			
Carter & Jennings (2002)									Social responsible logistics management
Chen et al. (2011)					Openness to technological change			Service innovation	
Chen et al. (2013)									
Cheng et al. (2014)						Firm's IT usage resources			
Chen & Pauraj (2004)	Customer focus								

Chiou et al. (2011)			Refining product design						
Claycomb et al. (2005)				Easy acquiring technical know-how				Enhancing innovations by technologies	
Cohen & Levinthal (1990)		Explorative learning							
Damanpour & Gopalakrishnan (2001)			Meeting customer anticipations						
Devaraj et al. (2007)				Managing availability of relevant information					
Dunxan (1995)						Creating competitive-ness			
Flint et al. (2005)								Customer value-oriented process	
Flint et al. (2008)								Influencing performance	
Gebauer (2011)								Attaining organizational goals	
Golgeci & Ponomarov (2013)					Affecting innovation				
Hurley and Hult (1998)					Development implementation & adoption				
Jayaram and Pathak (2013)		Knowledge integration influencing development							
Jean et al. (2012)	Supporting innovation	Absorbing external knowledge							

Jin et al. (2014)							Supporting interactions & creating competitive-ness		
Kache and Seuring (2017)				Big Data Analytics					
Koufteros et al. (2007)			Innovating continually & conveying quickly to markets						
Lee et al. (2011)								Involving various stakeholders	
Lee et al. (2014)			Meeting customer's expectations						
Li and Ye (1999)						Creating values via flowing information among partners			
Manuj et al. (2014)								Including different stakeholders	
Mejias et al. (2016)									Sustainability combined supply chain process
Melnyk et al. (2009)			Satisfying customer's demand					Satisfying demand	
Melnyk et al. (2010)							Introducing reverse logistics		
Miao et al. (2012)									Preventing environ-mental risk via investing innovation

Piecyk & Bjorklund (2015)									Measurement items
Prajogo et al. (2018)				Information technology					
Prater et al. (2001)							Firm's procurement system		
Ragu-Nathan et al. (2001)			Product innovation view						
Richey et al. (2005)							Reverse logistics		
Sanders (2008)				Using IT for exploitation & exploration					
Tanskanen et al. (2015)								Involving different stakeholders	
Vickery et al. (2003)				Leading process innovation					
Wang et al. (2016)	Understanding customers & producing value								
Wagner (2008)								External & internal search & development	
Wanger & Sutter, 2012								PDA at Holcim, RFID at DHL ESC	
Yu et al. (2017)				Exchanging information among partners			Handling information & material flow		
Zhang et al. (2002)	Improving creativity for customer's needs		Improving creativity				Responding customer needs		

Zhou et al. (2005)					Influencing innovation				
Zhou & Li (2012)		External knowledge integration							

Step One—Construct definition

According to MacKenzie et al. (2011), the first step in the survey instrument development procedure is to develop a conceptual definition of the constructs. Indeed, significant measurement errors will occur during the testing phase if there is no detailed and precise conceptualization of the focal constructs (DeVellis, 2016).

Therefore, based on the elements of innovation, MOIA, TDOIA, and LOIA, identified in previous studies, a more comprehensive taxonomy of supply chain innovation among supply chain partners was proposed, reorganizing and adopting these different elements. This taxonomy can be treated as a set of previous findings in the field, but also generates a new structure and organization of previously proposed supply chain innovation components. I tried to involve all innovation activities related to supply chain performance proposed in previous studies and limited my taxonomy to the supply chain innovation categories described in the literature. My proposed taxonomy involved nine specific areas of innovation activities grouped into three categories: MOIA, TDOIA, and LOIA. These three categories included some understanding of what other parties do and were able to communicate and work effectively and efficiently with them. Conceptual support was found in Bello et al. (2004). Therefore, in this study, MOIA represented the new marketing procedures, TDOIA included information and related technology development, and LOIA mainly covered the new logistics procedures, as specified by Bello et al. (2004). The elements of the taxonomy are illustrated in the following section.

2.2.1.1. Marketing-oriented innovation activities (MOIA)

The first dimension, MOIA, was defined as innovative marketing-related services and inspirational customer research that meets customer requirements (Desbarats, 1999; Chen and Paulraj, 2004). Desbarats (1999) also explained that marketing has the core strategic responsibility of the customer–supplier relationship. Supplier integration and collaboration play a significant role in supply chain innovation. Thus, when suppliers are not aligned with innovation, firms are unlikely to achieve supply chain innovation (Jajja et al., 2017). Firms develop their supply chain innovations upstream and internally for these purposes (Ageron et al., 2013).

MOIA included:
1) Customer orientation
2) Market knowledge acquisition
3) Product innovation

Customer orientation

Customer orientation refers to the sufficient understanding of buyers to provide them with excellent value at all times (Wang et al., 2016b). Jean et al. (2012) emphasized that customer orientation is a critical strategic orientation to support business innovation. In addition, Chen and Pauraj (2004) pointed out that the main purpose of business is to meet the needs of customers, which is also the main purpose of marketing. Customer orientation helps develop customer satisfaction processes and increases the understanding of customer expectations (Allred et al., 2011). As a result, it improves firm creativity to meet the needs of customers (Jean et al., 2012).

Market knowledge acquisition

Market knowledge acquisition refers to an external knowledge integration mechanism to capture, interpret, and deploy a firm’s knowledge base (Zhou and Li, 2012). In addition, it stimulates the absorption of important knowledge from external market sources, involving both competitors and customers (Jean et al., 2012). Market knowledge acquisition helps increase knowledge identification via explorative learning (Cohen and Levinthal, 1990), while innovative ideas are likely to arise from the impregnation of new information of foreign origin. Moreover, the integration of downstream and upstream knowledge in a supply chain occurs in different processes over time and should influence different areas of product development (Jayaram and Pathak, 2013).

Product innovation

Product innovation refers to a firm’s ability to develop new services and products to meet customer expectations (Damanpour and Gopalakrishnan, 2001). It helps capture the intention of new uses, which encourages user interaction and involvement (Ragu-Nathan et al., 2001). Firms focus on the needs of their customers and develop value-added services and better products to meet their needs (Lee et al., 2014; Melnyk et al., 2009). One example is to refine a current product design to reduce its negative environmental impact (Chiou et al., 2011). Zhang et al. (2002) further explained that product innovation positively contributes to design improvement and manufacturing flexibility. Firms need to constantly innovate and quickly bring these innovations to the market to meet customer demands for new products and beat the fast pace of technology (Koufteros et al., 2007).

2.2.1.2 Technological-development-oriented innovation activities (TDOIA)

The second dimension, TDOIA, was defined as the creation of technical skills and new knowledge that can help develop new products and/or services for customers (Lee et al., 2011). Storer et al. (2014) also highlighted that supply chain innovation often involves collaborative relationships and partnerships that can be mutually beneficial, especially with regard to the application of industry-led and industry-wide innovations, such as information systems and new technologies. In addition, Vanpoucke et al. (2009) stated that IT has a direct effect on coordination and leads to supply chain innovation. Indeed, IT has a positive influence on process innovation and has been identified as a key element of supply chain innovation (Sanders, 2005; Sanders, 2008). According to the literature, the success of supply chain networks is highly dependent on the long-term commitment of supply chain members and their ability to share risks associated with process design, joint service/product design, and supply chain innovation (Harland et al., 2003; Wakolbinger and Cruz, 2011).

I identified three areas of innovation activities in TDOIA based on the literature:
1) Information management
2) Innovation orientation
3) IT infrastructure flexibility

Information management

Information management refers to the management and availability of relevant and timely information (Devaraj et al., 2007). Prajogo et al. (2018) pointed out that a large amount of external and internal information can be captured by firms through information technology. When firms possess enough technical know-how or can access this knowledge economically or easily, they are more likely to achieve logistical and technological innovations (Claycomb et al., 2005). A good example of corporate information management application is improving information availability through big data analytics to enhance the provision, exploration, availability, assessment, and discovery of information and data (Kache and Seuring, 2017).

The application of information technology also affects coordination. Indeed, current processes can be improved incrementally throughout their operation, directly influencing operational coordination (Sanders, 2008). The literature has shown that the adoption of information technology leads to information exchange between supply chain partners, resulting in process innovation and supply chain restructuring, accompanied with the production of more customer-specific, more diverse, and less expensive products (Vickey et al., 2003; Yu et al., 2017).

Innovation orientation

Innovation orientation represents a firm's tendency to change and its openness to new things through the use of new skills, technologies, administrative systems, and resources (Chen et al., 2011). Hurley and Hult (1998) pointed out that innovation orientation is a critical factor in overcoming barriers and reinforcing a firm's capability to successfully implement or adopt new developments. According to Zhou et al. (2005), innovation orientation affects organizational innovation. Golgeci and Ponomarov (2013) further argued that innovation orientation accounts for innovation adoption and outputs. Firms achieve higher performance and competitive advantage if they have a greater capacity for innovation (Hurley and Hult, 1998).

IT infrastructure flexibility

IT infrastructure flexibility refers to a set of firm resources to provide future information technology usage and high-speed development (Cheng et al., 2014). The flow of information between supply chain partners can be accelerated to create IT infrastructure and business value (Bharadwaj, 2000; Bhatt et al., 2010; Byrd and Turner, 2001; Li and Ye, 1999). In addition to being vital to a firm's ability to use information technology competitively (Duncan, 1995), IT infrastructure flexibility allows for innovative rethinking of key business processes (Broadbent et al., 1999). Moreover, the performance of inter-organizational innovation can be enhanced by IT infrastructure flexibility between partners, through the integration of geographically separated systems and the sharing of resources (Cheng et al., 2014).

2.2.1.3. Logistics-oriented innovation activities (LOIA)

The third dimension, LOIA, was defined as logistics-related services that are useful and new to a specific target audience. Innovation improves operational efficiency (internal audience) and better serves customers (external audience; Flint et al., 2005; Grawe, 2009). Logistics provide firms with time and space utilities, guarantee the necessary amount of goods at the right time and in the right place, and reduce organizational slack, requiring a close, coordinated, and intensive information exchange between supply chain partners (Chen and Paulraj, 2004). Eschenbacher et al. (2011) further explained that supply chain innovation processes are an example of inter-organizational and distributed innovation processes (DIPs), with innovation processes coordinated by a supply chain hub and often executed by a large firm with complete control. Moreover, logistics service providers take on a new role in service supply chains through the innovative combination of generic digital manufacturing and conventional logistics services (e.g. F-18 Super Hornet; Holmstrom and Partanen, 2014). Benetton, Whirlpool, and Hewlett Packard (HP) even significantly modified their current supply chain practices as part of their disruptive supply chain innovation project (Hult et al., 2010).

I identified three areas of innovation activities in LOIA based on the literature:
1) Logistics flexibility
2) Logistics innovation process
3) Logistics social responsibility

Logistics flexibility

Resource-based logistics flexibility refers to a firm's ability to quickly respond to customer needs for service, support, and delivery (Zhang et al., 2002). Prater et al. (2001) further described it as a firm's procurement system to efficiently, quickly, and accurately adapt to different delivery and receipt requests. It involves managing information and material flows between firms and their supply chain partners (Yu et al., 2017). According to Claycomb et al. (2005), flexibility helps firms adopt innovation. Jin et al. (2014) pointed out that logistics flexibility promotes innovation in supplier interactions and leads to competitive performance. A good example is the launch of reverse logistics and marketing waste management systems to improve performance (Rickey, 2005; Melnyk et al., 2010). However, the competitive advantages formed by innovative processes and novel products disappear rapidly without the support of logistics and production (Teece, 1986).

Logistics innovation process

Logistics innovation process refers to the adoption of any logistics-related service that is new and useful to customers (Flint et al., 2005; Tanskanen et al., 2015). Studies by Lee et al. (2011), Manuj et al. (2014), and Tanskanen et al. (2015) showed that other stakeholders (such as suppliers) should be included in the logistics innovation process. In addition, Wagner (2008) pointed out that external and internal research and development are related to logistics process innovations. Flint et al. (2008) further suggested that a firm's overall performance, innovation performance, learning process, and logistics innovation process are positively correlated.

Value is generated by the design and delivery of the logistics process to meet new customer demands (Melnyk et al., 2009). This also has other organizational goals

(Gebauer, 2011). For instance, Claycomb et al. (2005) pointed out that logistics process innovations improve significantly when technologies become more routinized and are better understood. Good examples are Holcim's track-and-trace PDA and DHL ESC's RFID technology, leading to efficient and effective internal processes (Wagner and Sutter, 2012).

Logistics social responsibility

Logistics social responsibility refers to issues related to socially responsible logistics management (Carter and Jennings, 2002). Ciliberti et al. (2008) suggested that logistics social responsibility focuses on "socially responsible management of the supply chain under a cross-functional perspective" (p. 89). It is a way to combine sustainability with supply chain processes (Mejías et al., 2016). A firm's customers are exposed to increased environmental risk if suppliers apply poor environmental practices. Therefore, firms are required to invest in environmental supply chain innovation (Miao et al., 2012). Piecyk and Bjorklund (2015) suggested a number of measures for logistics social responsibility, such as safety and health, workplace diversity, environment, and employee training. Similarly, Carter and Jennings (2002) recommended that ethics and human rights be included as dimensions of logistics social responsibility.

Thus, my model proposed that firms' supply chain innovation consisted of innovation activities in three categories, MOIA, TDOIA, and LOIA, each category comprising specific components of innovation activities. MOIA included customer orientation, market knowledge acquisition, and product innovation. TDOIA included information management, innovation orientation, and IT infrastructure flexibility. Finally, LOIA included logistics flexibility, logistics innovation process, and logistics social responsibility, suggesting a third-order model for supply chain innovation.

2.2.1.4. Effects on supply chain performance

Supply chain innovation can potentially influence organizational outcomes involving social responsibility, environmental protection, economic prosperity, service effectiveness, and operational efficiency (Bello et al., 2004). Agarwal et al. (2007) further explained that supply chain performance can be improved by improving the level of services. However, no empirical study has examined the relationship between these areas of innovation activities and supply chain performance.

Roy et al. (2004) stated that supply chain innovation can be implemented by the shared processes of many firms in the supply chain network, while all innovative activities enhancing the effectiveness of a firm's supply chain are covered. As a result, the effectiveness of a firm's supply chain is improved, leading to a competitive advantage. In addition, Kroes and Ghosh (2010) suggested that a firm's supply chain performance has a positive and intuitive effect on business performance. Baum et al. (2010) further argued that when a firm innovates, its competitive advantage and profits increase compared with other firms in the industry. Thus, firms are more likely to engage in different orientations of innovation activities to achieve higher levels of supply chain innovation, positively influencing supply chain performance. In this study, the contribution of the different orientations of innovation activities to supply chain innovation was tested through their supply chain performance.

2.2.2. Development of supply chain innovation measurement instrument

Step Two—Measure development

After clearly defining the constructs of interest, the next step in the survey instrument development procedure of MacKenzie et al. (2011) is the creation of items. Using the conceptual definition of supply chain innovation above, the next stage in this research was to develop and refine an instrument. Scale development is an important step in empirical research on operations management (Menor, 2000; Stratman and Roth, 2002). In some cases, the refinement and iterative design of multi-item scales is also used to investigate the constructs. The validity of the scales depends on the implementation of reliable measures (Churchill, 2006) and the relationships between different operational concepts can only be empirically estimated using valid and reliable measurement scales. My objective was to measure the three second-order constructs discussed in Sub-section 3.2.1 by creating or locating a valid and reliable multi-item measurement scale. In addition to the definition, a list of first-order constructs describing supply chain innovation activities in firms was included in the taxonomy (see Table 5) in Sub-section 3.2.1. These items were applied to produce the original statements of the instrument, based on the literature review, with extensions in multiple areas. Below are the different steps to measure content validity throughout the survey instrument development process.

Focus group discussion

I followed Davis's (1989) approach to focus group discussion. I invited 10 participants, including 6 supply chain professionals with more than 10 years of experience in the apparel and textile industry and four researchers with expertise in innovation and supply chain management. Throughout the group discussion, I 1) received feedback on the clarity, format, and length of the draft and instructions of the initial questionnaire; 2) eliminated low ranking, inapplicable, or redundant items; 3) increased clarity by rewording certain items (i.e. face validity); and 4) allowed participants to independently rank the 64 items according to the closeness of their meaning with the underlying supply chain innovation factors by applying the nominal group technique (Stewart and Shamdasani, 2014). After the focus group discussion, the initial set of 64 items was reduced to 48 items by eliminating the low ranking, inapplicable, and redundant items. Face validity was also enhanced by rewording certain items, resulting in the inclusion of 48 items in the card sorting exercise.

Card sorting exercise

To evaluate the extent to which the 48 items tapped the 9 supply chain innovation factors and therefore supported construct validity, a card sorting exercise was conducted with the help of six judges (Hinkin, 1998; Moore and Benbasat, 1991). The initial phase of the card sorting exercise involved three supply chain professionals with more than 10 years of experience in the apparel and textile industry and three researchers with expertise in innovation and supply chain management (four male and two female, the average age being 32). None of the judges were aware of the content of my study. Each judge received a randomly sorted list of the 48 items and nine supply chain innovation factors (together with their definition) printed on 4x6 inch index cards. They were guided to individually assign each item to one of the nine factors or to an “uncertain” category if they were unsure of the best placement. The judges explained why they put cards in the “uncertain” category (if applicable) after completing the sorting process. For example, they all had difficulties with certain items because of their confusing and ambiguous wording. For instance, the item “Firms with supply chain innovation are technologically reputable” was ambiguous because it tapped other factors in the supply chain innovation framework, or the item “Firms with supply chain innovation help customers set high expectations” was too general to fit into any of my proposed nine supply chain innovation factors. As a result, I eliminated 12 items that at least 4 of the 6 judges found confusing or ambiguous, resulting in 36 items. The average “hit ratio” was 0.85 among the 9 supply chain innovation factors and the average Cohen’s kappa for good construct validity was 0.83 (Cohen, 1960).

The next phase of the card sorting exercise was to identify higher-order constructs in the construct conceptualization. Constructs with similar characteristics and a common theme should be extracted and identified at a higher level theoretically (Edwards, 2001; MacKenzie et al., 2011). According to MacKenzie et al. (2011), this step should be completed once all constructs have been defined and conceptualized, which is essential in the survey instrument development process. I reviewed the literature for each identified construct and evaluated them carefully based on their conceptual similarities. I discussed the characteristics of each construct and whether removing any of them would hinder the domain of the construct (MacKenzie et al., 2011). Four new judges, including two supply chain professionals with more than 10 years of experience in the apparel and textile industry and two researchers with expertise in innovation and supply chain management, helped identify the conceptual similarities between the constructs. None of the judges were aware of the content of my study. Each judge received nine cards, each with a construct name and its definition determined in the previous step of the survey instrument development process. The card sorting results were then discussed and compared with the higher-order constructs determined by the authors. As a result, three second-order constructs were determined to represent the aggregations of the nine first-order constructs, while a third-order construct was identified to represent the aggregations of the three second-order constructs (Rindskopf and Rose, 1988; Wetzels et al., 2009).

Step Three—Content validity assessment

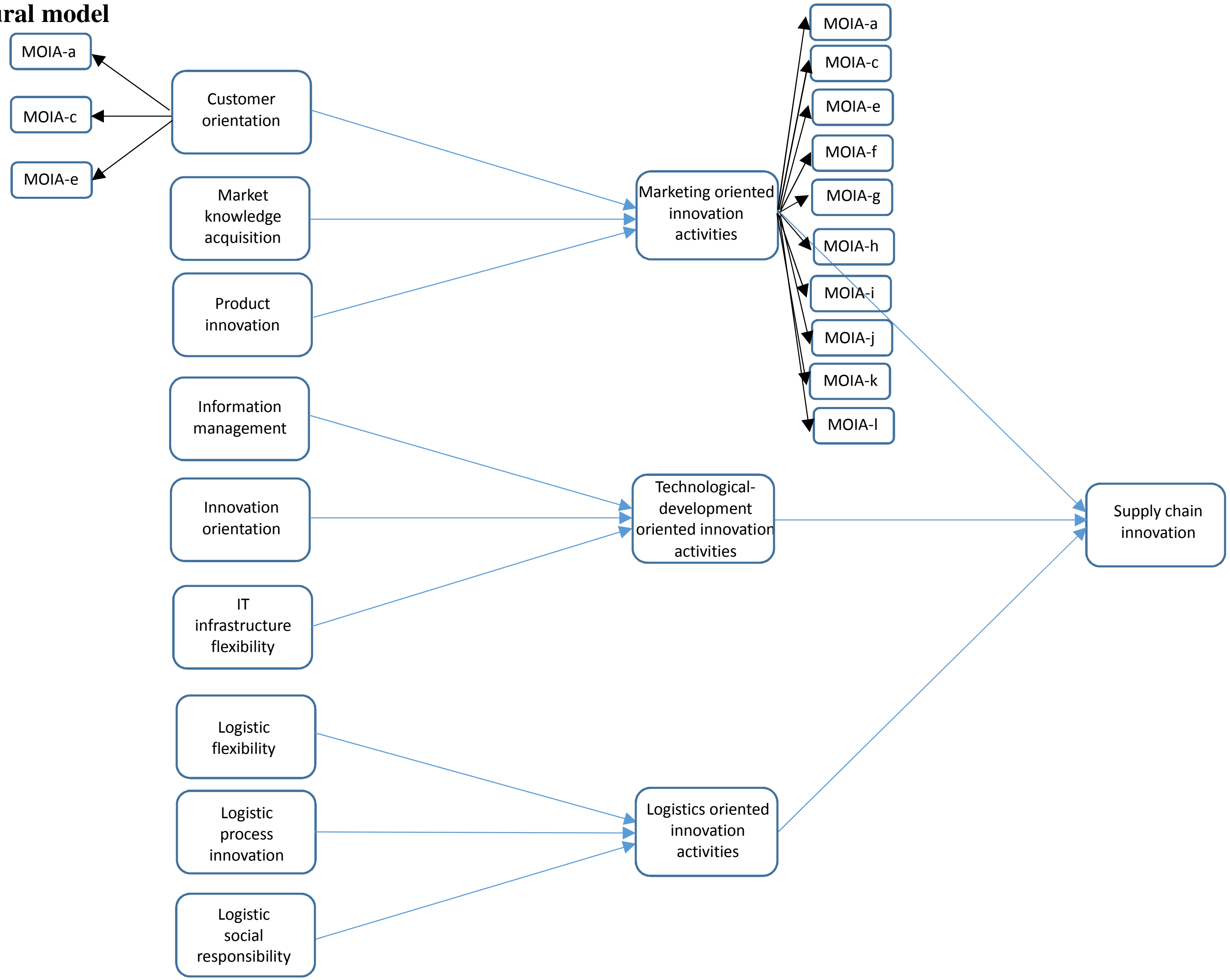
Content validity refers to the degree to which a measurement scale represents all domains of a construct (Straub et al., 2004; Lewis et al., 2005; MacKenzie et al., 2011). According to MacKenzie et al. (2011), researchers need to review two important areas when evaluating the content validity of a measurement scale: 1) Are the items as a set collectively representative of the entire content domain of the construct? 2) Is an individual item representative of a specific area of the content domain of the construct? However, in the supply chain innovation field, no previous study has discussed the development of survey instruments to operationalize this construct (Wong and Ngai, 2019).

The original draft of the questionnaire included 36 questions. As previously mentioned, each of them derived from the first-order constructs of the taxonomy representing specific aspects of supply chain innovation (see Table 5). Appendix F presents the measurement items and their supporting literature. Questions were asked about the participants' perceptions of the presence of supply chain innovation practices in their firm. The response categories of the measurement scale were as follows: 1 = Strongly disagree, 2 = Disagree, 3 = Slightly disagree, 4 = Neutral, 5 = Slightly agree, 6 = Agree, and 7 = Strongly agree. In addition, the initial questionnaire collected demographic variables, such as job function, work experience, education level (individual data), and firm (organizational data).

Step Four—Measurement model specification

The next step in the survey instrument development process of MacKenzie et al. (2011) is the specification of the measurement model. In this study, this step focused on the relationships between first-order constructs, second-order constructs, and the third-order construct. In addition, it specified the links between indicators and constructs. Given the multidimensionality of the supply chain innovation construct, supply chain innovation was modeled as a higher-order construct of my survey instrument in a reflective-formative way (see Figure 3; Ringle et al., 2012). The model assessed in this study was a third-order construct model, with formative measures for second- and third-order constructs and reflective measures for first-order constructs. At the first-order construct level, I modeled the measurement items as reflective of their areas of innovation activities as they were strongly correlated with each other. This provided evidence that they were representative of the underlying constructs (Gefen et al., 2000). In addition, higher-order constructs were the sum or were formed by lower level innovation activity areas.

Figure 3. Structural model



Step Five—Scale pretest

The pretest of the instrument is the next step in the survey instrument development process of MacKenzie et al. (2011) after specifying the measurement model. Based on grounded theory (Glaser and Strauss, 1967), an exploratory qualitative research was conducted by carrying out a pretest on the questionnaire. First, I consulted three academic professionals from a large university in Hong Kong to verify the validity of the content, format, appearance, and organization of the initial questionnaire. Then, I consulted two shipping managers, three sales managers, two IT managers, two production managers, and one director with relevant knowledge of the apparel and textile industry. The participants were invited to comment on the instrument in the following areas to improve questionnaire design: ease and speed of completion, terminology, understandability, content, and format. In addition, they were asked to identify any questions they felt should be deleted or added to the questionnaire. They were also invited to make recommendations for improvement.

Step Six—Scale purification

MacKenzie et al. (2011) recommended refining and purifying the survey instrument using pretest data. The measurement properties of the survey instrument were evaluated using statistical tests with pretest data, such as evaluating the reliability and validity of individual indicators and removing weak indicators.

First, a pilot test was conducted to evaluate and purify the instrument after receiving the pretest revisions. The revised questionnaire and a cover letter were sent by e-mail to 15 supply chain professionals in the apparel and textile industry. The cover letter explained the purpose of my research, it also invited the respondents to complete the questionnaire and make suggestions for improvement. This step used postal services for data collection, while the questionnaire was modified based on the feedback.

Afterward, the content validity of the survey was evaluated quantitatively by carrying out a variant of the procedure (Lawshe, 1975). This technique used a content evaluation panel composed of supply chain professionals with knowledge of the supply chain innovation concept measured. The content evaluation panel consisted of 15 individuals (different from the pilot test participants) from the apparel and textile industry. A copy of the revised measurement scale was sent to the panelists and they were asked to rate each supply chain innovation activity on a 3-point scale: Essential = 3, Important (but not essential) = 2, and Not relevant = 1. After receiving their feedback, the content validity ratio (CVR) was computed for every measurement item based on the data by applying the following formula:

$$CVR = (n - N/2)/\ (N/2),$$

where N is the number of respondents and *n* is the frequency count of the number of panelists rating an item as Important (but not essential) = 2 or Essential = 3.

Compared with Lawshe (1975) who only used the "Essential = 3" response category to calculate the content validity ratio, I applied a less stringent standard (Lewis et al., 1995) in this study, i.e. "Essential = 3" and "Important (but not essential) = 2" response categories were used as both were positive indicators of the items corresponding to supply chain innovation. The respondents who did not rate a given item were not included in the calculation of the content validity ratio for this item.

The content validity ratio for each item was tested for its statistical significance at the 0.05 level (Lawshe, 1975). Statistical significance indicated that over 85% of panelists rated a measurement item as either "Important" or "Essential." This majority vote confirmed the content validity of this item in accordance with Lawshe (1975). As a result, 31 items out of 36 were considered significantly valid and remained in the final version of the questionnaire. Five statistically non-significant items (MIA-b, MIA-d, TDLI-i, LIA-e, and LIA-f) were removed from the study. Appendix G presents the final version of the proposed measurement items for the supply chain innovation construct.

2.2.3. Data collection

Step Seven—New sample data collection

The data should be re-collected from a new sample once the scale has been refined, pretested, and the problematic indicators eliminated to re-examine the purified scale. This is an important step in the survey instrument development process of MacKenzie et al. (2011). I conducted an online panel survey for data collection in the apparel and textile industry to validate the conceptual framework for measuring supply chain innovation.

2.2.3.1. Selection of apparel and textile firms in China

I collected my survey data exclusively from firms in the apparel and textile industry in China. Several reasons motivated us to do so. According to Wong and Ngai (2019), the majority of previous research on supply chain innovation has focused on developed countries, such as North America and Europe, while this study was one of the few attempts to explore this construct in Southeast Asia. China is the world's largest manufacturer and exporter of apparel and textiles, due in part to the rapid growth of its domestic market (Fong and Dodes, 2006). Most apparel and textile firms have relocated their production operations to China in recent decades to reduce their production costs, making China the world's leading apparel and textile supply center (Moon et al., 2009). According to the World Trade Organization (2016), China's exports amounted to US$106 billion for textiles and US$161 billion for clothing, indicating the enormous market size.

2.2.3.2 Apparel and textile supply chain levels

My literature review in sub-section 2.2. showed that previous studies in supply chain innovation have mainly focused on upstream suppliers (62.6%), while some studies (8.4%) have focused on downstream customers or both upstream suppliers and downstream customers (29%). Gao et al. (2017) explained that supply chain innovation focuses primarily on manufacturing because of its core function of value creation. Indeed, the apparel and textile supply chain is multidimensional (Chan et al., 2017), complex (Jones, 2002), and lengthy (Bruce and Daly, 2011). It is customer-driven, with final customers' demands determining product demands (garments, yarns, and fibers; Moon et al., 2012). Chan et al. (2017) proposed that the garment supply chain includes a trading sector (wholesalers, agents, and retailers) and a production sector (accessories, textiles, garments, and fibers), while the addition of the agency to the supply chain is the outcome of the growing globalization of the industry (Popp, 2000).

My aim was to investigate supply chain innovation from a holistic perspective, therefore my data were collected from firm managers in different parts of the supply chain (Skippari et al., 2017). The five main levels of the supply chain structure are described in Figure 4. These levels or categories are fabric and textile producers, apparel manufacturers, apparel agencies, brand owners, and retailers. I further identified fabric and textile producers and apparel manufacturers as upstream suppliers, while apparel agencies, brand owners, and retailers were downstream customers. This wide variety in the sample allowed use to explore different patterns and generalize the results in the industry.

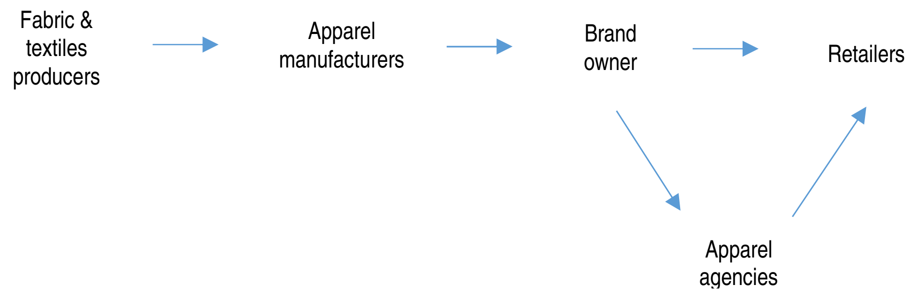


Figure 4. Five main levels in apparel and textile supply chain

2.2.3.3. Survey administration

I used QQSurvey (Quality and Quick) China online research for data collection. A recent study showed that 55.8% of Chinese people use the Internet (CNNIC, 2018). As a result, QQSurvey was selected for its active and large online survey community in China (Lyu et al., 2017; Lyu et al., 2018). Nearly 5.1 million panelists participated in the website by 2019 (www.1diaocha.com). Compared with traditional online sampling, QQSurvey has several important characteristics, such as (1) control of recruitment and selection of participants; (2) complete anonymity of the sample; (3) motivation to visit the recruitment location; and (4) incentive disbursement through built-in payment systems. It also makes it possible to obtain rapidly and inexpensively large data of great demographic diversity and high quality.

The original measurement scale was developed in English as it was adapted from the literature in English. A professor in the field of operations management in China helped translate the scale into Chinese to ensure the reliability of the questionnaire (Zhao et al., 2011a, 2011b). A number of questions were reworded to make them relevant to China's operations management practices and to enhance the accuracy of translation. The questionnaire was then back-translated into English by a professor in the field of operations management in Hong Kong, as all data collection analysis procedures were conducted in Chinese. Then, an associate professor in the field of operations management in China helped verify the translation against the original English version for accuracy. Therefore, the bilingual version of the questionnaire was used in Hong Kong and a Chinese version in mainland China (Zhao et al., 2008). After completing the translation process, the questionnaire was linked to the QQSurvey website, with the survey objective and the recruitment requirements of the participants described at the beginning of the survey. I emphasized that (1) the study only focused on the future development of the apparel and textile industry, so that only solvers with supply chain-related experience in the industry were eligible to participate in the survey; and (2) the data collected in the questionnaire would only be used for academic purposes and would only be accessible to the parties involved in the research. In addition, the questionnaire was set on a "no name basis" to comply with the requirements of "Privacy" and "Confidentiality." Moreover, as supply chain innovation might be new to some interviewees, a cover page clearly explained what supply chain innovation is and how and why it can be applied in the supply chain, to ensure that each participant had an understanding and basic knowledge of supply chain innovation. After linking the questionnaire to the website, QQSurvey sent invitation alerts to 1,100 randomly selected participants with supply chain-related experience in the apparel and textile industry to recruit the participants. Two hundred and fifty responses were obtained through these two channels, with a response rate of 22.7%. There were no missing data in the collected questionnaires as the web page did not allow it. After eliminating the systematic variance due to social bias in the respondents' responses (Boyer and Pagell, 2000), 221 usable responses were obtained.

The valid response rate was 20.1%, reaching the recommended minimum response rate of 20% for empirical studies (Malhotra and Grover, 1998).

As China is vast with different levels of economic growth across regions (Zhao et al., 2008; Huo et al., 2014; Chavez et al., 2017), I strategically chose 10 industrial cities to provide economic and geographic diversity to the sample pool. Shanghai (located in the Yangtze River Delta) and Guangzhou (located in the Pearl River Delta) have the highest and second highest GDP per capita in China, and both have the highest degree of economic reform and marketization (Zhao et al., 2006; Zhao et al., 2008). In addition, several industrial agglomerations of apparel and textile sub-industries are located in Zhejiang Province, for example, warp knitting firms in Haining, tie manufacturers in Shengzhou, women's clothing manufacturers in Hangzhou, chemical fiber fabric manufacturers and chemical fiber manufacturers in Shaoxing (Lin et al., 2011). I also chose Tianjin, Chongqing, and Hong Kong in my study because Tianjin is a large city located in the Bohai Sea Economic Development Zone, while Chongqing is a traditional industrial city representing an early economic development stage. They are located in northern China and northwestern inland China, respectively. In addition, Hong Kong manufacturers operate differently from other cities in China, with their factories located in China and their headquarters in Hong Kong (Huo et al., 2014). I considered these cities to be representative of the different areas of China in the apparel and textile industry (Huo et al., 2014).

Moreover, the population frame of my sample was defined as supply chain professionals in the apparel and textile industry in China. The survey data were collected from top management teams (chief executive officers and chief financial officers). In addition, Skippari et al. (2017) pointed out that supply chain innovation typically takes place at the operational level and the top management level. Therefore, my data were collected from middle or frontline managers who work in different functional areas of their firm and have corresponding knowledge of the apparel and textile industry, such as material sourcing (fabric managers, trim and accessory managers), product development (product development managers), procurement, production, and operations (procurement managers, production managers, brand managers), information technology (IT managers), logistics (logistics (or shipping) managers), and sales and marketing managers. As some firms may register multiple names for business purposes, QQSurvey verified each firm's e-mail address and principal name to ensure that only one participant was selected from each sample firm to avoid overlapping. The participants were asked to specify their tenure and position in their firm and in the industry. My purpose was to exclude responses from newly hired staff and from junior staff. All respondents worked for more than five years in the industry and in their firm, highlighting their role in the success, maintenance, and development of their company. As there are comparatively fewer resources for younger or smaller firms, they may have more difficulty exploiting opportunities and performance (Stam and Elfring, 2008; Li et al., 2011). Therefore, my study also included firm size and firm age as control variables.

2.2.4. Results

Step Eight—Assessing scale validity

According to MacKenzie et al. (2011), the main objective of this step is to evaluate if the items used to analyze the focal construct 1) have discriminant validity, i.e. distinguishable from indicators of other constructs; 2) include the multidimensional nature of the construct; 3) accurately represent the underlying construct; and 4) have nomological validity, i.e. relate to the measures of other constructs in the theoretical framework. The supply chain innovation model was evaluated using the partial least squares method, a component-based approach particularly suited to smaller datasets. SmartPLS version 3.2.8 was applied to test the higher-order model using the hierarchical component model (Wold, 1982; Lohmoller, 2013).

2.2.4.1 Evaluation of measurement properties

In accordance with the procedures depicted in Agarwal and Karahanna (2000), I used a confirmatory factor analysis to evaluate the item loadings, reliability, and discriminant validity of the reflective constructs. To represent the latent variable, the reflective items should be unidimensional and correlated with each other. Hair et al. (2014) highlighted that the item loadings should be at least 0.70, so that more than half of the variance is explained by the constructs. The results for the 31 items revealed that the loadings of 2 items were below the threshold value of 0.70 (TDLI-d = 0.659 and LIA-l = 0.667). Therefore, I excluded these items from the analysis. Table 7 shows the remaining 29 items and their significant loadings above 0.70.

Table 7. Loadings of the indicator variables

Construct	Measurement items	Loadings	Mean	Standard deviation	Significant level
Logistic flexibility	LOIA-a	0.823	5.670	1.020	p<0.05
	LOIA-b	0.704	5.620	1.090	p<0.05
	LOIA-c	0.778	5.590	1.100	p<0.05
Logistic innovation process	LOIA-d	0.748	5.740	1.090	p<0.05
	LOIA-g	0.770	5.680	1.058	p<0.05
	LOIA-h	0.779	5.620	1.190	p<0.05
Logistic social responsibility	LOIA-i	0.774	5.590	1.100	p<0.05
	LOIA-j	0.822	5.740	1.110	p<0.05
	LOIA-k	0.768	5.730	1.140	p<0.05
Customer orientation	MOIA-a	0.819	5.550	1.090	p<0.05
	MOIA-c	0.801	5.570	1.160	p<0.05
	MOIA-e	0.768	5.590	1.100	p<0.05
Market knowledge acquisition	MOIA-f	0.777	5.670	1.110	p<0.05
	MOIA-g	0.734	5.760	0.990	p<0.05
	MOIA-h	0.703	5.700	1.110	p<0.05
	MOIA-i	0.699	5.540	1.160	p<0.05
Product innovation	MOIA-j	0.803	5.670	1.070	p<0.05
	MOIA-k	0.776	5.590	1.100	p<0.05
	MOIA-l	0.745	5.780	1.030	p<0.05
Information management	TDOIA-a	0.828	5.780	1.010	p<0.05
	TDOIA-b	0.801	5.640	1.120	p<0.05
	TDOIA-c	0.730	5.670	1.090	p<0.05
Innovation orientation	TDOIA-e	0.777	5.760	1.060	p<0.05
	TDOIA-f	0.741	5.640	1.040	p<0.05
	TDOIA-g	0.724	5.690	1.130	p<0.05
	TDOIA-h	0.702	5.810	1.100	p<0.05
IT infrastructure flexibility	TDOIA-j	0.817	5.700	1.040	p<0.05
	TDOIA-k	0.799	5.740	1.070	p<0.05
	TDOIA-l	0.763	5.760	1.110	p<0.05

Table 8 presents the results of the confirmatory factor analysis. First, all indicators had higher loadings on their own constructs compared with the other constructs of the model. Second, discriminant validity was confirmed as the constructs had more variance with their own measures than with the other constructs of the model, and the percentage of variance captured by a construct was represented by its AVE (average variance extracted; Bassellier and Benbasat, 2004). According to Chin (1998), the square root of the AVE for each construct should to be larger relative to its correlation with other factors. Table 9 shows that all constructs fulfilled this requirement. Finally, Hair et al. (1998) stated that the minimum composite reliability value should be 0.70. Table 9 shows that all constructs fulfilled this requirement. Therefore, all constructs had adequate discriminant validity and sufficient reliability (Gefen et al., 2000; Liang et al., 2007).

Table 8. Factor analysis

Construct	Measurement items	Logistics flexibility	Logistics innovation process	Logistics social responsibility	Customer orientation	Market knowledge acquisition	Product innovation	Supply Chain Performance	Information management	Innovation orientation	IT infrastructure flexibility
Logistic flexibility	LOIA-a	0.823	0.433	0.484	0.468	0.455	0.492	0.320	0.493	0.496	0.561
	LOIA-b	0.704	0.338	0.332	0.340	0.305	0.428	0.281	0.407	0.338	0.368
	LOIA-c	0.778	0.426	0.378	0.403	0.461	0.403	0.310	0.449	0.459	0.484
Logistic innovation process	LOIA-d	0.400	0.748	0.361	0.461	0.437	0.379	0.242	0.370	0.460	0.463
	LOIA-g	0.368	0.770	0.343	0.343	0.376	0.412	0.214	0.403	0.437	0.443
	LOIA-h	0.428	0.779	0.370	0.336	0.380	0.413	0.234	0.421	0.466	0.391
Logistic social responsibility	LOIA-i	0.427	0.327	0.774	0.469	0.378	0.417	0.385	0.306	0.439	0.394
	LOIA-j	0.407	0.386	0.822	0.608	0.557	0.510	0.448	0.465	0.541	0.448
	LOIA-k	0.402	0.391	0.768	0.471	0.472	0.511	0.256	0.377	0.479	0.348
Customer orientation	MOIA-a	0.472	0.446	0.570	0.819	0.530	0.456	0.407	0.513	0.548	0.477
	MOIA-c	0.410	0.401	0.487	0.801	0.526	0.520	0.368	0.382	0.513	0.496
	MOIA-e	0.377	0.332	0.512	0.768	0.443	0.431	0.352	0.431	0.462	0.437
Market knowledge acquisition	MOIA-f	0.487	0.437	0.551	0.539	0.777	0.533	0.255	0.487	0.593	0.456
	MOIA-g	0.434	0.430	0.448	0.522	0.734	0.475	0.279	0.473	0.524	0.487
	MOIA-h	0.342	0.343	0.322	0.368	0.703	0.440	0.190	0.358	0.404	0.328
	MOIA-i	0.268	0.285	0.397	0.385	0.699	0.393	0.151	0.416	0.421	0.354
Product innovation	MOIA-j	0.463	0.387	0.510	0.551	0.513	0.803	0.352	0.492	0.581	0.485
	MOIA-k	0.489	0.469	0.476	0.433	0.496	0.776	0.276	0.572	0.483	0.557
	MOIA-l	0.377	0.363	0.425	0.378	0.468	0.745	0.179	0.526	0.406	0.284
Information management	TDOIA-a	0.523	0.419	0.476	0.538	0.520	0.587	0.236	0.828	0.590	0.432
	TDOIA-b	0.430	0.413	0.396	0.410	0.438	0.538	0.177	0.801	0.472	0.473
	TDOIA-c	0.426	0.398	0.254	0.344	0.456	0.477	0.109	0.730	0.399	0.325
Innovation orientation	TDOIA-e	0.493	0.485	0.481	0.554	0.519	0.490	0.369	0.593	0.777	0.467
	TDOIA-f	0.378	0.413	0.484	0.463	0.495	0.482	0.350	0.479	0.741	0.469
	TDOIA-g	0.342	0.438	0.429	0.434	0.494	0.456	0.252	0.392	0.724	0.417
	TDOIA-h	0.445	0.410	0.422	0.420	0.476	0.450	0.290	0.356	0.702	0.500
	TDOIA-j	0.561	0.507	0.454	0.542	0.489	0.503	0.390	0.455	0.571	0.817
	TDOIA-k	0.497	0.459	0.399	0.439	0.430	0.493	0.400	0.444	0.500	0.799

IT infrastructure flexibility	TDOIA-1	0.400	0.362	0.336	0.418	0.416	0.362	0.210	0.341	0.411	0.763

Table 9. Construct reliability and correlation matrix

Construct	# items	Cron .α	Mean	SD	Composite reliability	AVE	Customer orientation	IT infrastructure flexibility	Information management	Innovation orientation	Logistics flexibility	Logistics innovation process	Logistics social responsibility	Market knowledge acquisition	Product innovation	Supply Chain Performance
Customer orientation	3	0.711	5.725	1.087	0.838	0.634	0.796									
IT infrastructure flexibility	3	0.706	5.733	1.074	0.836	0.629	0.592	0.793								
Information management	3	0.694	5.697	1.078	0.830	0.620	0.555	0.525	0.787							
Innovation orientation	4	0.719	5.725	1.087	0.826	0.542	0.639	0.628	0.626	0.736						
Logistics flexibility	3	0.657	5.627	1.072	0.813	0.593	0.528	0.619	0.586	0.565	0.770					
Logistics innovation process	3	0.648	5.680	1.124	0.810	0.587	0.496	0.563	0.520	0.594	0.521	0.766				
Logistics social responsibility	3	0.695	5.687	1.121	0.831	0.622	0.656	0.504	0.487	0.618	0.522	0.468	0.789			
Market knowledge acquisition	4	0.706	5.668	1.094	0.819	0.531	0.630	0.563	0.599	0.674	0.534	0.519	0.597	0.729		
Product innovation	3	0.668	5.680	1.070	0.818	0.601	0.591	0.576	0.681	0.638	0.573	0.524	0.609	0.636	0.775	
Supply Chain Performance	4	0.760	5.678	1.046	0.847	0.582	0.473	0.428	0.227	0.431	0.395	0.300	0.462	0.305	0.353	0.763

***Diagonal elements in shaded color are the square roots of average variance extracted**

The results of the measurement model confirmed the reliability and validity of the 29-item instrument for supply chain innovation and the 4-item scale for supply chain performance. Therefore, this conceptualization of supply chain innovation could be used to assess the contribution of supply chain innovation to supply chain performance. In addition, non-response bias was not significant, with all responses collected within four consecutive days and no reminder used (Hoehle and Venkatesh, 2015).

2.2.4.2. Common method variance

According to Chang et al. (2010), common method variance is a concern for many researchers. Therefore, I took this concern into account when developing my research instrument. Podsakoff et al. (2003) stated that common method variance is the "variance that is attributable to the measurement method rather than to the construct interest" (p. 879). I followed the remedial approaches recommended by these authors to reduce this problem. For instance, I adopted scale items for the supply chain performance construct that were well established in the literature, divided the questions into groups based on their content, guaranteed anonymity in my survey process, and used different response formats for different research constructs.

According to Ganster et al. (1983), social desirability will affect the validity of a participant's responses to performance-related questions because of his/her position in the firm. In addition, Vickery et al. (1997) argued that the sample size for subjective values is usually larger than that of actual objective values because of the confidentiality of sensitive information, such as performance data. Firstly, I collected their firm's subjective performance values relative to competitors, resulting in 4 ratings. In order to test the validity of the self-reported performance measures, two marker variable items asked the respondents to evaluate their firm's *rates of sales in new products* and *number of new products launched* relative to their competitors in the industry (Malhotra et al., 2006). All of the respondents (i.e. 221) gave a subjective performance values relative to competitors for these two marker variable items, while 184 respondents provided actual objective performance values relative to competitors. The response percentage of the actual ratings was 83.26% (184 out of 221), which is acceptable in this study to run a rolling correlation between the subjective ratings and actual values provided, along with sample sizes and p values. The means and correlations of the correlation analysis are presented in Table 10. In Part 2 of Table 10, p values are provided to indicate the statistical significance of the results. The results showed the following correlations: 0.201 for *rates of sales in new products* ($p = 0.05$) and 0.319 for *number of new products launched* ($p = 0.05$). Overall, all correlations between actual objective performance values relative to competitors and subjective performance values relative to competitors were significant at the 0.01 level. Therefore, the participants were considered reliable indicators because the actual values were strongly correlated with the subjective scale ratings of the respondents who provided both.

Table 10. Means and correlations of supply chain performance measures

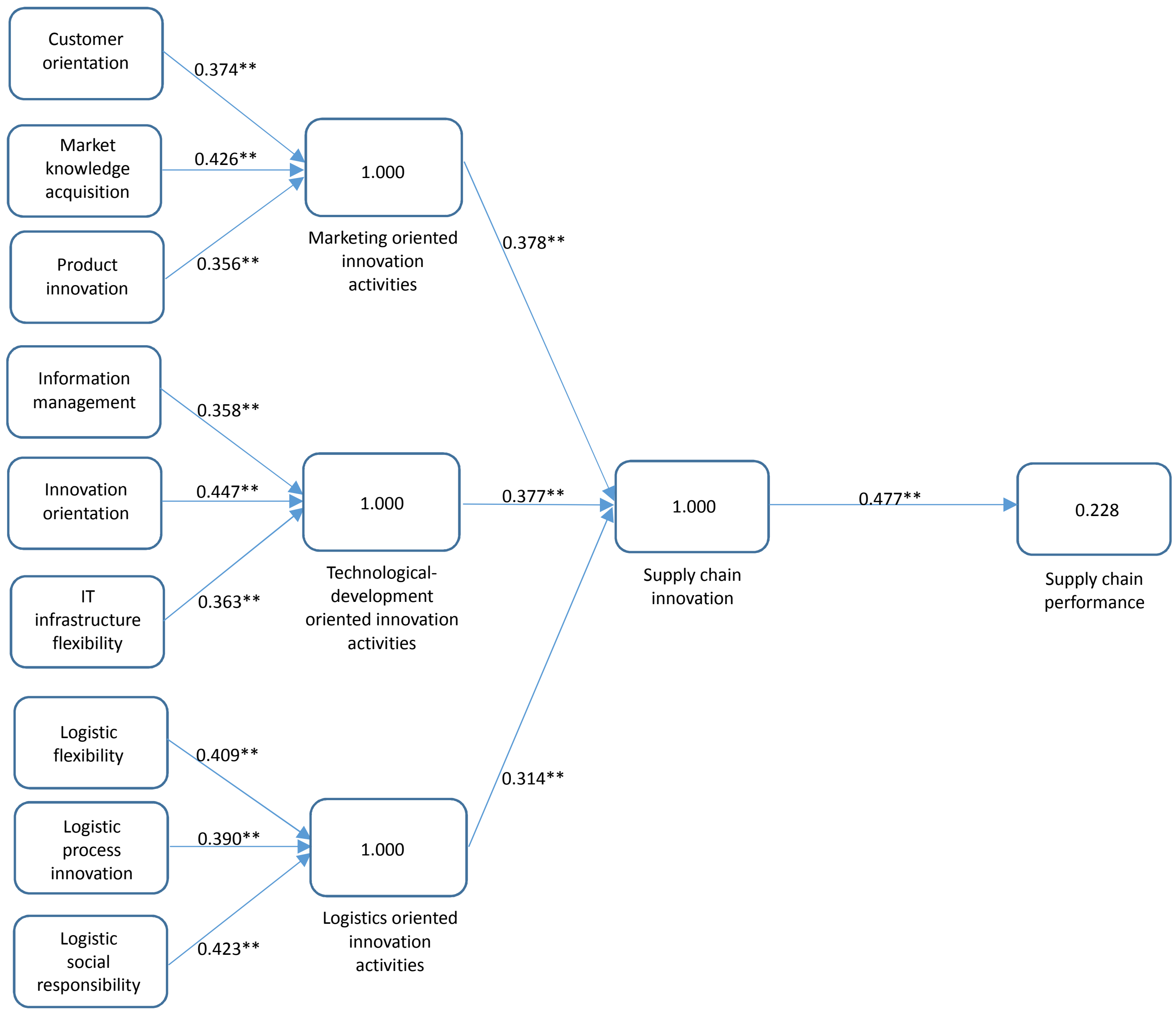
	Measures of supply chain performance	
	Rates of sales in new products	**Number of new products launched**
Part 1 Means		
Versus competitors (n = 221)	5.69	5.68
Actual (%) (n = 184)	5.49	5.40
Part 2. Correlations (p-value)		
Versus competitors and actual (%) (n = 184)	0.201 (0.05)	0.373 (0.05)

2.2.4.3. Test of the structural model

Step Nine—Cross validation

According to the survey instrument development process of MacKenzie et al. (2011), the next step is to cross-validate the results to evaluate the stability of the scale. Following Chin (1998), standard errors and *t*-statistics were obtained using a bootstrapping procedure. Statistical tests were evaluated at the 0.05 level of significance by a one-tailed *t*-test with unidirectional hypotheses. The structural model test was designed to evaluate (1) the supply chain innovation structure and (2) the influence of supply chain innovation on a firm's supply chain performance. The hypothesized supply chain innovation structure was a third-order construct (supply chain innovation) formed by three factors (MOIA, TDOIA, and LOIA). MOIA included three factors (customer orientation, market knowledge acquisition, and product innovation), TDOIA was composed of three factors (information management, innovation orientation, and IT infrastructure flexibility), and LOIA consisted of three factors (logistics flexibility, logistics process innovation, and logistics social responsibility). As mentioned in Sub-section 5.1., a hierarchical component model was used to estimate the higher-order constructs of the model, consisting of indicators of lower-order constructs. According to Chin et al. (1996), this approach with indicator duplication allows the model to be evaluated using the standard partial least squares algorithm. This makes it possible to test the relative path weights of factors constituting higher-order constructs. The results of the supply chain innovation structure indicated that the three dimensions of supply chain innovation had significant paths (shown in Figure 5). The comparatively higher path coefficients for MOIA and TDOIA indicated the greater importance of these two categories compared with LOIA in supply chain innovation. The correlation between LOIA and MOIA was 0.793, that between LOIA and TDOIA was 0.805, and that between MOIA and TDOIA was 0.832, confirming their association in supply chain innovation. The three first-order constructs of MOIA also had significant paths. Their relative significance in ascending order was (1) product innovation, (2) customer orientation, and (3) market knowledge acquisition. Similarly, the three first-order constructs of TDOIA had significant paths. Their relative significance in ascending order was (1) information management, (2) IT infrastructure flexibility, and (3) innovation orientation. Finally, the three first-order constructs of LOIA had significant paths. Their relative significance in ascending order was (1) logistics process innovation, (2) logistics flexibility, and (3) logistics social responsibility.

Figure 5. Supply chain innovation and its influence on supply chain performance



Note: **p<0.05

To evaluate the validity of the second-order constructs and the third-order construct, I examined three areas. First, I evaluated all of the indicator weights to access the absolute contribution of formative indicators to higher-order constructs (Wright et al., 2012; Ringle et al., 2012). Table 14 shows that all indicator weights were significant, indicating that higher-order constructs were interpreted by lower-order constructs. Second, I evaluated the adequacy coefficient (R^2) to determine the relationship between higher-order constructs and lower-order constructs (Edwards, 2001; Mackenzie et al., 2011). Table 14 shows that most of the variance of the formative indicators was shared with the aggregate construct, with a R^2 value greater than 0.50 (threshold) for the third-order construct and 1 for all second-order constructs (Mackenzie et al., 2011). In general, my analysis results confirmed the reliability and validity of the measurement instrument. Third, I tested the conceptual redundancy of the formative constructs. Due to the formative nature of lower-order latent constructs compared with higher-order latent constructs, they should not be collinear if their influence on the respective construct can be distinguished (Mackenzie et al., 2011). The variance inflation factor (VIF) was used to evaluate multicollinearity (Ringe et al., 2012), and no first- or second-order construct in my model had a value greater than the threshold value (10.0), thus multicollinearity was generally assumed (Diamantopoulos, 2011), even with the more restrictive thresholds of 5.0 (Hair et al., 2011) and 4.0 (Hoehle and Venkatesh, 2015). Therefore, multicollinearity did not significantly bias my results.

Table 14. Higher-order construct validation

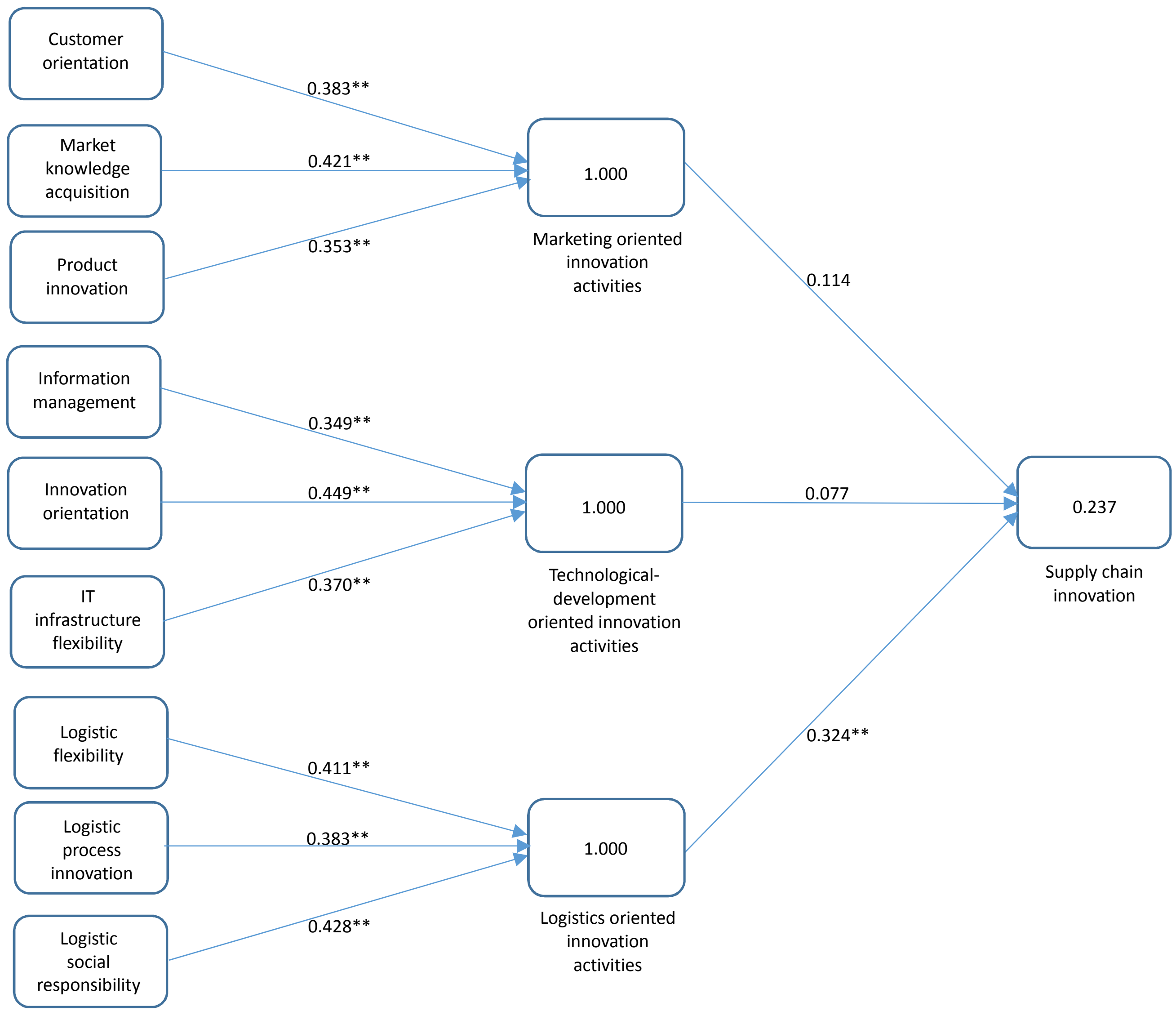
Higher order construct code	Lower order construct code	Weight	VIF	Adequacy coefficient R^2	Q^2	Significant level
Marketing oriented innovation activities (MOIA)	Customer orientation	0.374	1.843	1	0.404	$p<0.05$
	Market knowledge acquisition	0.426	2.015			$p<0.05$
	Product innovation	0.356	1.868			$p<0.05$
Technological-development oriented innovation activities (TDOIA)	Information management	0.358	1.725	1	0.401	$p<0.05$
	Innovation orientation	0.447	2.064			$p<0.05$
	IT infrastructure flexibility	0.363	1.735			$p<0.05$
Logistics oriented innovation activities (LOIA)	Logistic flexibility	0.409	1.590	1	0.372	$p<0.05$
	Logistic innovation process	0.39	1.480			$p<0.05$
	Logistic social responsibility	0.423	1.481			$p<0.05$
Supply chain innovation	Marketing oriented innovation activities	0.378	3.774	1	0.342	$p<0.05$
	Technological-development oriented innovation activities	0.377	3.979			$p<0.05$

	Logistics oriented innovation activities	0.314	3.311			p<0.05

Moreover, the path linking supply chain innovation with supply chain performance (see Figure 5) confirmed the nomological validity of the supply chain innovation construct. The value of 0.477 ($p < 0.05$) for this path confirmed the influence of supply chain innovation on the dependent variable. The supply chain performance ($R^2 = 0.228$) of firms was affected by their supply chain innovation. In other words, the significant and positive R^2 values and the path coefficients confirmed the link between supply chain innovation and supply chain performance in the model.

An alternative model with three second-order constructs directly affecting supply chain performance was also evaluated (see Figure 6). Although this model explained 23.7% of the variance in supply chain innovation, only the path linking LOIA with supply chain performance was significant. These results provided further evidence of the importance of including a third-order construct in my proposed model (see Figure 5). In addition, the third-order model showed the direct effect of supply chain innovation, which was the core construct and interest of this study, highlighting the relative importance of MOIA, TDOIA, and LOIA in supply chain innovation.

Figure 6. Second-order constructs and their influence on supply chain performance



*Note: **p<0.05, *p<0.1*

2.3. Summary of chapter

In summary, I hypothesized that supply chain innovation in firms affected their supply chain performance. The results showed that supply chain innovation accounted for 22.8% of the variance in firms' supply chain performance. I also proposed that supply chain innovation in firms was a third-order, multidimensional latent construct formed of the definitional properties of MOIA, TDOIA, and LOIA. The results confirmed this structure, with significant paths linking all second-order constructs with the third-order construct (i.e. supply chain innovation) and all first-order constructs with all second-order constructs. The next chapter presents a new structural model of supply chain innovation, and the relationships among the constructs are defined and hypotheses are discussed in detail.

Chapter 3 Discussions and conclusions

This chapter presents the discussion and implications of the findings of the study. In the first section of the chapter, the discussion of the hypotheses tested are presented. The managerial and theoretical implications of the findings, followed by the limitations of the study, are discussed next. Finally, the chapter concludes with suggestions for future research.

3.1. Research Contributions

The chapter describes the theoretical contributions as well as the practical implications of the findings in the dissertation. The theoretical contributions are first discussed, followed by practical implications.

3.1.1. Theoretical Implications

My conceptualization and measurement scale for supply chain innovation are a comprehensive and precise representation of supply chain innovation compared with previous research. Therefore, I believe that my development results can be used in future research. Previous studies have shown that researchers use a pick-and-choose strategy or combine several theoretical constructs to measure supply chain innovation (Lee et al., 2011; Kwak et al., 2018). I believe that these strategies should no longer be used because my developed instrument clarifies the underlying constructs of all areas of supply chain innovation. Instead of combining theoretically unrelated constructs to measure supply chain innovation, researchers should use my entire instrument or relevant parts (especially some or all of the first-/second-order constructs) to investigate all specific areas of supply chain innovation. My study includes the conceptualizing of the supply chain innovation construct and the development of an empirically valid and reliable instrument for measuring this construct. The results showed that supply chain innovation had a positive influence on supply chain performance and that it was influenced by the MOIA, TDOIA, and LOIA of the firms. In addition, the model identified specific areas of innovation activities to focus on. MOIA included product innovation, customer orientation, and market knowledge acquisition. TDOIA consisted of information management, IT infrastructure flexibility, and innovation orientation. Finally, LOIA included logistics process innovation, logistics flexibility, and logistics social responsibility. Supply chain innovation research should apply my conceptualization and survey instrument to examine the performance of MOIA, TDOIA, and LOIA in terms of supply chain innovation. Therefore, supply chain innovation research should benefit empirically from a quantitative measure of this concept.

3.1.2. Practical Implications

The measurement scale developed in this study can be applied to manage and evaluate supply chain innovation in business processes. It would be difficult for managers to evaluate the degree of supply chain innovation in their firm without such an evaluation tool. It is important for managers to better understand supply chain innovation because of its potential effects on organizational outcomes, including operational efficiency, economic prosperity, environmental protection, service effectiveness, and social responsibility (Wong and Ngai, 2019). Therefore, being able to accurately assess supply chain innovation enables firms to firms to improve their supply chain performance, which was empirically proven by my research model.

Second, the third-order factor, the three second-order factors, and the nine first-order factors can help achieve different objectives in the practice of managing and estimating supply chain innovation. The third-order factor can be useful for communicating the overall level of supply chain innovation with managers. In contrast, the three second-order factors and nine first-order factors of supply chain innovation can be applied to facilitate detailed communication and assessments in each business unit. The results presented here can be used to help managers better understand supply chain innovation. They are useful for evaluating specific areas of innovation activities, allowing managers to strategically control and manage the most important areas of supply chain innovation in business processes.

3.2. Limitations and Future Research

The data come from the apparel and textile industry in China. Future studies should contrast with other industries (e.g. the automotive industry) in different countries (e.g. South Korea) to increase the generalizability of my results.

Appendix A - Papers collected in literature review

[A1] Ageron, B., Lavastre, O., & Spalanzani, A. (2013). Innovative supply chain practices: the state of French companies. Supply Chain Management: An International Journal, 18(3), 265-276.

[A2] Aitken, J., & Harrison, A. (2013). Supply governance structures for reverse logistics systems. International Journal of Operations & Production Management, 33(6), 745-764.

[A3] Allred, C. R., Fawcett, S. E., Wallin, C., & Magnan, G. M. (2011). A dynamic collaboration capability as a source of competitive advantage. Decision Sciences, 42(1), 129-161.

[A4] Amit, R., & Zott, C. (2001). Value creation in e-business. Strategic Management Journal, 22(6-7), 493-520.

[A5] Anderson, E. J., Coltman, T., Devinney, T. M., & Keating, B. (2011). What drives the choice of a third-party logistics provider?. Journal of Supply Chain Management, 47(2), 97-115.

[A6] Archer, N., Wang, S., & Kang, C. (2008). Barriers to the adoption of online supply chain solutions in small and medium enterprises.Supply Chain Management: An International Journal, 13(1), 73-82.

[A7] Arend, R. J., & Wisner, J. D. (2005). Small business and supply chain management: is there a fit?. Journal of Business Venturing, 20(3), 403-436.

[A8] Arlbjorn, J. S., & Paulraj, A. (2013). Special topic forum on innovation in business networks from a supply chain perspective: current status and opportunities for future research. Journal of Supply Chain Management, 49(4), 3-11.

[A9] Azadegan, A. (2011). Benefiting from supplier operational innovativeness: The influence of supplier evaluations and absorptive capacity. Journal of Supply Chain Management, 47(2), 49-64.

[A10] Basole, R. C., Bellamy, M. A., & Park, H. (2017). Visualization of innovation in global supply chain networks. Decision Sciences, 48(2), 288-306.

[A11] Bastl, M., Johnson, M., & Choi, T. Y. (2013). Who's seeking whom? Coalition behavior of a weaker player in buyer–supplier relationships. Journal of Supply Chain Management, 49(1), 8-28.

[A12] Beh, L. S., Ghobadian, A., He, Q., Gallear, D., & O'Regan, N. (2016). Second-life retailing: a reverse supply chain perspective. Supply Chain Management: An International Journal, 21(2), 259-272.

[A13] Bello, D. C., Lohtia, R., & Sangtani, V. (2004). An institutional analysis of supply chain innovations in global marketing channels. Industrial Marketing Management, 33(1), 57-64.

[A14] Bendoly, E., Bharadwaj, A., & Bharadwaj, S. (2012). Complementary Drivers of New Product Development Performance: Cross-Functional Coordination, Information System Capability, and Intelligence Quality. Production and Operations Management, 21(4), 653-667.

[A15] Berghman, L., Matthyssens, P., & Vandenbempt, K. (2012). Value innovation, deliberate learning mechanisms and information from supply chain partners. Industrial Marketing Management, 41(1), 27-39.

[A16] Beske-Janssen, P., Johnson, M. P., & Schaltegger, S. (2015). 20 years of performance measurement in sustainable supply chain management–what has been achieved? Supply Chain Management: An International Journal, 20(6), 664-680.

[A17] Billington, C., & Davidson, R. (2013). Leveraging open innovation using intermediary networks. Production and Operations Management, 22(6), 1464-1477.

[A18] Bitner, M. J., Ostrom, A. L., & Morgan, F. N. (2008). Service blueprinting: a practical technique for service innovation. California Management Review, 50(3), 66-94.

[A19] Blome, C., Schoenherr, T., & Kaesser, M. (2013). Ambidextrous governance in supply chains: The impact on innovation and cost performance. Journal of Supply Chain Management, 49(4), 59-80.

[A20] Boddy, D., Macbeth, D., & Wagner, B. (2000). Implementing collaboration between organizations: an empirical study of supply chain partnering. Journal of Management studies, 37(7), 1003-1018.

[A21] Borgatti, S. P., & Li, X. (2009). On social network analysis in a supply chain context. Journal of Supply Chain Management, 45(2), 5-22.

[A22] Brun, A., & Castelli, C. (2008). Supply chain strategy in the fashion industry: developing a portfolio model depending on product, retail channel and brand. International Journal of Production Economics, 116(2), 169-181.

[A23] Brun, A., Caniato, F., Caridi, M., Castelli, C., Miragliotta, G., Ronchi, S., ... & Spina, G. (2008). Logistics and supply chain management in luxury fashion retail: Empirical investigation of Italian firms. International Journal of Production Economics, 114(2), 554-570.

[A24] Cabigiosu, A., Zirpoli, F., & Camuffo, A. (2013). Modularity, interfaces definition and the integration of external sources of innovation in the automotive industry. Research Policy, 42(3), 662-675.

[A25] Cai, J., Liu, X., Xiao, Z., & Liu, J. (2009). Improving supply chain performance management: A systematic approach to analyzing iterative KPI accomplishment. Decision Support Systems, 46(2), 512-521.

[A26] Caniato, F., Caridi, M., Moretto, A., Sianesi, A., & Spina, G. (2014). Integrating international fashion retail into new product development. International Journal of Production Economics, 147, 294-306.

[A27] Cao, M., & Zhang, Q. (2010). Supply chain collaborative advantage: A firm's perspective. International Journal of Production Economics, 128(1), 358-367.

[A28] Cao, M., & Zhang, Q. (2011). Supply chain collaboration: Impact on collaborative advantage and firm performance. Journal of Operations Management, 29(3), 163-180.

[A29] Caridi, M., Pero, M., & Sianesi, A. (2012). Linking product modularity and innovativeness to supply chain management in the Italian furniture industry. International Journal of Production Economics, 136(1), 207-217.

[A30] Carnovale, S., & Yeniyurt, S. (2014). The role of ego networks in manufacturing joint venture formations. Journal of Supply Chain Management, 50(2), 1-17.

[A31] Carnovale, S., & Yeniyurt, S. (2015). The role of ego network structure in facilitating ego network innovations. Journal of Supply Chain Management, 51(2), 22-46.

[A32] Chen, I. J., & Paulraj, A. (2004). Towards a theory of supply chain management: the constructs and measurements. Journal of Operations Management, 22(2), 119-150.

[A33] Chen, J. S., Tsou, H. T., & Ching, R. K. (2011). Co-production and its effects on service innovation. Industrial Marketing Management, 40(8), 1331-1346.

[A34] Cheng, J. H., Chen, M. C., & Huang, C. M. (2014). Assessing inter-organizational innovation performance through relational governance and dynamic capabilities in supply chains. Supply Chain Management: An International Journal, 19(2), 173-186.

[A35] Choi, T. Y., & Krause, D. R. (2006). The supply base and its complexity: Implications for transaction costs, risks, responsiveness, and innovation. Journal of Operations Management, 24(5), 637-652.

[A36] Chong, A. Y. L., & Zhou, L. (2014). Demand chain management: Relationships between external antecedents, web-based integration and service innovation performance. International Journal of Production Economics, 154, 48-58.

[A37] Claycomb, C., Iyer, K., & Germain, R. (2005). Predicting the level of B2B e-commerce in industrial organizations. Industrial Marketing Management, 34(3), 221-234.

[A38] Cohen, M. A., Cull, C., Lee, H. L., & Willen, D. (2000). Saturn's supply-chain innovation: High value in after-sales service. MIT Sloan Management Review, 41(4), 93.

[A39] Coltman, T., Gattorna, J., & Whiting, S. (2010). Realigning service operations strategy at DHL express. Interfaces, 40(3), 175-183.

[A40] Craighead, C. W., Hult, G. T. M., & Ketchen, D. J. (2009). The effects of innovation–cost strategy, knowledge, and action in the supply chain on firm performance. Journal of Operations Management, 27(5), 405-421.

[A41] Daugherty, P. J., Chen, H., & Ferrin, B. G. (2011). Organizational structure and logistics service innovation. The International Journal of Logistics Management, 22(1), 26-51.

[**A42**] Desbarats, G. (1999). The innovation supply chain. Supply Chain Management: An International Journal, 4(1), 7-10.

[A43] Eschenbächer, J., Seifert, M., & Thoben, K. D. (2011). Improving distributed innovation processes in virtual organisations through the evaluation of collaboration intensities. Production Planning & Control, 22(5-6), 473-487.

[A44] Ettlie, J. E., & Pavlou, P. A. (2006). Technology-based new product development partnerships. Decision Sciences, 37(2), 117-147.

[A45] Ferrer, M., Santa, R., Storer, M., & Hyland, P. (2011). Competences and capabilities for innovation in supply chain relationships. International Journal of Technology Management, 56(2/3/4), 272-289.

[A46] Fine, C. (2013). Intelli-Sourcing to Replace Offshoring as Supply Chain Transparency Increases. Journal of Supply Chain Management, 49(2), 6-7.

[A47] Gadde, L. E. (2013). Moving corporate boundaries: Consequences for innovative redesign. Journal of Supply Chain Management, 49(4), 12-26.

[A48] Gebauer, H. (2011). Exploring the contribution of management innovation to the evolution of dynamic capabilities. Industrial Marketing Management, 40(8), 1238-1250.

[A49] Gligor, D. M., & Holcomb, M. C. (2012). Understanding the role of logistics capabilities in achieving supply chain agility: a systematic literature review. Supply Chain Management: An International Journal, 17(4), 438-453.

[A50] Gnyawali, D. R., & Srivastava, M. K. (2013). Complementary effects of clusters and networks on firm innovation: A conceptual model. Journal of Engineering and Technology Management, 30(1), 1-20.

[A51] Golgeci, I., & Y. Ponomarov, S. (2013). Does firm innovativeness enable effective responses to supply chain disruptions? An empirical study. Supply Chain Management: An International Journal, 18(6), 604-617.

[A52] Grawe, S. J. (2009). Logistics innovation: a literature-based conceptual framework. The International Journal of Logistics Management, 20(3), 360-377.

[A53] Gualandris, J., & Kalchschmidt, M. (2014). Customer pressure and innovativeness: Their role in sustainable supply chain management. Journal of Purchasing and Supply Management, 20(2), 92-103.

[A54] Gualandris, J., & Kalchschmidt, M. (2016). Developing environmental and social performance: the role of suppliers' sustainability and buyer–supplier trust. International Journal of Production Research, 54(8), 2470-2486.

[A55] Gunasekaran, A., Lai, K. H., & Cheng, T. E. (2008). Responsive supply chain: a competitive strategy in a networked economy. Omega, 36(4), 549-564.

[A56] Hansen, E. G., Grosse-Dunker, F., & Reichwald, R. (2009). Sustainability innovation cube—a framework to evaluate sustainability-oriented innovations. International Journal of Innovation Management, 13(04), 683-713.

[A57] Harland, C., Brenchley, R., & Walker, H. (2003). Risk in supply networks. Journal of Purchasing and Supply management, 9(2), 51-62.

[A58] Hazen, B. T., Overstreet, R. E., & Cegielski, C. G. (2012). Supply chain innovation diffusion: going beyond adoption. The International Journal of Logistics Management, 23(1), 119-134.

[A59] He, Y., Lai, K. K., Sun, H., & Chen, Y. (2014). The impact of supplier integration on customer integration and new product performance: the mediating role of manufacturing flexibility under trust theory. International Journal of Production Economics, 147, 260-270.

[A**60]** He, Y. (2017). Supply risk sharing in a closed-loop supply chain. International Journal of Production Economics, 183, 39-52.

[A61] Holmstrom, J., & Partanen, J. (2014). Digital manufacturing-driven transformations of service supply chains for complex products. Supply Chain Management: An International Journal, 19(4), 421-430.

[A62] Homburg, C., Krohmer, H., & Workman, J. P. (2004). A strategy implementation perspective of market orientation. Journal of Business Research, 57(12), 1331-1340.

[A63] Hoole, R. (2005). Five ways to simplify your supply chain. Supply Chain Management: An International Journal, 10(1), 3-6.

[A64] Hsieh, K.N. and Tidd, J. (2012), "Open versus closed new service development: the influences of project novelty", Technovation, Vol. 32 No. 11, pp. 600-608.

[A65] Hult, G. T. M., Ketchen, D. J., & Nichols, E. L. (2002). An examination of cultural competitiveness and order fulfillment cycle time within supply chains. Academy of Management Journal, 45(3), 577-586.

[A66] Hult, G. T. M., Craighead, C. W., & Ketchen Jr, D. J. (2010). Risk uncertainty and supply chain decisions: A real options perspective. Decision Sciences, 41(3), 435-458.

[A67] Huo, B., Han, Z., Zhao, X., Zhou, H., Wood, C. H., & Zhai, X. (2013). The impact of institutional pressures on supplier integration and financial performance: Evidence from China. International Journal of Production Economics, 146(1), 82-94.

[A68] Ireland, R.D. & Webb, J.W. (2007) "A multi-theoretic perspective on trust and power in strategic supply chains", Journal of Operations Management, 25(2), 482-497.

[A69] Isaksson, R., Johansson, P., & Fischer, K. (2010). Detecting supply chain innovation potential for sustainable development. Journal of Business Ethics, 97(3), 425-442.

[A70] Isaksson, O. H., Simeth, M., & Seifert, R. W. (2016). Knowledge spillovers in the supply chain: Evidence from the high tech sectors. Research Policy, 45(3), 699-706.

[A71] Jajja, M. S. S., Kannan, V. R., Brah, S. A., & Hassan, S. Z. (2017). Linkages between firm innovation strategy, suppliers, product innovation, and business performance: insights from resource dependence theory. International Journal of Operations & Production Management, 37(8), 1054-1075.

[A72] Jayaram, J., & Pathak, S. (2013). A holistic view of knowledge integration in collaborative supply chains. International Journal of Production Research, 51(7), 1958-1972.

[A73] Jayaraman, V., & Luo, Y. (2007). Creating competitive advantages through new value creation: a reverse logistics perspective. The Academy of Management Perspectives, 21(2), 56-73.

[A74] Jean, R. J., Kim, D., & Sinkovics, R. R. (2012). Drivers and performance outcomes of supplier innovation generation in customer–supplier relationships: The role of power-dependence. Decision Sciences, 43(6), 1003-1038.

[A75] Jean, R. J., Sinkovics, R. R., & Hiebaum, T. P. (2014). The effects of supplier involvement and knowledge protection on product innovation in customer–supplier relationships: a study of global automotive suppliers in China. Journal of Product Innovation Management, 31(1), 98-113.

[A76] Johnsen, T. E. (2011). Supply network delegation and intervention strategies during supplier involvement in new product development. International Journal of Operations & Production Management, 31(6), 686-708.

[A77] Juttner, U., & Maklan, S. (2011). Supply chain resilience in the global financial crisis: an empirical study. Supply Chain Management: An International Journal, 16(4), 246-259.

[A78] Kache, F., & Seuring, S. (2017). Challenges and opportunities of digital information at the intersection of Big Data Analytics and supply chain management. International Journal of Operations & Production Management, 37(1), 10-36.

[A79] Kang, S. C., Morris, S. S., & Snell, S. A. (2007). Relational archetypes, organizational learning, and value creation: Extending the human resource architecture. Academy of Management Review, 32(1), 236-256.

[A80] Khan, O., Christopher, M., & Creazza, A. (2012). Aligning product design with the supply chain: a case study. Supply Chain Management: An International Journal, 17(3), 323-336.

[A81] Kim, B., & Oh, H. (2005). The impact of decision-making sharing between supplier and manufacturer on their collaboration performance. Supply Chain Management: An International Journal, 10(3), 223-236.

[A82] Kim, D., & Lee, R. P. (2010). Systems collaboration and strategic collaboration: Their impacts on supply chain responsiveness and market performance. Decision Sciences, 41(4), 955-981.

[A83] Koufteros, X. A., Cheng, T. E., & Lai, K. H. (2007). “Black-box” and “gray-box” supplier integration in product development: Antecedents, consequences and the moderating role of firm size. Journal of Operations Management, 25(4), 847-870.

[A84] Koufteros, X., Vickery, S. K., & Dröge, C. (2012). The effects of strategic supplier selection on buyer competitive performance in matched domains: does supplier integration mediate the relationships?. Journal of Supply Chain Management, 48(2), 93-115.

[A85] Kuhne, B., Gellynck, X., & Weaver, R. D. (2013). The influence of relationship quality on the innovation capacity in traditional food chains. Supply Chain Management: An International Journal, 18(1), 52-65.

[A86] Lau, A. K., Yam, R. C., & Tang, E. P. (2007). Supply chain product co-development, product modularity and product performance: empirical evidence from Hong Kong manufacturers. Industrial Management & Data Systems, 107(7), 1036-1065.

[A87] Lau, A. K. (2011). Supplier and customer involvement on new product performance: Contextual factors and an empirical test from manufacturer perspective. Industrial Management & Data Systems, 111(6), 910-942.

[A88] Lee, S. M., Lee, D., & Schniederjans, M. J. (2011). Supply chain innovation and organizational performance in the healthcare industry. International Journal of Operations & Production Management, 31(11), 1193-1214.

[A89] Lee, V. H., Ooi, K. B., Chong, A. Y. L., & Seow, C. (2014). Creating technological innovation via green supply chain management: An empirical analysis. Expert Systems with Applications, 41(16), 6983-6994.

[A90] Li, S., Ragu-Nathan, B., Ragu-Nathan, T. S., & Rao, S. S. (2006). The impact of supply chain management practices on competitive advantage and organizational performance. Omega, 34(2), 107-124.

[A91] Liao, S. H., & Kuo, F. I. (2014). The study of relationships between the collaboration for supply chain, supply chain capabilities and firm performance: A case of the Taiwan′ s TFT-LCD industry. International Journal of Production Economics, 156, 295-304.

[A92] Lui, A. K., Ngai, E. W., & Lo, C. K. (2016). Disruptive information technology innovations and the cost of equity capital: The moderating effect of CEO incentives and institutional pressures. Information & Management, 53(3), 345-354.

[A93] MacCarthy, B. L., Blome, C., Olhager, J., Srai, J. S., & Zhao, X. (2016). Supply chain evolution–theory, concepts and science. International Journal of Operations & Production Management, 36(12), 1696-1718.

[A94] Malhotra, A., Gosain, S. & El Sawy, O.A. (2005) “Absorptive capacity configurations in supply chains: gearing for partner-enabled market knowledge creation”, MIS Quarterly, 29(1), 145-187.

[A95] McIvor, R., & Humphreys, P. (2004). Early supplier involvement in the design process: lessons from the electronics industry. OMEGA, 32(3), 179-199.

[A96] Melnyk, S. A., Lummus, R. R., Vokurka, R. J., Burns, L. J., & Sandor, J. (2009). Mapping the future of supply chain management: a Delphi study. International Journal of Production Research, 47(16), 4629-4653.

[A97] Melnyk, S. A., Davis, E. W., Spekman, R. E., & Sandor, J. (2010). Outcome-driven supply chains. MIT Sloan Management Review, 51(2), 33-38.

[A98] Miao, Z., Cai, S., & Xu, D. (2012). Exploring the antecedents of logistics social responsibility: A focus on Chinese firms. International Journal of Production Economics, 140(1), 18-27.

[A99] Modi, S. B., & Mabert, V. A. (2010). Exploring the relationship between efficient supply chain management and firm innovation: an archival search and analysis. Journal of Supply Chain Management, 46(4), 81-94.

[A100] Munksgaard, K. B., Stentoft, J., & Paulraj, A. (2014). Value-based supply chain innovation. Operations Management Research, 7(3-4), 50-62.

[A101] Narasimhan, R., & Narayanan, S. (2013). Perspectives on supply network–enabled innovations. Journal of Supply Chain Management, 49(4), 27-42.

[A102] Ojha, D., Shockley, J., & Acharya, C. (2016). Supply chain organizational infrastructure for promoting entrepreneurial emphasis and innovativeness: The role of trust and learning. International Journal of Production Economics, 179, 212-227.

[A103] Oke, A., Prajogo, D. I., & Jayaram, J. (2013). Strengthening the innovation chain: The role of internal innovation climate and strategic relationships with supply chain partners. Journal of Supply Chain Management, 49(4), 43-58.

[A104] Pagell, M. (2004). Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics. Journal of Operations Management, 22(5), 459-487.

[A105] Peng, D. X., Verghese, A., Shah, R., & Schroeder, R. G. (2013). The relationships between external integration and plant improvement and innovation capabilities: The moderation effect of product clockspeed. Journal of Supply Chain Management, 49(3), 3-24.

[A106] Pero, M., Abdelkafi, N., Sianesi, A., & Blecker, T. (2010). A framework for the alignment of new product development and supply chains. Supply Chain Management: An International Journal, 15(2), 115-128.

[A107] Petersen, K. J., Handfield, R. B., & Ragatz, G. L. (2005). Supplier integration into new product development: coordinating product, process and supply chain design. Journal of Operations Management, 23(3), 371-388.

[A108] Radas, S. and Bozic, L. (2009), “The antecedents of SME innovativeness in an emerging transition economy”, Technovation, Vol. 29 Nos 6/7, pp. 438-450.

[A109] Ranganathan, C., Teo, T. S., & Dhaliwal, J. (2011). Web-enabled supply chain management: Key antecedents and performance impacts. International Journal of Information Management, 31(6), 533-545.

[A110] Robertson, P. W., Gibson, P. R., & Flanagan, J. T. (2002). Strategic supply chain development by integration of key global logistical process linkages. International Journal of Production Research, 40(16), 4021-4040.

[A111] Roh, J., Hong, P., & Min, H. . (2014). Implementation of a responsive supply chain strategy in global complexity: The case of manufacturing firms. International Journal of Production Economics, 147, 198–210.

[A112] Roy, S., & Sivakumar, K. (2010). Innovation generation in upstream and downstream business relationships. Journal of Business Research, 63(12), 1356-1363.

[A113] Roy, S., Sivakumar, K., & Wilkinson, I. F. (2004). Innovation generation in supply chain relationships: A conceptual model and research propositions. Journal of the Academy of Marketing Science, 32(1), 61-79.

[A114] Saenz, M. J., Revilla, E., & Knoppen, D. (2014). Absorptive capacity in buyer–supplier relationships: empirical evidence of its mediating role. Journal of Supply Chain Management, 50(2), 18-40.

[A115] Salvador, F., & Villena, V. H. (2013). Supplier integration and NPD outcomes: Conditional moderation effects of modular design competence. Journal of Supply Chain Management, 49(1), 87-113.

[A116] Samiee, S. (2008). Global marketing effectiveness via alliances and electronic commerce in business-to-business markets. Industrial Marketing Management, 37(1), 3-8.

[A117] Sampson, S. E., & Spring, M. (2012). Customer roles in service supply chains and opportunities for innovation. Journal of Supply Chain Management, 48(4), 30-50.

[A118] Sanders, N. R. (2005). IT alignment in supply chain relationships: A study of supplier benefits. Journal of Supply Chain Management, 41(2), 4-13.

[A119] Sanders, N. R. (2008). Pattern of information technology use: The impact on buyer–suppler coordination and performance. Journal of Operations Management, 26(3), 349-367.

[A120] Sarkis, J. (2012). A boundaries and flows perspective of green supply chain management. Supply Chain Management: An International Journal, 17(2), 202-216.

[A121] Sawhney, M., Wolcott, R. C., & Arroniz, I. (2006). The 12 different ways for companies to innovate. MIT Sloan Management Review, 47(3), 75-81.

[A122] Schaltegger, S., & Burritt, R. (2014). Measuring and managing sustainability performance of supply chains: Review and sustainability supply chain management framework. Supply Chain Management: An International Journal, 19(3), 232-241.

[A123] Schoenherr, T., & Swink, M. (2012). Revisiting the arcs of integration: Cross-validations and extensions. Journal of Operations Management, 30(1), 99-115.

[A124] Khalili Shavarini, S., Salimian, H., Nazemi, J., & Alborzi, M. (2013). Operations strategy and business strategy alignment model (case of Iranian industries). International Journal of Operations & Production Management, 33(9), 1108-1130.

[A125] Singh Srai, J., & Gregory, M. (2008). A supply network configuration perspective on international supply chain development. International Journal of Operations & Production Management, 28(5), 386-411.

[A126] Singhal, J., & Singhal, K. (2002). Supply chains and compatibility among components in product design. Journal of Operations Management, 20(3), 289-302.

[A127] Skippari, M., Laukkanen, M., & Salo, J. (2017). Cognitive barriers to collaborative innovation generation in supply chain relationships. Industrial Marketing Management, 62, 108-117.

[A128] Soosay, C. & Hyland, P. (2008) "Exploration and exploitation: the interplay between knowledge and continuous innovation", International Journal of Technology Management, 42(1/2), 20-35.

[A129] 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.

[A130] Storer, M., Hyland, P., Ferrer, M., Santa, R., & Griffiths, A. (2014). Strategic supply chain management factors influencing agribusiness innovation utilization. The International Journal of Logistics Management, 25(3), 487-521.

[A131] Tan, K. H., Zhan, Y., Ji, G., Ye, F., & Chang, C. (2015). Harvesting big data to enhance supply chain innovation capabilities: An analytic infrastructure based on deduction graph. International Journal of Production Economics, 165, 223-233.

[A132] Teichert, T., & Bouncken, R. B. (2011). Rigidities considered: Supplier strategies for integrated innovation. International Journal of Innovation Management, 15(01), 95-119.

[A133] Trautrims, A., MacCarthy, B. L., & Okade, C. (2017). Building an innovation-based supplier portfolio: The use of patent analysis in strategic supplier selection in the automotive sector. International Journal of Production Economics, 1-9.

[A134] Turkulainen, V., & Swink, M. L. (2017). Supply chain personnel as knowledge resources for innovation—a contingency view. Journal of Supply Chain Management, 53(3), 41-59.

[A135] Tomlinson, P. R., & Fai, F. M. (2013). The nature of SME co-operation and innovation: A multi-scalar and multi-dimensional analysis. International Journal of Production Economics, 141(1), 316-326.

[A136] Tracey, M., & Neuhaus, R. (2013). Purchasing's role in global new product-process development projects. Journal of Purchasing and Supply Management, 19(2), 98-105.

[A137] Vanpoucke, E., Boyer, K. K., & Vereecke, A. (2009). Supply chain information flow strategies: an empirical taxonomy. International Journal of Operations & Production Management, 29(12), 1213-1241.

[A138] Vickery, S. K., Jayaram, J., Droge, C., & Calantone, R. (2003). The effects of an integrative supply chain strategy on customer service and financial performance: an analysis of direct versus indirect relationships. Journal of Operations Management, 21(5), 523-539.

[A139] von Massow, M., & Canbolat, M. (2014). A strategic decision framework for a value added supply chain. International Journal of Production Research, 52(7), 1940-1955.

[A140] Wagner, S. M., & Bode, C. (2014). Supplier relationship-specific investments and the role of safeguards for supplier innovation sharing. Journal of Operations Management, 32(3), 65-78.

[A141] Wagner, S. M. (2010). Supplier traits for better customer firm innovation performance. Industrial Marketing Management, 39(7), 1139-1149.

[A142] Wagner, S. M. (2012). Tapping supplier innovation. Journal of Supply Chain Management, 48(2), 37-52.

[A143] Wakolbinger, T., & Cruz, J. M. (2011). Supply chain disruption risk management through strategic information acquisition and sharing and risk-sharing contracts. International Journal of Production Research, 49(13), 4063-4084.

[A144] Wang, L., Yeung, J. H. Y., & Zhang, M. (2011). The impact of trust and contract on innovation performance: The moderating role of environmental uncertainty. International Journal of Production Economics, 134(1), 114-122.

[A145] Wong, C. Y., Boon-Itt, S., & Wong, C. W. (2011). The contingency effects of environmental uncertainty on the relationship between supply chain integration and operational performance. Journal of Operations Management, 29(6), 604-615.

[A146] Wong, C. W., Wong, C. Y., & Boon-itt, S. (2013). The combined effects of internal and external supply chain integration on product innovation. International Journal of Production Economics, 146(2), 566-574.

[A147] Wu, Y., Cegielski, C. G., Hazen, B. T., & Hall, D. J. (2013). Cloud computing in support of supply chain information system infrastructure: understanding when to go to the cloud. Journal of Supply Chain Management, 49(3), 25-41.

[A148] Wynstra, F., Von Corswant, F., & Wetzels, M. (2010). In chains? An empirical study of antecedents of supplier product development activity in the automotive industry. Journal of Product Innovation Management, 27(5), 625-639.

[A149] Yaibuathet, K., Enkawa, T., & Suzuki, S. (2008). Influences of institutional environment toward the development of supply chain management. International Journal of Production Economics, 115(2), 262-271.

[A150] Yeniyurt, S., Henke, J. W., & Yalcinkaya, G. (2014). A longitudinal analysis of supplier involvement in buyers' new product development: working relations, inter-dependence, co-innovation, and performance outcomes. Journal of the Academy of Marketing Science, 42(3), 291-308.

[A151] Yeung, A. C. (2008). Strategic supply management, quality initiatives, and organizational performance. Journal of Operations Management, 26(4), 490-502.

[A152] Yin, Y., Stecke, K. E., & Li, D. (2018). The evolution of production systems from Industry 2.0 through Industry 4.0. International Journal of Production Research, 56(1-2), 848-861.

[A153] Young, R. R. (2000). Managing residual disposition: Achieving economy, environmental responsibility, and competitive advantage using the supply chain framework. Journal of Supply Chain Management, 36(4), 57-66.

[A154] Zhang, Q., Vonderembse, M. A., & Lim, J. S. (2002). Value chain flexibility: a dichotomy of competence and capability. International journal of production research, 40(3), 561-583.

[A155] Zimmermann, R., Ferreira, L. M. D. F., & Moreira, A. C. (2016). The influence of supply chain on the innovation process: a systematic literature review. Supply Chain Management: An International Journal, 21(3), 289-304.

Appendix B - Coded articles: Contributions to theory classification, topic areas & supply chain stages

Author	Coding	Types of theoretical contribution					Supply Chain Stages				Topic areas							
											Organizational action			Outcome		Output		
		Analyzing	Explaining	Predicting	Explaining & Predicting	Design & Action	Supplier	Manufacturer	Retailer	Customer	Logistics-oriented innovation activities	Marketing-oriented innovation activities	Technological Development-oriented innovation activities	Operation Efficiencies	Services Effectiveness	Economy	Environment	Social
Ageron et al. (2013)	A1				x		x	x	x	x	x	x	x	x	x	x		
Aitken and Harrison (2013)	A2				x		x	x			x	x	x	x	x	x	x	x
Allred et al. (2011)	A3				x		x	x	x			x	x	x	x	x		
Amit and Zott (2001)	A4				x		x					x	x			x		
Anderson et al. (2011)	A5				x		x				x	x	x	x	x	x		
Archer et al. (2008)	A6				x		x	x	x			x	x	x	x	x		
Arend and Wisner (2005)	A7				x			x			x	x	x	x	x	x		
Arlbjorn and Paulraj (2013)	A8	x					x			x		x	x		x	x		
Azadegan et al. (2011)	A9				x		x	x				x	x	x		x		
Basole et al. (2016)	A10				x		x	x				x	x		x	x		
Bastl et al. (2013)	A11			x			x					x	x		x	x		
Beh et al. (2016)	A12				x				x		x	x	x	x	x	x	x	x
Bello et al. (2004)	A13		x						x		x	x	x	x	x	x		x
Bendoly et al. (2012)	A14				x		x	x	x			x	x	x	x	x		
Berghman et al. (2012)	A15				x		x	x	x	x		x	x		x	x		
Beske-Janssen et al. (2015)	A16	x					x				x	x		x	x	x	x	x
Billington and Davidson (2013)	A17				x		x						x	x		x	x	
Bitner et al. (2008)	A18				x		x					x	x	x	x	x		

Blome et al. (2013)	A19				x			x				x		x	x	x		
Boddy et al. (2000)	A20				x		x			x			x		x	x		
Borgatti and Li (2009)	A21		x				x			x		x	x		x	x		
Brun and Castelli (2008)	A22				x				x			x	x	x	x	x		
Brun et al. (2008)	A23				x				x		x	x	x	x	x	x		
Cabigiosu et al. (2013)	A24				x		x	x				x	x		x	x		
Cai et al. (2009)	A25		x						x		x	x		x	x	x		
Caniato et al. (2014)	A26				x				x			x	x		x	x		
Cao and Zhang (2010)	A27					x		x				x		x	x	x		
Cao and Zhang (2011)	A28				x			x			x	x		x	x	x		
Caridi et al. (2012)	A29				x			x			x		x	x		x		
Carnovale and Yeniyurt (2014)	A30				x			x				x			x	x		
Carnovale and Yeniyurt (2015)	A31				x		x	x				x	x		x	x		
Chen and Paulraj (2004)	A32				x					x	x	x	x	x	x	x		
Chen et al. (2011)	A33				x				x			x	x	x	x	x		
Cheng et al. (2014)	A34				x			x				x	x	x	x	x		x
Choi and Krause (2006)	A35			x			x					x	x	x		x		
Chong and Zhou (2014)	A36				x		x			x	x	x	x	x	x	x		
Claycomb et al. (2005)	A37				x			x			x	x	x	x	x	x		
Cohen et al. (2000)	A38		x						x		x	x		x	x	x		
Coltman et al. (2010)	A39		x				x				x	x	x	x	x	x		
Craighead et al. (2009)	A40				x		x		x	x	x	x	x	x	x	x		
Daugherty et al. (2011)	A41				x			x			x	x		x	x	x		
Desbarats et al. (1999)	A42	x					x	x	x	x	x	x	x	x	x	x		
Eschenbacher et al. (2011)	A43		x				x	x				x	x		x	x		
Ettlie and Pavlou (2006)	A44				x		x	x				x	x	x	x	x		
Ferrer et al. (2011)	A45				x		x		x		x	x	x	x		x		
Fine et al. (2013)	A46	x							x		x				x	x		
Gadde et al. (2013)	A47			x			x	x	x			x	x	x	x	x		
Gebauer et al. (2011)	A48				x			x			x	x	x	x	x	x		
Gligor and Holcomb (2012)	A49		x				x				x	x	x	x	x	x		
Gnyawali and Srivastava (2013)	A50			x			x	x	x	x			x		x	x		
Golgeci and Ponomarov (2013)	A51				x			x			x	x	x	x	x	x	x	

Grawe (2009)	A52			x			x				x	x	x	x	x	x		
Gualandris and Kalchschmidt (2014)	A53				x			x			x	x	x	x	x	x	x	x
Gualandris and Kalchschmidt (2016)	A54				x			x				x	x	x	x	x	x	x
Gunasekaran et al. (2008)	A55		x				x	x			x	x	x	x	x	x	x	
Hansen et al. (2009)	A56		x				x	x			x		x	x	x	x	x	x
Harland et al. (2003)	A57				x		x					x	x		x	x		x
Hazen et al. (2012)	A58	x					x	x	x	x			x		x	x		
He et al. (2014)	A59				x			x				x	x	x	x	x		
He et al. (2017)	A60		x				x	x				x		x	x	x	x	
Holmstrom and Partanen (2014)	A61		x				x	x			x	x	x	x	x	x		
Homburg et al. (2004)	A62				x		x	x				x		x	x	x		
Hoole et al. (2005)	A63	x								x	x	x	x	x	x	x		
Hsieh and Tidd (2012)	A64				x		x		x		x	x	x		x	x		
Hult et al. (2002)	A65				x		x	x				x	x	x		x		
Hult et al. (2010)	A66				x			x	x		x		x	x		x		
Huo et al. (2013)	A67				x			x				x	x	x	x	x	x	x
Ireland and Webb (2007)	A68			x				x				x	x	x	x	x		
Isaksson et al. (2010)	A69		x				x	x			x	x	x	x	x	x	x	x
Isaksson et al. (2016)	A70				x		x			x		x	x		x	x		
Jajja et al. (2017)	A71				x		x	x		x		x	x	x	x	x		
Jayaram and Pathak (2013)	A72				x			x				x	x	x	x	x		
Jayaraman and Luo (2007)	A73		x				x	x			x	x	x	x	x	x	x	x
Jean et al. (2012)	A74				x		x					x	x	x	x	x		
Jean et al. (2014)	A75				x		x					x	x	x	x	x		
Johnsen et al. (2011)	A76				x		x					x	x	x	x	x		
Juttner and Maklan (2011)	A77				x			x			x			x	x	x		
Kache and Seuring (2017)	A78				x			x			x	x	x	x	x	x		
Kang et al.(2007)	A79		x					x				x	x	x	x	x		
Khan et al. (2012)	A80				x				x		x	x	x	x	x	x		
Kim and Oh (2005)	A81				x		x	x				x		x	x	x		

Kim et al. (2010)	A82				x			x	x		x	x	x	x	x	x		
Koufteros et al. (2007)	A83				x		x					x	x	x	x	x		
Koufteros et al. (2012)	A84				x		x					x	x		x	x		
Kuhne et al. (2013)	A85				x		x	x		x		x			x	x		
Lau et al. (2007)	A86				x		x	x		x	x	x	x	x	x	x		
Lau et al. (2011)	A87				x		x			x	x	x	x	x	x	x		
Lee et al. (2011)	A88				x		x				x	x	x	x	x	x	x	
Lee et al. (2014)	A89				x			x			x	x	x	x	x	x	x	x
Li et al. (2006)	A90				x		x	x		x	x	x	x	x	x	x		
Liao and Kuo (2014)	A91				x		x	x			x	x	x	x	x	x		
Lui et al. (2016)	A92				x			x					x	x	x	x	x	x
MacCarthy et al. (2016)	A93			x				x			x	x	x	x	x	x	x	x
Malhotra et al. (2005)	A94				x		x	x	x			x	x	x	x	x		
Mclvor and Humphreys (2004)	A95				x		x					x	x		x	x		
Melnyk et al. (2009)	A96				x		x	x		x	x	x	x	x	x	x	x	
Melnyk et al. (2010)	A97		x				x	x		x	x	x	x	x	x	x	x	
Miao et al. (2012)	A98				x			x			x	x			x	x	x	x
Modi and Mabert (2010)	A99				x			x			x			x		x		
Munksgaard et al. (2014)	A100			x			x	x		x	x	x	x	x	x	x		
Narasimhan and Narayanan (2013)	A101		x				x					x	x	x	x	x	x	
Ojha et al. (2016)	A102				x			x	x			x	x	x	x	x		
Oke et al. (2013)	A103				x			x				x	x		x	x		
Pagell et al. (2004)	A104				x			x			x	x	x	x	x	x		
Peng et al. (2013)	A105				x			x				x	x	x	x	x		
Pero et al. (2010)	A106				x		x	x			x	x	x	x	x	x		
Petersen et al. (2005)	A107				x		x					x	x	x	x	x		
Radas and Bozic (2009)	A108				x			x	x			x	x		x	x		
Ranganathan et al. (2011)	A109				x		x	x	x		x	x	x	x	x	x		
Robertson et al. (2002)	A110				x			x			x	x	x	x	x	x		
Roh et al. (2014)	A111				x			x			x	x	x	x	x	x		
Roy and Sivakumar (2010)	A112			x			x		x	x		x	x		x	x		
Roy et al. (2004)	A113			x			x			x		x	x	x	x	x		

Saenz et al. (2014)	A114				x		x					x	x	x	x	x		
Salvador and Villena (2013)	A115				x		x					x	x	x	x	x		
Samiee et al. (2008)	A116		x				x		x		x	x	x	x	x	x		x
Sampson and Spring (2012)	A117				x					x		x	x	x	x	x		
Sanders et al. (2005)	A118				x		x					x	x	x	x	x		
Sanders et al. (2008)	A119				x		x				x	x	x	x	x	x		
Sarkis et al. (2012)	A120	x					x	x		x	x	x	x	x	x	x	x	x
Sawhney et al. (2006)	A121				x		x	x	x	x	x	x	x	x	x	x		
Schaltegger and Burritt (2014)	A122	x					x	x					x	x		x	x	x
Schoenherr and Swink (2012)	A123				x		x				x	x		x	x	x		
Shavarini et al. (2013)	A124				x		x					x	x	x	x	x		
Singh and Gregory (2008)	A125				x		x	x			x	x	x	x	x	x		
Singhal and Singhal (2002)	A126		x				x	x		x		x	x	x	x	x		
Skippari et al. (2017)	A127				x		x	x	x		x	x	x	x	x	x		
Soosay and Hyland (2008)	A128				x			x				x	x	x		x		
Soosay et al. (2008)	A129				x			x			x	x	x	x	x	x	x	
Storer et al. (2014)	A130				x		x	x	x	x		x	x	x	x	x		x
Tan et al. (2015)	A131				x			x				x	x	x	x	x		
Teichert and Bouncken (2011)	A132				x		x					x	x		x	x		
Trautrims et al. (2017)	A133				x		x					x	x	x	x	x		
Turkulainen and Swink (2017)	A134				x			x			x	x	x	x	x	x		
Tomlinson and Fai (2013)	A135				x			x			x	x	x		x	x		
Tracey and Neuhaus (2013)	A136		x				x	x		x	x	x	x	x	x	x		
Vanpoucke et al. (2009)	A137				x			x			x	x	x	x	x	x		
Vickery et al. (2003)	A138				x		x				x	x	x	x	x	x		
von Massow and Canbolat (2014)	A139		x					x				x			x	x	x	
Wagner and Bode (2014)	A140				x		x					x	x	x	x	x		
Wagner et al. (2010)	A141				x		x			x		x	x	x	x	x		
Wagner et al. (2012)	A142				x		x					x	x	x	x	x		
Wakolbinger and Cruz (2011)	A143		x					x	x				x	x		x		
Wang et al. (2011)	A144				x			x				x	x	x	x	x		
Wong et al. (2011)	A145				x			x			x	x		x	x	x		

Wong et al. (2013)	A146				x		x	x				x	x	x	x	x		
Wu et al. (2013)	A147				x			x	x				x	x		x		x
Wynstra et al. (2010)	A148				x		x					x	x		x	x		
Yaibuathet et al. (2008)	A149				x			x			x	x	x	x	x	x		x
Yeniyurt et al. (2014)	A150				x		x					x	x		x	x		
Yeung et al. (2008)	A151				x			x			x	x		x	x	x		
Yin et al. (2018)	A152		x				x	x	x	x	x	x	x	x	x	x		
Young et al. (2000)	A153				x			x					x	x		x	x	
Zhang et al. (2002)	A154			x				x			x	x	x	x	x	x		x
Zimmermann et al. (2016)	A155	x					x			x	x	x	x	x	x	x	x	

Appendix C - Coded articles: Topic areas and Level of analysis

Author	Sample origin	Respondent Origin	Respondent Type	Contribution											
				Perspective											
				Level of analysis				Topic areas							
				Demographic				Organizational action			Outcome				
				Individual	Group	Organization	Societal	Logistics-oriented innovation activities	Marketing-oriented innovation activities	Technological development-oriented innovation activities	Operation Efficiencies	Services Effectiveness	Economic Prosperity	Environmental Protection	Social Responsibility
Ageron et al. (2013)	Case study: 50 interviews supply chain managers	Not specified	Manufacturing and others	x		x		x	x	x	x	x	x		
Aitken and Harrison (2013)	Case study: Car crash repair sector	U.K.	Manufacturing			x		x	x	x	x	x	x	x	x
Allred et al. (2011)	Survey: 505 firms involved; Case study: 51 for Period 1 (58 for Period 2)	Global	Manufacturing/ Retailing/ Servicing			x			x	x	x	x	x		
Amit and Zott (2001)	Case study: 59 e-business firms	Europe/ U.S.	Servicing			x			x	x			x		
Anderson et al. (2011)	Survey: 309 firms - customers of large multinational 3PL providers	Australia/ China/ Hong Kong/ India/ Japan /New Zealand/ South Korea/	Not specified			x		x	x	x	x	x	x		

		Singapore													
Archer et al. (2008)	Survey: 173 Canadian small and medium-sized enterprises	Canada	Distribution/ Manufacturing/ Retailing			x			x	x	x	x	x		
Arend and Wisner (2005)	Survey: 421 managers of supply and production	Europe/ Mexico/ U.S.	Manufacturing			x		x	x	x	x	x	x		
Arlbjorn and Mikkelsen (2014)	Survey: 843 manufacturing companies	Denmark	Manufacturing			x				x	x		x		
Azadegan et al. (2011)	Survey: 136 manufacturers & 272 of their suppliers	U.S.	Manufacturing			x			x	x	x		x		
Basole et al. (2016)	Supply chain networks using SDC Platinum (SDC) and Connexiti data from 2005 to 2009; Using actual patent data from the USPTO and Classification and Search Support Information System (CASSIS) Database	U.S.	Not specified			x			x	x		x	x		
Bastl et al. (2013)						x			x	x		x	x		
Beh et al. (2016)	Case study: interviews with Managers of 2 second-life retailers	Malaysia	Manufacturing			x		x	x	x	x	x	x	x	x
Bello et al. (2004)						x		x	x	x	x	x	x		x
Bendoly et al. (2012)	Survey: 169 unique publicly traded firms	Not specified	Manufacturing	x		x			x	x	x	x	x		

Berghman et al. (2012)	Survey: 182 marketing manager (large organizations)/ CEO (small companies)	Netherlands	Not specified			x			x	x		x	x		
Beske-Janssen et al. (2015)						x		x	x		x	x	x	x	x
Billington and Davidson (2013)	Case study: 16 multi-national companies and 2 NGO companies	Not specified	Servicing	x		x				x	x		x	x	
Bitner et al. (2008)	Case study: YRC Worldwide	U.S.	Servicing			x			x	x	x	x	x		
Blome et al. (2013)	Survey: 238 manufacturing firms	Germany	Manufacturing			x			x		x	x	x		
Boddy et al. (2000)	Case study: two companies - customer and supplier - for Sun Microsystems	U.S.	Manufacturing			x				x		x	x		
Borgatti and Li (2009)						x			x	x		x	x		
Brun and Castelli (2008)	Case studies: 3 brands - Fratelli Rossetti, Bric's, Parah	Italy	Retailing			x			x	x	x	x	x		
Brun et al. (2008)	Multiple case studies - 12 retailers	Italy	Retailing			x		x	x	x	x	x	x		
Cabigiosu et al. (2013)	Multiple case studies - 2 similar auto air conditioning system's development projects carried out by Denso Thermal System (DNTS) for two competing carmakers, 12 interviews conducted.	Not specified	Manufacturing			x			x	x		x	x		
Cai et al. (2009)						x		x	x		x	x	x		
Caniato et al. (2014)	Case study, 13 fashion company	Italy	Retailing			x	x		x	x		x	x		
Cao and	Survey: 211 manufacturing	U.S.	Manufacturing			x			x		x	x	x		

Zhang (2010)	Firms														
Cao and Zhang (2011)	Survey: 211 manufacturing Firms	U.S.	Manufacturing			x		x	x		x	x	x		
Caridi et al. (2012)	Survey: 54 manufacturing firms in furniture	Italy	Manufacturing			x		x		x	x		x		
Carnovale and Yeniyurt (2014)	Survey: 217 firms in Automotive Industry	Global	Manufacturing	x		x			x			x	x		
Carnovale and Yeniyurt (2015)	Construct a manufacturing joint venture network by using 1,158 automotive manufacturers/ parts suppliers over a 19-year period (1985-2003)	U.S.	Manufacturing			x			x	x		x	x		
Chen and Paulraj (2004)	Survey: 221 buying firms' top purchasing/supply management executives	U.S.	Buying	x		x		x	x	x	x	x	x		
Chen et al. (2011)	Survey: 157 IT services companies	Taiwan	Servicing			x			x	x	x	x	x		
Cheng et al. (2014)	Survey: 260 senior managers/purchasing managers/ experienced managers of manufacturing firms	Taiwan	Manufacturing			x			x	x	x	x	x		x
Choi and Krause (2006)						x			x	x	x		x		
Chong and Zhou (2014)	Survey: 256 companies in healthcare industry	Malaysia	Servicing			x		x	x	x	x	x	x		
Claycomb et al. (2005)	Survey: 152 U.S. Manufacturers	U.S.	Manufacturing			x		x	x	x	x	x	x		
Cohen et al. (2000)						x		x	x		x	x	x		
Coltman et al. (2010)				x		x		x	x	x	x	x	x		
Craighead et al. (2009)	Survey: 489 firms	Not specified	Not specified	x		x		x	x	x	x	x	x		

Daugherty et al. (2011)	Survey: 304 executives of firms	China	Logistics/ Manufacturing/ Marketing/ Operations/ Supply chain	x		x		x	x		x	x	x		
Desbarats et al. (1999)						x		x	x	x	x	x	x		
Eschenbacher et al. (2011)				x		x			x	x		x	x		
Ettlie and Pavlou (2006)	Survey: 72 auto company managers	Not specified	Manufacturing	x		x			x	x	x	x	x		
Ferrer et al. (2011)	Case study: Road freight service firms	Australia	Servicing			x		x	x	x	x		x		
Fine et al. (2013)						x		x				x	x		
Gadde et al. (2013)						x			x	x	x	x	x		
Gebauer et al. (2011)	Multiple case studies - eight captial goods manufacturing companies	Europe	Manufacturing	x		x		x	x	x	x	x	x		
Gligor and Holcomb (2012)						x		x	x	x	x	x	x		
Gnyawali and Srivastava (2013)				x		x				x		x	x		
Golgeci and Ponomarov (2013)	Survey: 114 management executives	Europe/ U.S.	Logistics/ Operations/ Purchasing	x		x		x	x	x	x	x	x	x	
Grawe (2009)						x		x	x	x	x	x	x		
Gualandris and Kalchschmidt	Survey: 77 manufacturing firms	Italy	Manufacturing	x		x		x	x	x	x	x	x	x	x

(2014)															
Gualandris and Kalchschmidt (2016)	Survey: 86 manufacturing firms	Italy	Manufacturing	x		x			x	x	x	x	x	x	x
Gunasekaran et al. (2008)				x		x		x	x	x	x	x	x	x	
Hansen et al. (2009)				x		x	x	x		x	x	x	x	x	x
Harland et al. (2003)	Case study: 4 four case studies in electronics sector	Germany/ U.S.	Distributions/ Manufacturing/ Operations			x			x	x		x	x		x
Hazen et al. (2012)				x		x				x		x	x		
He et al. (2014)	Survey: 320 CEO/ general managers	Global	Manufacturing/ Operation			x			x	x	x	x	x		
He et al. (2017)				x		x			x		x	x	x	x	
Holmstrom and Partanen (2014)						x		x	x	x	x	x	x		
Homburg et al. (2004)	Survey: 280 U.S. & 234 German marketing managers	Germany/ U.S.	Not specified	x		x			x		x	x	x		
Hoole et al. (2005)						x		x	x	x	x	x	x		
Hsieh and Tidd (2012)	Case study: 52 interviews for firms	Taiwan	Servicing			x		x	x	x		x	x		
Hult et al. (2002)	Survey: transportation company, USA - 141 internal customers, 115 corporate buyer, 58 external supplier	U.S.	Servicing			x			x	x	x		x		
Hult et al. (2010)	Survey: 273 supply chain manager	Not specified	Manufacturing/ Servicing			x		x		x	x		x		
Huo et al.	Survey: 617 manufacturers	China	Manufacturing			x			x	x	x	x	x	x	x

(2013)	in China														
Ireland and Webb (2007)						x			x	x	x	x	x		
Isaksson et al. (2010)				x		x		x	x	x	x	x	x	x	x
Isaksson et al. (2016)	Survey: 230 firms in Hi-Tech sectors	U.S.	Manufacturing			x			x	x		x	x		
Jajja et al. (2017)	Survey: 296 firms (automotive/ chemical process/ engineering/ fast moving consumer goods/ pharmaceutical/ textile/ telecommunications)	Pakistan/ India	Manufacturing	x		x			x	x	x	x	x		
Jayaram and Pathak (2013)	Survey: 432 manufacturing firms (high value-added/ high technology products)	Not specified	Manufacturing	x		x			x	x	x	x	x		
Jayaraman and Luo (2007)						x		x	x	x	x	x	x	x	x
Jean et al. (2012)	Survey: 236 Taiwanese executives in electronic industry	Taiwan	Manufacturing	x		x			x	x	x	x	x		
Jean et al. (2014)	Survey: 170 multinational automobile suppliers	China	Manufacturing	x		x			x	x	x	x	x		
Johnsen et al. (2011)	Case study: 3 in-depth case studies of NPD projects (39 semi-structured interviews in automotive/ telecommunications)	Not specified	Manufacturing	x		x			x	x	x	x	x		
Juttner and Maklan (2011)	Case study: 28 semi-structured interviews of three global supply chains from different industries - cabling/specialty chemical products/wood/timber wholesaler.	Europe	Not specified	x		x		x			x	x	x		

Kache and Seuring (2017)	Delphi study: 20 international experts (management consulting companies)	Not specified	Not specified	x		x		x	x	x	x	x	x		
Kang et al.(2007)						x			x	x	x	x	x		
Khan et al. (2012)	Case study: interviews supply chain managers, design mangers, key personnel in design, procurement, sourcing and logistics of a fashion retailer	U.K.	Retailing			x		x	x	x	x	x	x		
Kim and Oh (2005)	Case study: Korean telecommunications company	Korea	Not specified	x		x			x		x	x	x		
Kim et al. (2010)	Survey: 184 companies	Not specified	Manufacturing/ Retailing	x		x		x	x	x	x	x	x		
Koufteros et al. (2007)	Survey: 157 films	U.S.	Manufacturing			x			x	x	x	x	x		
Koufteros et al. (2012)	Survey: 157 films	U.S.	Manufacturing	x		x			x	x		x	x		
Kuhne et al. (2013)	Survey: 270 firms	Europe	Customer/ Manufacturer/ Supplier	x		x			x			x	x		
Lau et al. (2007)	Survey: 251 manufacturing firms (Electronics/ Plastics/ Toys)	Hong Kong	Manufacturing	x		x		x	x	x	x	x	x		
Lau et al. (2011)	Survey: 251 manufacturing firms (Electronics/ Plastics/ Toys)	Hong Kong	Manufacturing	x		x		x	x	x	x	x	x		
Lee et al. (2011)	Survey: 243 hospitals	South Korea	Servicing			x		x	x	x	x	x	x	x	
Lee et al. (2014)	Survey: 133 firms	Malaysia	Manufacturing	x		x		x	x	x	x	x	x	x	x
Li et al. (2006)	Survey: 196 organizations	U.S.	Manufacturing			x		x	x	x	x	x	x		

Liao and Kuo (2014)	Survey: 127 firms of Thin-Film Transistor Liquid Crystal Display (TFT-LCD) industry	Taiwan	Manufacturing			x		x	x	x	x	x	x		
Lui et al. (2016)	Survey: 146 U.S. listed firms (adopted radio frequency identification, RFID)	U.S.	Manufacturing	x		x				x	x	x	x	x	x
MacCarthy et al. (2016)						x		x	x	x	x	x	x	x	x
Malhotra et al. (2005)	Case study: 13 IT enterprises	Not specified	Servicing			x			x	x	x	x	x		
Mclvor and Humphreys (2004)	Case study: 35 companies in electronic component sector	Not specified	Manufacturing	x		x			x	x		x	x		
Melnyk et al. (2009)	Survey: 45 respondents (22 academicians 23 practitioners)	Not specified	Not specified	x		x		x	x	x	x	x	x	x	
Melnyk et al. (2010)				x		x		x	x	x	x	x	x	x	
Miao et al. (2012)	Survey: 157 mid-management in firms	China	Manufacturing			x		x	x			x	x	x	x
Modi and Mabert (2010)	Survey: 148 firms (had at least one patent in each year over the years 1987-96)	U.S.	Manufacturing			x		x			x		x		
Munksgaard et al. (2014)	Case study: 4 case study companies (all running supply chain innovation projects)	Danish/ Denmark/ Sweden	Manufacturing/ Servicing	x	x	x		x	x	x	x	x	x		
Narasimhan and Narayanan (2013)						x			x	x	x	x	x	x	
Ojha et al. (2016)	Survey: 128 firms	U.S.	Manufacturing/ Servicing	x		x			x	x	x	x	x		
Oke et al. (2013)	Survey: 207 manufacturing firms	Australia	Manufacturing	x		x			x	x		x	x		

Pagell et al. (2004)	Case study: 11 different plants from 11 distinct companies	U.S.	Manufacturing			x		x	x	x	x	x	x		
Peng et al. (2013)	Survey: 238 manufacturing plants	Austria/ Finland/ Sweden, Germany/ Italy/ Japan/ Korea/ U.S.	Manufacturing	x		x			x	x	x	x	x		
Pero et al. (2010)	Multiple case studies - electric car & alternators, worldwide electro-valve producer, worldwide apparel industry, weapon producers	Not specified	Manufacturing	x		x		x	x	x	x	x	x		
Petersen et al. (2005)	Survey: 134 firms	Global	Manufacturing/ Non-manufacturing			x			x	x	x	x	x		
Radas and Bozic (2009)	Survey: 448 SMEs	Croatia	Manufacturing/ Servicing	x		x			x	x		x	x		
Ranganathan et al. (2011)	Survey: 249 firms	Canada/ U.S.	Manufacturing/ Servicing	x		x		x	x	x	x	x	x		
Robertson et al. (2002)	Case study: international steel manufacturer	Australia/ New Zealand/ South Asia/ South-east Asia	Manufacturing			x		x	x	x	x	x	x		
Roh et al. (2014)	Survey: 559 manufacturing firms	Global	Manufacturing	x		x		x	x	x	x	x	x		
Roy and Sivakumar (2010)				x		x			x	x		x	x		
Roy et al. (2004)				x		x			x	x	x	x	x		

Saenz et al. (2014)	Case study: 23 semi-structured interviews including focal buyers/ strategic suppliers	Not specified	Not specified	x		x			x	x	x	x	x		
Salvador and Villena (2013)	Survey: 238 plant directors in electronics/ machinery/ transportation equipment	Austria/ Germany/ Finland Italy/ Japan/ South Korea/ Sweden/ U.S.	Manufacturing			x			x	x	x	x	x		
Samiee et al. (2008)				x		x		x	x	x	x	x	x		x
Sampson and Spring (2012)	Survey: 1,380 customer roles survey responses	Not specified	Servicing	x		x			x	x	x	x	x		
Sanders et al. (2005)	Survey: 242 first-tier OEM suppliers (electronic computer industry)	U.S.	Manufacturing	x		x			x	x	x	x	x		
Sanders et al. (2008)	Survey: 241 first-tier OEM suppliers (electronic computer industry)	U.S.	Manufacturing	x		x		x	x	x	x	x	x		
Sarkis et al. (2012)				x	x	x	x	x	x	x	x	x	x	x	x
Sawhney et al. (2006)	Survey: 54 managers (a large public company in energy industry/ a midsize private firm in food industry)	Not specified	Not specified			x		x	x	x	x	x	x		
Schaltegger and Burritt (2014)						x				x	x		x	x	x
Schoenherr and Swink (2012)	Survey: 403 supply chain executives/ managers	Global	27 Industries including Manufacturing/ Retail etc	x		x		x	x		x	x	x		

Shavarini et al. (2013)	Survey: 160 companies for food industry and chemical industry (detergents)	Iran	Manufacturing			x			x	x	x	x	x		
Singh and Gregory (2008)	Multiple case studies - 11 supply networks sectors	Global	OEM/ Manufacturing/ Retailing/ Servicing			x	x	x	x	x	x	x	x		
Singhal and Singhal (2002)						x			x	x	x	x	x		
Skippari et al. (2017)	Case study: firms from all parts of supply chains	Finland	Brand owner/ Manufacturing/ Retailing/ Servicing/ Producing	x		x		x	x	x	x	x	x		
Soosay and Hyland (2008)	Case study, Australian engineering firm	Australia	Manufacturing			x			x	x	x		x		
Soosay et al. (2008)	Case study: interviews 23 managers in 10 case studies					x		x	x	x	x	x	x	x	
Storer et al. (2014)	Survey: 412 respondents Australian supply chain	Australia	Manufacturing			x			x	x	x	x	x		x
Tan et al. (2015)	Case study: leading eyeglasses manufacturer	China	Manufacturing			x			x	x	x	x	x		
Teichert and Bouncken (2011)	Survey: 241 small- and mid-sized companies (high-tech sector)	Not specified	Not specified	x		x			x	x		x	x		
Trautrims et al. (2017)	Case study: a premium car manufacturer	Europe	Manufacturing	x		x			x	x	x	x	x		
Turkulainen and Swink (2017)	Survey: 203 firms (various industries)	Not specified	Manufacturing	x		x		x	x	x	x	x	x		
Tomlinson and Fai (2013)	Survey: 371 SMEs	U.K.	Manufacturing	x		x		x	x	x		x	x		
Tracey and				x		x		x	x	x	x	x	x		

Neuhaus (2013)															
Vanpoucke et al. (2009)	Survey: 300 firms in primary goods/ chemical/ pharmaceutical/ consumer goods/ media & informatics industries	Not specified	Manufacturing	x		x		x	x	x	x	x	x		
Vickery et al. (2003)	Survey: 57 firms (automotive industry)	U.S.	Manufacturing	x		x		x	x	x	x	x	x		
von Massow and Canbolat (2014)				x		x			x			x	x	x	
Wagner and Bode (2014)	Survey: 367 firms (Automotive/ Chemicals/pharmaceuticals/ Consumer goods/ Electronics/ Industrial machinery)	Germany	Manufacturing	x		x			x	x	x	x	x		
Wagner et al. (2010)	Survey: 45 firms; Analysis: PLS structural model	Not specified	Manufacturing	x		x			x	x	x	x	x		
Wagner et al. (2012)	Survey: 67 supplier integration projects in 16 firms	Not specified	Manufacturing			x			x	x	x	x	x		
Wakolbinger and Cruz (2011)				x		x				x	x		x		
Wang et al. (2011)	Survey: 315 firms	China	Manufacturing	x		x			x	x	x	x	x		
Wong et al. (2011)	Survey: 151 Thailand's automotive manufacturing plants	Thailand	Manufacturing	x		x		x	x		x	x	x		
Wong et al. (2013)	Survey: 151 first-tier automotive suppliers & automakers	Thailand	Manufacturing	x		x			x	x	x	x	x		
Wu et al. (2013)	Survey: 289 firms	U.S.	Manufacturing/ Retailing			x				x	x		x		x

Wynstra et al. (2010)	Survey: 161 companies (production suppliers to car/ truck manufacturers)	Sweden	Manufacturing	x		x			x	x		x	x		
Yaibuathet et al. (2008)	Survey: 458 firms	China/ Japan/ Thailand	Manufacturing		x	x	x	x	x	x	x	x	x		x
Yeniyurt et al. (2014)	Survey: 144 firms (Tier 1 production suppliers of Original Equipment Manufacturers(OEMs))	U.S.	Manufacturing			x			x	x		x	x		
Yeung et al. (2008)	Survey: 225 electronics manufacturing firms	Hong Kong	Manufacturing	x		x		x	x		x	x	x		
Yin et al. (2018)				x	x	x	x	x	x	x	x	x	x		
Young et al. (2000)	Case study: furniture, industrial printing, electronic component, pharmaceutical companies	Not specified	Manufacturing	x		x				x	x		x	x	
Zhang et al. (2002)						x		x	x	x	x	x	x		x
Zimmermann et al. (2016)						x		x	x	x	x	x	x	x	

Appendix D - Theories and models used in the previous supply chain innovation research

Theory and Models	References	N
Absorptive capacity theory	[A147]	1
Agency theory	[A92], [A93]	2
Ambidexterity theory	[A145], [A146]	2
Capability-based theory	[A48], [A93], [A124], [A154]	4
Cognitive theory	[A18]	1
Coalition theory	[A11], [A87]	2
Complementarity theory	[A19]	1
Competence theory	[A154]	1
Contingency theory	[A26], [A64], [A81], [A93], [A134], [A144], [A145], [A146]	8
Coordination theory	[A120]	1
Innovation theory*	[A4], [A37], [A58], [A147]	4
Dynamic capabilities theory	[A51]	**1**
Ecological modernization theory	[A12], [A120]	2
Emerging theory	[A82]	1
Institutional theory	[A13], [A34], [A66], [A75], [A92], [A93], [A120], [A122]	8
Interaction theory	[A113]	1
Internalization theory	[A93]	1
Knowledge-based theory**	[A8], [A52], [A72], [A79], [A103], [A105], [A109], [A112], [A114], [A142], [A155]	11
Knowledge transfer theory	[A17]	1
Network theory***	[A4], [A21], [A29], [A31], [A74], [A76], [A83], [A107], [A113], [A122], [A155]	11

Organizational information processing theory	[A94], [A105], [A111], [A123], [A137], [A145], [A146]	7
Organizational theory****	[A14], [A15], [A24], [A32], [A76], [A87], [A104], [A107], [A119], [A142]	10
Random utility theory	[A5]	1
Real options theory	[A66]	1
Relational theory*****	[A2], [A9], [A13], [A28], [A54], [A93], [A107], [A112], [A113], [A145], [A146], [A155]	12
Resource advantage theory	[A3], [A5], [A31], [A52]	4
Resource-based theory******	[A3], [A4], [A12], [A28], [A33], [A37], [A41], [A45], [A47], [A51], [A52], [A53], [A54], [A56], [A59], [A65], [A73], [A84], [A86], [A87], [A91], [A93], [A102], [A105], [A109], [A111], [A120], [A123], [A124], [A128], [A130], [A132], [A142], [A151], [A154], [A155]	36
Resource dependence theory	[A8], [A15], [A68], [A71], [A74], [A103], [A137]	7
Reverse logistics theory	[A73]	1
Situated learning theory	[A113]	1
Social capital theory	[A8], [A68], [A103]	3
Social exchange theory	[A150]	1
Stakeholder theory	[A53], [A120]	2
Strategic choice theory*******	[A32], [A40], [A41], [A49]	4
Structural holes theory	[A31]	1
Supply network theory	[A125]	1
System dynamics theory	[A96]	1
Theory of combinatorial technological evolution	[A61]	1
Theory of constraints	[A25], [A55]	2
Theory of modular	[A115]	1

systems		
Theory of partner selection	[A33]	1
Theory of swift and even flow	[A99]	1
Transaction cost economics	[A2], [A4], [A5], [A7], [A8], [A28], [A35], [A47], [A59], [A68], [A75], [A86], [A87], [A93], [A102], [A105], [A106], [A107], [A113], [A116], [A118], [A119], [A137], [A138], [A140], [A142], [A151], [A155]	28
Trust theory	[A60]	1
Unified service theory	[A117]	1
Value-chain analysis	[A4], [A93]	2

* “Innovation theory” includes “Diffusion of innovation theory”/ “Innovation theory”/ “Innovation diffusion theory”/ “Schumpeter's theory of innovation”

** “Knowledge-based theory” includes “Knowledge-based theory”/ “Knowledge-based view”

*** “Network theory” includes “Network theory”/ “Network governance model”/ “Social network theory”

**** “Organizational theory” includes “Organizational theory”/ “Organizational design theory”/ “Organizational behavior theory”/ “Organizational learning theory”

***** “Relational theory” includes “Relational theory”/ “Relational contracting theory”/ “Relational exchange theory”/ “Relational marketing theory”/ “Relational view theory”/ “Relationship theory”

****** “Resource-based theory” includes “Resource-based theory”/ “Resource-based view”

******* “Strategic choice theory” includes “Strategic choice theory”/ “Strategic management theory”/ “Strategic structure-performance framework/ theory”

Some articles counted more than once because they apply more than one theory.

Appendix E - Theoretical perspectives

The five theoretical perspectives proposed to account for the phenomena of supply chain innovations:

- *Knowledge-based theory*
- *Organizational theory*
- *Transaction cost economics*
- *Relational theory*
- *Resource-based theory*

Below is a brief description of each theory.

Knowledge-based theory

The knowledge-based view sees knowledge as the strategic resource of the firm (Nonaka et al., 1991; Kogut and Zander, 1992; Thompson and Walsham, 2004; Grawe, 2009; Jayaram and Pathak, 2013). Proponents of this theory argue that knowledge-based resources are socially complex and have heterogeneous knowledge bases. They are difficult to imitate and lead to varying firms' capabilities (Grant, 1996). For example, managerial IT knowledge is one of the critical resources for effective IT diffusion/assimilation among/within firm networks (Armstrong and Sambamurthy, 1999; Ranganathan et al., 2011). The theory suggests that organizational capabilities integrate knowledge externally and internally to perform different productive tasks (Kogut and Zander, 1992; Peng et al., 2013).

Organizational theory

Organizational learning is defined as the capability of an organization to process knowledge, namely, to transfer, acquire, integrate, and create knowledge and modify its behavior to reflect new cognitive situations to enhance its performance (Jerez-Gomez et al., 2005). Camison and Villar-Lopez (2011) showed that the openness of firms resembles a climate in which they welcome new internal and external ideas and perspectives. This culture promotes creativity, agility, and innovativeness as ways to improve the work process.

Another important topic in organizational learning is the complex link between innovation and knowledge search (Levinthal and March, 1981; Nohria and Gulati, 1996). The organizational learning literature based on the behavioral theory of a firm has argued that a firm's contextual factors and its environment influence the search for external knowledge (Chen and Miller, 2007). Specifically, this context affects the availability of resources and limits their applications, similar to the abundance of external knowledge that can be used for innovations. Both of these factors can affect a firm's search strategy, as advanced in the organizational learning literature (Argote et al., 2003). Search depth/search breadth are also relevant concepts (Garriga et al., 2003).

Organizations learn when they encode inferences from experiences into conceptual frameworks and eventually into routines that guide their behavior (Arrow et al., 1962). Sherif et al. (2006) also illustrated that successful disruptive IT innovations require paying active attention to organizational learning with resources and to invest time in such learning activities.

Relational theory

Mesquita et al. (2008) discussed relational theory as an inter-organizational theory, suggesting that buyers and suppliers must invest efforts to enhance joint performance outcomes in product development. Azadegan et al. (2011) also argued that sharing interfirm resources leads to "jointly generated supernormal benefits," while buyers' and suppliers' commitments to people, time, effort, and funding represent their significant investments (Osborn and Hagedoorn, 1997; Petersen et al., 2005).

Resource-based theory

The focus of resource-based theory is internal to the firm and considers the firm as a bundle of resources (Priem and Butler, 2001a). This theory has been widely advocated (Barney, 1991; Barney, 2001) and researchers have considered a firm's internal technology resource base as the key driver of innovation (Benner and Tripsas, 2012; Hitt et al., 2001; Hoskisson et al., 1999). Firms with non-substitutable, valuable, and scarce resources can gain a sustainable competitive advantage.

Transaction cost economics

Transaction cost economics (TCE) is related to almost all "make or buy" decisions in various economic situations (Walker and Weber, 1987; Williamson, 2008; Wallenburg, 2009; Kamann and Van Nieulande, 2010; Anderson et al., 2011). This theory focuses on certain characteristics of transactions that determine how transactions are pursued (Coase, 1937; Williamson et al., 1975; Williamson, 1979; Arend and Wisnet, 2005). In addition, TCE suggests that uncertainty should lead to vertical integration as internalization reduces transaction costs and uncertainty in transactions (Williamson et al., 1975; Peng et al., 2013). It provides distinct recommendations for efficient boundary setting on the basis of the interplay between uncertainty, opportunism, bounded rationality, frequency of transactions, and asset specificity (Gadde et al., 2013).

References

Agarwal, A., Shankar, R., & Tiwari, M. K. (2007). Modeling agility of supply chain. Industrial Marketing Management, 36(4), 443-457.

Alexander, L., & Van Knippenberg, D. (2014). Teams in pursuit of radical innovation: A goal orientation perspective. Academy of Management Review, 39(4), 423-438.

Ambrose, E., Marshall, D., & Lynch, D. (2010). Buyer supplier perspectives on supply chain relationships. International Journal of Operations & Production Management, 30(12), 1269-1290.

Ambrosini, V., & Bowman, C. (2009). What are dynamic capabilities and are they a useful construct in strategic management?. International Journal of Management Reviews, 11(1), 29-49.

Ambulkar, S., Blackhurst, J., & Grawe, S. (2015). Firm's resilience to supply chain disruptions: Scale development and empirical examination. Journal of Operations Management, 33, 111-122.

Ancona, D. G., Goodman, P. S., Lawrence, B. S., & Tushman, M. L. (2001). Time: A new research lens. Academy of Management Review, 26(4), 645-663.

Anderson, N., Potočnik, K., & Zhou, J. (2014). Innovation and creativity in organizations: A state-of-the-science review, prospective commentary, and guiding framework. Journal of Management, 40(5), 1297-1333.

Angerhofer, B. J., & Angelides, M. C. (2006). A model and a performance measurement system for collaborative supply chains. Decision Support Systems, 42(1), 283-301.

Armstrong, C. P., & Sambamurthy, V. (1999). Information technology assimilation in firms: The influence of senior leadership and IT infrastructures. Information Systems Research, 10(4), 304-327.

Arnold, V., Benford, T., Hampton, C., & Sutton, S. G. (2010). Competing pressures of risk and absorptive capacity potential on commitment and information sharing in global supply chains. European Journal of Information Systems, 19(2), 134-152.

Argote, L., McEvily, B., & Reagans, R. (2003). Managing knowledge in organizations: n integrative framework and review of emerging themes. Management Sscience, 49(4), 571-582.

Aspara, J., Lamberg, J. A., Laukia, A., & Tikkanen, H. (2013). Corporate business model transformation and inter-organizational cognition: The case of Nokia. Long Range

Planning, 46(6), 459-474.

Bamberger, P. (2008). From the editors beyond contextualization: Using context theories to narrow the micro-macro gap in management research.

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99-120.

Barney, J. B. (2001). Is the resource-based "view" a useful perspective for strategic management research? Yes. Academy of Management Review, 26(1), 41-56.

Barrales-Molina, V., Bustinza, O. F., & Gutierrez-Gutierrez, L. J. (2013). Explaining the causes and effects of dynamic capabilities generation: A multiple-indicator multiple-cause modelling approach. British Journal of Management, 24(4), 571-591.

Basole, R. C., Bellamy, M. A., & Park, H. (2017). Visualization of innovation in global supply chain networks. Decision Sciences, 48(2), 288-306.

Bassellier, G., & Benbasat, I. (2004). Business competence of information technology professionals: Conceptual development and influence on IT-business partnerships. MIS Quarterly, 673-694.

Baum, J. A., Cowan, R., & Jonard, N. (2010). Network-independent partner selection and the evolution of innovation networks. Management Science, 56(11), 2094-2110.

Beamon, B. M. (1999). Measuring supply chain performance. International Journal of Operations & Production Management, 19(3), 275-292

Belanger, F., & Crossler, R. E. (2011). Privacy in the digital age: a review of information privacy research in information systems. MIS Quarterly, 35(4), 1017-1042.

Bello, D. C., Lohtia, R., & Sangtani, V. (2004). An institutional analysis of supply chain innovations in global marketing channels. Industrial Marketing Management, 33(1), 57-64.

Benner, M. J., & Tripsas, M. (2012). The influence of prior industry affiliation on framing in nascent industries: the evolution of digital cameras. Strategic Management Journal, 33(3), 277-302.

Beske-Janssen, P., Johnson, M. P., & Schaltegger, S. (2015). 20 years of performance measurement in sustainable supply chain management–what has been achieved? Supply Chain Management: An International Journal, 20(6), 664-680.

Bharadwaj, A. S. (2000). A resource-based perspective on information technology capability and firm performance: an empirical investigation. MIS Quarterly, 169-196.

Bhatt, G., Emdad, A., Roberts, N., & Grover, V. (2010). Building and leveraging information in dynamic environments: The role of IT infrastructure flexibility as enabler of organizational responsiveness and competitive advantage. Information & Management, 47(7-8), 341-349.

Bjorklund, M., & Forslund, H. (2018). A framework for classifying sustainable logistics innovations. Logistics Research, 11(1), 1-12.

Bogers, M., Afuah, A., & Bastian, B. (2010). Users as innovators: a review, critique, and future research directions. Journal of Management, 36(4), 857-875

Boyer, K. K., & Pagell, M. (2000). Measurement issues in empirical research: improving measures of operations strategy and advanced manufacturing technology. Journal of Operations Management, 18(3), 361-374.

Broadbent, M., Weill, P., & St. Clair, D. (1999). The implications of information technology infrastructure for business process redesign. MIS Quarterly, 159-182.

Brown, S. A., Dennis, A. R., & Venkatesh, V. (2010). Predicting collaboration technology use: Integrating technology adoption and collaboration research. *Journal of Management Information Systems*, *27*(2), 9-54.

Bruce, M., & Daly, L. (2011). Adding value: challenges for UK apparel supply chain management–a review. Production Planning & Control, 22(3), 210-220.

Byrd, T. A., & Turner, D. E. (2001). An exploratory examination of the relationship between flexible IT infrastructure and competitive advantage. Information & Management, 39(1), 41-52.

Camison, C., & Villar Lopez, A. (2010). An examination of the relationship between manufacturing flexibility and firm performance: The mediating role of innovation. International Journal of Operations & Production Management, 30(8), 853-878.

Camison, C., & Villar-López, A. (2011). Non-technical innovation: organizational memory and learning capabilities as antecedent factors with effects on sustained competitive advantage. Industrial Marketing Management, 40(8), 1294-1304.

Capron, L. (1999). The long-term performance of horizontal acquisitions. Strategic Management Journal, 987-1018.

Chan, A. T., Ngai, E. W., & Moon, K. K. (2017). The effects of strategic and manufacturing flexibilities and supply chain agility on firm performance in the fashion industry. European Journal of Operational Research, 259(2), 486-499.

Chang, H. H., Wong, K. H., & Chiu, W. S. (2019). The effects of business systems leveraging on supply chain performance: Process innovation and uncertainty as moderators. Information & Management, 56(6), 103-140.

Chang, S. J., Van Witteloostuijn, A., & Eden, L. (2010). From the editors: Common method variance in international business research. Journal of International Business Studies, 41, 178–184.

Chatha, K. A., & Butt, I. (2015). Themes of study in manufacturing strategy literature. International Journal of Operations & Production Management, 35(4), 604-698.

Chavez, R., Yu, W., Jacobs, M. A., & Feng, M. (2017). Manufacturing capability and organizational performance: The role of entrepreneurial orientation. International Journal of Production Economics, 184, 33-46.

Chen, I. J., Paulraj, A., & Lado, A. A. (2004). Strategic purchasing, supply management, and firm performance. Journal of Operations Management, 22(5), 505-523.

Chen, W. R., & Miller, K. D. (2007). Situational and institutional determinants of firms' R&D search intensity. Strategic Management Journal, 28(4), 369-381.

Chen, Y. S., Lin, M. J. J., & Chang, C. H. (2009). The positive effects of relationship learning and absorptive capacity on innovation performance and competitive advantage in industrial markets. Industrial Marketing Management, 38(2), 152-158.

Cheng, C. C., & Chen, J. S. (2013). Breakthrough innovation: the roles of dynamic innovation capabilities and open innovation activities. Journal of Business & Industrial Marketing, 28(5), 444-454.

Cheung, G. W., & Lau, R. S. (2007). Testing Mediation and Suppression Effects of Latent Variables. Organization Research Methods, 11(2), 296-325.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. Modern methods for business research, 295(2), 295-336.

Chiou, T. Y., Chan, H. K., Lettice, F., & Chung, S. H. (2011). The influence of greening the suppliers and green innovation on environmental performance and competitive advantage in Taiwan. Transportation Research Part E: Logistics and Transportation Review, 47(6), 822-836.

Churchill, G. A., & Iacobucci, D. (2006). Marketing research: methodological foundations. New York: Dryden Press.

Ciliberti, F., Pontrandolfo, P., & Scozzi, B. (2008). Logistics social responsibility: Standard adoption and practices in Italian companies. International Journal of Production Economics, 113(1), 88-106.

CNNIC (2018). China network development report. Beijing: China Network Information Center.

Coase, R. H. (1937). The nature of the firm. Economica, 4(16), 386-405.

Cohen, J. (1960). A coefficient of agreement for nominal scales. Educational and psychological measurement, 20(1), 37-46.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. Administrative Science Quarterly, 35(1), 128-152.

Cousins, P. D., Handfield, R. B., Lawson, B., & Petersen, K. J. (2006). Creating supply chain relational capital: the impact of formal and informal socialization processes. Journal of Operations Management, 24(6), 851-863.

Cousins, P. D., & Menguc, B. (2006). The implications of socialization and integration in supply chain management. Journal of Operations Management, 24(5), 604-620.

Cox, A. (2001). Managing with power: strategies for improving value appropriation from supply relationships. Journal of Supply Chain Management, 37(1), 42-47.

Cruz-González, J., Lopez-Saez, P., & Navas-Lopez, J. E. (2015). Absorbing knowledge from supply-chain, industry and science: The distinct moderating role of formal liaison devices on new product development and novelty. Industrial Marketing Management, 47, 75-85.

Damanpour, F., & Gopalakrishnan, S. (2001). The dynamics of the adoption of product and process innovations in organizations. Journal of Management Studies, 38(1), 45-65.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS quarterly, 319-340.

Devaraj, S., Krajewski, L., & Wei, J. C. (2007). Impact of eBusiness technologies on operational performance: the role of production information integration in the supply chain. Journal of Operations Management, 25(6), 1199-1216.

DeVellis, R. F. (2016). Scale development: Theory and applications (Vol. 26). Sage publications.

Diamantopoulos, A. (2011). Incorporating formative measures into covariance-based structural equation models. MIS Quarterly, 335-358

Dobrzykowski, D. D., Leuschner, R., Hong, P. C., & Roh, J. J. (2015). Examining absorptive capacity in supply chains: Linking responsive strategy and firm performance. Journal of Supply Chain Management, 51(4), 3-28.

Droge, C., Claycomb, C., & Germain, R. (2003). Does knowledge mediate the effect of context on performance? Some initial evidence. Decision Sciences, 34(3), 541-568.

Duncan, N. B. (1995). Capturing flexibility of information technology infrastructure: A study of resource characteristics and their measure. Journal of Management Information Systems, 12(2), 37-57.

Dyer, J. H., Kale, P., & Singh, H. (2004). When to ally and when to acquire. Harvard Business Review, 1-11.

Dyer, J. H., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. Academy of Management Review, 23(4), 660-679.

Eddleston, K. A., Kellermanns, F. W., & Sarathy, R. (2008). Resource configuration in family firms: Linking resources, strategic planning and technological opportunities to performance. Journal of Management Studies, 45(1), 26-50.

Edwards, J. R. (2001). Multidimensional constructs in organizational behavior research: An integrative analytical framework. Organizational Research Methods, 4(2), 144-192.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they?. Strategic Management Journal, 1105-1121

Eshima, Y., & Anderson, B. S. (2017). Firm growth, adaptive capability, and entrepreneurial orientation. Strategic Management Journal, 38(3), 770-779.

Evers, N., Andersson, S., & Hannibal, M. (2012). Stakeholders and marketing capabilities in international new ventures: evidence from Ireland, Sweden and Denmark. Journal of International Marketing, 20(4), 46-71.

Flint, D. J., Larsson, E., Gammelgaard, B., & Mentzer, J. T. (2005). Logistics innovation: a customer value-oriented social process. Journal of Business Logistics, 26(1), 113-147.

Flint, D. J., Larsson, E., & Gammelgaard, B. (2008). Exploring processes for customer value insights, supply chain learning and innovation: an international study. Journal of Business Logistics, 29(1), 257-281.

Fong, M. and Dodes, R. (2006), "Style & substance: some apparel makers now see China as a customer", Wall Street Journal (Eastern edition), 23 June, p. B1

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39-50.

Frohlich, M. T., & Westbrook, R. (2001). Arcs of integration: an international study of supply chain strategies. Journal of Operations Management, 19(2), 185-200.

Ganster, D. C., Hennessey, H. W., & Luthans, F. (1983). Social desirability response effects: Three alternative models. Academy of Management Journal, 26(2), 321-331.

Gao, D., Xu, Z., Ruan, Y. Z., & Lu, H. (2017). From a systematic literature review to integrated definition for sustainable supply chain innovation (SSCI). Journal of Cleaner Production, 142, 1518-1538.

Garriga, H., Von Krogh, G., & Spaeth, S. (2013). How constraints and knowledge impact open innovation. Strategic Management Journal, 34(9), 1134-1144.

Gefen, D., Straub, D., & Boudreau, M. C. (2000). Structural equation modeling and regression: Guidelines for research practice. Communications Of The Association For Information Systems, 4(1), 7.

Glaser, B., & Strauss, A. (1967). The Discovery of Grounded Theory Aldine Publishing Company. Hawthorne, New York.

Gnyawali, D. R., Fan, W., & Penner, J. (2010). Competitive actions and dynamics in the digital age: an empirical investigation of social networking firms. Information Systems Research, 21(3), 594-613.

Govindarajan, V., & Kopalle, P. K. (2006). Disruptiveness of innovations: measurement and an assessment of reliability and validity. Strategic Management Journal, 27(2), 189-199.

Grant, R. M. (1996). Toward a knowledge-based theory of the firm. Strategic Management Journal, 17(S2), 109-122.

Gregor, S. (2006). The nature of theory in information systems. MIS Quarterly, 611-642.

Gregory, G. D., Ngo, L. V., & Karavdic, M. (2017). Developing e-commerce marketing capabilities and efficiencies for enhanced performance in business-to-business export ventures. Industrial Marketing Management, 78, 146-157.

Gualandris, J., & Kalchschmidt, M. (2016). Developing environmental and social performance: the role of suppliers' sustainability and buyer–supplier trust. International Journal of Production Research, 54(8), 2470-2486.

Gunasekaran, A., Patel, C., Tirtiroglu, E., 2001. Performance measures and metrics in a supply chain environment. International Journal of Operations and Production Management 21 (1–2), 71–87.

Gunasekaran, A., Patel, C., & McGaughey, R. E. (2004). A framework for supply chain performance measurement. International Journal of Production Economics, 87(3), 333-347.

Guo, Z. X., Ngai, E. W. T., Yang, C., & Liang, X. (2015). An RFID-based intelligent decision support system architecture for production monitoring and scheduling in a distributed manufacturing environment. International Journal of Production Economics, 159, 16-28.

Hackbarth, G., & Kettinger, W. J. (2004). Strategic aspirations for net-enabled business. European Journal of Information Systems, 13(4), 273-285.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). Multivariate data analysis. 1998. Upper Saddle River.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. Journal of Marketing theory and Practice, 19(2), 139-152.

Hair Jr, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2014). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). Sage Publication Inc., 103.

Halldorsson, A., & Skjott-Larsen, T. (2004). Developing logistics competencies through third party logistics relationships. International Journal of Operations & Production Management, 24(2), 192-206.

Hallin, C. A., Andersen, T. J., & Tveterås, S. (2017). Harnessing the frontline employee sensing of capabilities for decision support. Decision Support Systems, 97, 104-112.

Hargrave, T. J., & Van de Ven, A. H. (2006). A collective action model of institutional innovation. Academy of Management Review, 31(4), 864-888.

He, Z. L., & Wong, P. K. (2004). Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis. Organization Science, 15(4), 481-494.

Hendricks, K. B., & Singhal, V. R. (2003). The effect of supply chain glitches on shareholder wealth. Journal of Operations Management, 21(5), 501-522.

Helfat, C. E. (1997). Know-how and asset complementarity and dynamic capability accumulation: the case of R&D. Strategic management journal, 18(5), 339-360.

Helfat, C. E., & Peteraf, M. A. (2003). The dynamic resource-based view: Capability lifecycles. Strategic Management Journal, 24(10), 997-1010.

Henke, J. W., & Zhang, C. (2010). Increasing supplier-driven innovation. MIT Sloan Management Review, 51(2), 41-46.

Hill, C. W., & Rothaermel, F. T. (2003). The performance of incumbent firms in the face of radical technological innovation. Academy of Management Review, 28(2), 257-274.

Hinkin, T. R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. Organizational research methods, 1(1), 104-121.

Hitt, M. A., Bierman, L., Shimizu, K., & Kochhar, R. (2001). Direct and moderating effects of human capital on strategy and performance in professional service firms: A resource-based perspective. Academy of Management Journal, 44(1), 13-28.

Hodgkinson, G. P., & Healey, M. P. (2011). Psychological foundations of dynamic capabilities: Reflexion and reflection in strategic management. Strategic Management Journal, 32(13), 1500-1516.

Hoehle, H., & Venkatesh, V. (2015). Mobile Application Usability: Conceptualization and Instrument Development. MIS Quarterly, 39(2).

Hong, W., Chan, F. K., Thong, J. Y., Chasalow, L. C., & Dhillon, G. (2013). A framework and guidelines for context-specific theorizing in information systems research. *Information Systems Research*, *25*(1), 111-136.

Hoskisson, R. E., Hitt, M. A., Wan, W. P., & Yiu, D. (1999). Theory and research in strategic management: Swings of a pendulum. Journal of Management, 25(3), 417-456.

Hsieh, T. J., Yeh, R. S., & Chen, Y. J. (2010). Business group characteristics and affiliated firm innovation: The case of Taiwan. Industrial Marketing Management, 39(4), 560-570.

Huo, B., Zhao, X., & Zhou, H. (2014). The effects of competitive environment on supply chain information sharing and performance: an empirical study in China. Production and Operations Management, 23(4), 552-569.

Huq, F. A., Chowdhury, I. N., & Klassen, R. D. (2016). Social management capabilities of multinational buying firms and their emerging market suppliers: An exploratory study of the clothing industry. Journal of Operations Management, 46, 19-37.

Hurley, R. F., & Hult, G. T. M. (1998). Innovation, market orientation, and organizational learning: an integration and empirical examination. The Journal of Marketing, 42-54.

Huston, L., & Sakkab, N. (2006). Connect and develop. Harvard business review, 84(3), 58-

66.

Inemek, A., & Matthyssens, P. (2013). The impact of buyer–supplier relationships on supplier innovativeness: An empirical study in cross-border supply networks. Industrial Marketing Management, 42(4), 580-594.

Jajja, M. S. S., Kannan, V. R., Brah, S. A., & Hassan, S. Z. (2017). Linkages between firm innovation strategy, suppliers, product innovation, and business performance: insights from resource dependence theory. International Journal of Operations & Production Management, 37(8), 1054-1075.

Jerez-Gomez, P., Cespedes-Lorente, J., & Valle-Cabrera, R. (2005). Organizational learning capability: a proposal of measurement. Journal of Business Research, 58(6), 715-725

Jiang, B., & Prater, E. (2002). Distribution and logistics development in China: The revolution has begun. International Journal of Physical Distribution & Logistics Management, 32(9), 783-798.

Jin, Y., Vonderembse, M., Ragu-Nathan, T. S., & Smith, J. T. (2014). Exploring relationships among IT-enabled sharing capability, supply chain flexibility, and competitive performance. International Journal of Production Economics, 153, 24-34.

Johnsen, R. E., & Ford, D. (2006). Interaction capability development of smaller suppliers in relationships with larger customers. Industrial Marketing Management, 35(8), 1002-1015.

Johnson, W. H., & Filippini, R. (2013). Integration capabilities as mediator of product development practices–performance. Journal of Engineering and Technology Management, 30(1), 95-111.

Jones, R. M. (2002). The apparel industry. Oxford: Blackwell Science.

Kache, F., & Seuring, S. (2017). Challenges and opportunities of digital information at the intersection of Big Data Analytics and supply chain management. International Journal of Operations & Production Management, 37(1), 10-36.

Kamann, D. J., & Van Nieulande, V. (2010). A Four-Filter Method for Outsourcing to Low-Cost Countries. Journal of Supply Chain Management, 46(2), 64-79.

Katila, R., & Ahuja, G. (2002). Something old, something new: A longitudinal study of search behavior and new product introduction. Academy of Management Journal, 45(6), 1183-1194.

Khalid, R. U., Seuring, S., Beske, P., Land, A., Yawar, S. A., & Wagner, R. (2015). Putting sustainable supply chain management into base of the pyramid research. Supply Chain

Management: An International Journal, 20(6), 681-696.

Khavul, S., Peterson, M., Mullens, D., & Rasheed, A. A. (2010). Going global with innovations from emerging economies: investment in customer support capabilities pays off. Journal of International Marketing, 18(4), 22-42.

Khazanchi, S., Lewis, M. W., & Boyer, K. K. (2007). Innovation-supportive culture: The impact of organizational values on process innovation. Journal of Operations Management, 25(4), 871-884.

Kim, M., & Chai, S. (2017). The impact of supplier innovativeness, information sharing and strategic sourcing on improving supply chain agility: Global supply chain perspective. International Journal of Production Economics, 187, 42-52.

Kim, K. T., Lee, J. S., & Lee, S. Y. (2017). The effects of supply chain fairness and the buyer's power sources on the innovation performance of the supplier: A mediating role of social capital accumulation. Journal of Business & Industrial Marketing, 32(7), 987-997.

Klassen, R. D., & Vereecke, A. (2012). Social issues in supply chains: Capabilities link responsibility, risk (opportunity), and performance. International Journal of Production Economics, 140(1), 103-115.

Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. Organization Science, 3(3), 383-397.

Kroes, J. R., & Ghosh, S. (2010). Outsourcing congruence with competitive priorities: Impact on supply chain and firm performance. Journal of Operations Management, 28(2), 124-143.

Kumar, G., Subramanian, N., & Arputham, R. M. (2018). Missing link between sustainability collaborative strategy and supply chain performance: Role of dynamic capability. International Journal of Production Economics, 203, 96-109.

Kwak, D. W., Seo, Y. J., & Mason, R. (2018). Investigating the relationship between supply chain innovation, risk management capabilities and competitive advantage in global supply chains. International Journal of Operations & Production Management, 38(1), 2-21.

Laursen, K., & Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. Strategic Management Journal, 27(2), 131-150.

Lawshe, C. H. (1975). A quantitative approach to content validity. Personnel psychology, 28(4), 563-575.

Lawson, B., Tyler, B. B., & Potter, A. (2015). Strategic suppliers' technical contributions to new product advantage: Substitution and configuration options. Journal of Product Innovation Management, 32(5), 760-776.

Lenox, M., & King, A. (2004). Prospects for developing absorptive capacity through internal information provision. Strategic Management Journal, 25(4), 331-345.

Levinthal, D., & March, J. G. (1981). A model of adaptive organizational search. Journal of Economic Behavior & Organization, 2(4), 307-333.

Lewis, B. R., Snyder, C. A., & Rainer Jr, R. K. (1995). An empirical assessment of the information resource management construct. Journal of Management Information Systems, 12(1), 199-223.

Li, M., & Ye, L. R. (1999). Information technology and firm performance: Linking with environmental, strategic and managerial contexts. Information & Management, 35(1), 43-51.

Li, Y., Liu, Y., & Liu, H. (2011). Co-opetition, distributor's entrepreneurial orientation and manufacturer's knowledge acquisition: Evidence from China. Journal of Operations Management, 29(1-2), 128-142.

Liang, H., Saraf, N., Hu, Q., & Xue, Y. (2007). Assimilation of enterprise systems: the effect of institutional pressures and the mediating role of top management. MIS Quarterly, 59-87.

Lichtenthaler, U. (2009). Absorptive capacity, environmental turbulence, and the complementarity of organizational learning processes. Academy of Management Journal, 52(4), 822-846.

Lichtenthaler, U., & Lichtenthaler, E. (2009). A capability-based framework for open innovation: Complementing absorptive capacity. Journal of Management Studies, 46(8), 1315-1338.

Lin, H. L., Li, H. Y., & Yang, C. H. (2011). Agglomeration and productivity: Firm-level evidence from China's textile industry. China Economic Review, 22(3), 313-329.

Liu, H., Ke, W., Wei, K. K., & Hua, Z. (2013). The impact of IT capabilities on firm performance: The mediating roles of absorptive capacity and supply chain agility. Decision Support Systems, 54(3), 1452-1462.

Lohmoller, J. B. (2013). Latent variable path modeling with partial least squares. Springer Science & Business Media.

Luzzini, D., Amann, M., Caniato, F., Essig, M., & Ronchi, S. (2015). The path of innovation: purchasing and supplier involvement into new product development. Industrial Marketing Management, 47, 109-120.

Lyu, J., Hu, L., Hung, K., & Mao, Z. (2017). Assessing services cape of cruise tourism: the perception of Chinese tourists. International Journal of Contemporary Hospitality Management, 29(10), 2556-2572.

Lyu, J., Mao, Z., & Hu, L. (2018). Cruise experience and its contribution to subjective well-being: A case of Chinese tourists. International Journal of Tourism Research, 20(2), 225-235

Mackenzie S. B., Podsakoff, P. M. & Podsakoff, N. P. (2011) Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques, MIS Quarterly, 35(2), 293-334

MacCarthy, B. L., Blome, C., Olhager, J., Srai, J. S., & Zhao, X. (2016). Supply chain evolution–theory, concepts and science. International Journal of Operations & Production Management, 36(12), 1696-1718.

Malhotra, M. K., & Grover, V. (1998). An assessment of survey research in POM: from constructs to theory. Journal of Operations Management, 16(4), 407-425.

Malhotra, A., Gosain, S. & El Sawy, O.A. (2005) "Absorptive capacity configurations in supply chains: gearing for partner-enabled market knowledge creation", MIS Quarterly, 29(1), 145-187.

Malhotra, N. K., Kim, S. S., & Patil, A. (2006). Common method variance in IS research: A comparison of alternative approaches and a reanalysis of past research. Management Science, 52(12), 1865-1883.

Manuj, I., Omar, A., & Pohlen, T. L. (2014). Inter-Organizational Learning in Supply Chains: A Focus on Logistics Service Providers and Their Customers. Journal of Business Logistics, 35(2), 103-120.

Markley, M. J., & Davis, L. (2007). Exploring future competitive advantage through sustainable supply chains. International Journal of Physical Distribution & Logistics Management, 37(9), 763-774.

Marshall, D., McCarthy, L., McGrath, P., & Claudy, M. (2015). Going above and beyond: how sustainability culture and entrepreneurial orientation drive social sustainability supply chain practice adoption. Supply Chain Management: An International Journal, 20(4), 434-454.

Masoumik, S. M., Abdul-Rashid, S. H., Olugu, E. U., Ghazilla, R., & Ariffin, R. (2014a). Sustainable supply chain design: a configurational approach. The Scientific World Journal, 2014, 1-16.

Masoumik, S. M., Abdul-Rashid, S. H., & Udoncy Olugu, E. (2014b). Gaining competitive advantage through strategic green supply chain management: From a literature review towards a conceptual model. International Journal of Supply Chain Management, 3(3), 49-58.

McDermott, G. A., & Corredoira, R. A. (2010). Network composition, collaborative ties, and upgrading in emerging-market firms: Lessons from the Argentine autoparts sector. Journal of International Business Studies, 41(2), 308-329.

Mejias, A. M., Paz, E., & Pardo, J. E. (2016). Efficiency and sustainability through the best practices in the Logistics Social Responsibility framework. International Journal of Operations & Production Management, 36(2), 164-199.

Menor, L. J. (2000). An empirical investigation of new service development competence and performance (Doctoral dissertation, University of North Carolina at Chapel Hill).

Mesquita, L. F., Anand, J., & Brush, T. H. (2008). Comparing the resource-based and relational views: knowledge transfer and spillover in vertical alliances. Strategic Management Journal, 29(9), 913-941.

Miles, M. B., & Huberman, A. M. (1994). Qualitative data analysis: An expanded sourcebook. Sage.

Moon, K. L., Ngai, E. W. T., Chang, J. M. T., & Ho, K. C. (2009). Measuring global production involvement: An exploratory study of Hong Kong clothing manufacturers. The Journal of The Textile Institute, 100(6), 475-485.

Moon, K. K. L., Yi, C. Y., & Ngai, E. W. T. (2012). An instrument for measuring supply chain flexibility for the textile and clothing companies. European Journal of Operational Research, 222(2), 191-203.

Moon, K. K., Mo, P. L., & Chan, R. L. (2014). Enterprise risk management: Insights from a textile-apparel supply chain. International Journal of Risk and Contingency Management (IJRCM), 3(2), 18-30.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. Information systems research, 2(3), 192-222.

Myers, M. D. (1997). Qualitative research in information systems. Management Information Systems Quarterly, 21(2), 241-242.

Nohria, N., & Gulati, R. (1996). Is slack good or bad for innovation?. Academy of Management Journal, 39(5), 1245-1264.

Nonaka, I. (1991). The Knowledge-Creating Company Harvard Business Review November-December 1991, 96-104.

Nunnally, J., & Bernstein, I. (1994). Psychometric Theory 3rd edition (MacGraw-Hill, New York).

O'Reilly III, C. A., & Tushman, M. L. (2008). Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. Research in Organizational Behavior, 28, 185-206

Ojha, D., Shockley, J., & Acharya, C. (2016). Supply chain organizational infrastructure for promoting entrepreneurial emphasis and innovativeness: The role of trust and learning. International Journal of Production Economics, 179, 212-227.

Oke, A., Prajogo, D. I., & Jayaram, J. (2013). Strengthening the innovation chain: The role of internal innovation climate and strategic relationships with supply chain partners. Journal of Supply Chain Management, 49(4), 43-58.

Osborn, R. N., & Hagedoorn, J. (1997). The institutionalization and evolutionary dynamics of interorganizational alliances and networks. Academy of Management Journal, 40(2), 261-278.

Qrunfleh, S., & Tarafdar, M. (2014). Supply chain information systems strategy: Impacts on supply chain performance and firm performance. International Journal of Production Economics, 147, 340-350.

Pagell, M., & Wu, Z. (2009). Building a more complete theory of sustainable supply chain management using case studies of 10 exemplars. Journal of Supply Chain Management, 45(2), 37-56.

Palmatier, R. W., Dant, R. P., & Grewal, D. (2007). A comparative longitudinal analysis of theoretical perspectives of interorganizational relationship performance. Journal of Marketing, 71(4), 172-194.

Panayides, P. M., & Lun, Y. V. (2009). The impact of trust on innovativeness and supply chain performance. International Journal of Production Economics, 122(1), 35-46.

Patnayakuni, R., Rai, A., & Seth, N. (2006). Relational antecedents of information flow integration for supply chain coordination. Journal of Management Information Systems, 23(1), 13-49

Pavlou, P. A., & El Sawy, O. A. (2010). The "third hand": IT-enabled competitive advantage in turbulence through improvisational capabilities. Information Systems Research, 21(3), 443-471.

Pavlou, P. A., & El Sawy, O. A. (2011). Understanding the elusive black box of dynamic capabilities. Decision Sciences, 42(1), 239-273.

Peng, D. X., Schroeder, R. G., & Shah, R. (2008). Linking routines to operations capabilities: A new perspective. Journal of Operations Management, 26(6), 730-748.

Peng, G., Dey, D., & Lahiri, A. (2014). Healthcare IT adoption: an analysis of knowledge transfer in socioeconomic networks. Journal of Management Information Systems, 31(3), 7-34.

Piecyk, M. I., & Bjorklund, M. (2015). Logistics service providers and corporate social responsibility: sustainability reporting in the logistics industry. International Journal of Physical Distribution & Logistics Management, 45(5), 459-485.

Piening, E. P., & Salge, T. O. (2015). Understanding the antecedents, contingencies, and performance implications of process innovation: A dynamic capabilities perspective. Journal of Product Innovation Management, 32(1), 80-97.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. Journal of Applied Psychology, 88(5), 879.

Popp, A. (2000). "Swamped in information but starved of data": information and intermediaries in clothing supply chains. Supply Chain Management: An International Journal, 5(3), 151-161.

Prajogo, D., Toy, J., Bhattacharya, A., Oke, A., & Cheng, T. C. E. (2018). The relationships between information management, process management and operational performance: Internal and external contexts. International Journal of Production Economics, 199, 95-103.

Prater, E., Biehl, M., & Smith, M. A. (2001). International supply chain agility-Tradeoffs between flexibility and uncertainty. International Journal of Operations & Production Management, 21(5/6), 823-839.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior Research Methods, 40(3), 879-891.

Priem, R. L., & Butler, J. E. (2001a). Is the resource-based "view" a useful perspective for strategic management research?. Academy of Management Review, 26(1), 22-40.

Priem, R. L., & Butler, J. E. (2001b). Tautology in the resource-based view and the implications of externally determined resource value: Further comments. Academy of Management Review, 26(1), 57-66.

Psillaki, M., Tsolas, I. E., & Margaritis, D. (2010). Evaluation of credit risk based on firm performance. European Journal of Operational Research, 201(3), 873-881.

Ragu-Nathan, B., Ragu-Nathan, T. S., Tu, Q., & Shi, Z. (2001). Information management (IM) strategy: the construct and its measurement. The Journal of Strategic Information Systems, 10(4), 265-289.

Rexhausen, D., Pibernik, R., & Kaiser, G. (2012). Customer-facing supply chain practices—The impact of demand and distribution management on supply chain success. Journal of Operations Management, 30(4), 269-281.

Rindskopf, D., & Rose, T. (1988). Some theory and applications of confirmatory second-order factor analysis. Multivariate behavioral research, 23(1), 51-67.

Ringle, C. M., Sarstedt, M., & Straub, D. (2012). A critical look at the use of PLS-SEM in MIS Quarterly, iii–xiv.

Rojo, A., Stevenson, M., Lloréns Montes, F. J., & Perez-Arostegui, M. N. (2018). Supply chain flexibility in dynamic environments: The enabling role of operational absorptive capacity and organisational learning. International Journal of Operations & Production Management, 38(3), 636-666.

Roy, S., Sivakumar, K., & Wilkinson, I. F. (2004). Innovation generation in supply chain relationships: A conceptual model and research propositions. Journal of the Academy of Marketing Science, 32(1), 61-79.

Schoenherr, T., & Swink, M. (2015). The roles of supply chain intelligence and adaptability in new product launch success. Decision Sciences, 46(5), 901-936.

Sherif, K., Zmud, R. W., & Browne, G. J. (2006). Managing peer-to-peer conflicts in disruptive information technology innovations: the case of software reuse. MIS Quarterly, 30(2), 339-356.

Shou, Y., Che, W., Dai, J., & Jia, F. (2018). Inter-organizational fit and environmental innovation in supply chains: A configuration approach. International Journal of Operations & Production Management, 38(8), 1683-1704.

Silvestre, B. S. (2015). A hard nut to crack! Implementing supply chain sustainability in an emerging economy. Journal of Cleaner Production, 96, 171-181.

Skinner, G., Han, S., & Chang, E. (2006). An information privacy taxonomy for collaborative environments. Information Management & Computer Security, 14(4), 382-394.

Skippari, M., Laukkanen, M., & Salo, J. (2017). Cognitive barriers to collaborative innovation generation in supply chain relationships. Industrial Marketing Management, 62, 108-117.

Smith, H. J., Dinev, T., & Xu, H. (2011). Information privacy research: an interdisciplinary review. MIS Quarterly, 35(4), 989-1016.

Srivastava, R. K., Shervani, T. A., & Fahey, L. (1999). Marketing, business processes, and shareholder value: An organizationally embedded view of marketing activities and the discipline of marketing. The Journal of Marketing, 168-179

Stam, W., & Elfring, T. (2008). Entrepreneurial orientation and new venture performance: The moderating role of intra and extra industry social capital. Academy of Management Journal, 51(1), 97-111.

Stephens Frings, G. (2002). Fashion from concept to consumer

Straub, D. W. (1989). Validating instruments in MIS research. MIS Quarterly, 147-169.

Straub, D., Boudreau, M. C., & Gefen, D. (2004). Validation guidelines for IS positivist research. Communications of the Association for Information systems, 13(1), 24.

Stewart, D. W., & Shamdasani, P. N. (2014). Focus groups: Theory and practice (Vol. 20). Sage publications.

Su, H. C., & Linderman, K. (2016). An Empirical Investigation in Sustaining High-Quality Performance. Decision Sciences, 47(5), 787-819.

Svensson, G., & Wagner, B. (2012). Implementation of a sustainable business cycle: the case of a Swedish dairy producer. Supply Chain Management: An International Journal, 17(1), 93-97.

Tanriverdi, H. (2006). Performance effects of information technology synergies in multibusiness firms. MIS Quarterly, 57-77.

Tanskanen, K., Holmström, J., & Öhman, M. (2015). Generative mechanisms of the adoption of logistics innovation: the case of on-site shops in construction supply chains. Journal of Business Logistics, 36(2), 139-159.

Teece, D. J. (1986). Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. Research Policy, 15(6), 285-305.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509-533.

Teece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. Strategic Management Journal, 28(13), 1319-1350.

Templeton G., and Snyder, C.A. Toward a method for providing database structures derived from an ontological specification process: The example of knowledge management. In A. Abecker, S. Decker, K. Kinkelmann, and U. Reimer, Proceedings of the Workshop "Knowledge-Based Systems for Knowledge Management in Enterprises." Kaiserslautern, Germany: DFKI GmbH, 1997, pp. 121–131.

Templeton, G. F., Lewis, B. R., & Snyder, C. A. (2002). Development of a measure for the organizational learning construct. Journal of management information systems, 19(2), 175-218.

Thompson, M., & Walsham, G. (2004). Placing knowledge management in context. Journal of Management Studies, 41(5), 725-747.

Trautrims, A., MacCarthy, B. L., & Okade, C. (2017). Building an innovation-based supplier portfolio: The use of patent analysis in strategic supplier selection in the automotive sector. International Journal of Production Economics, 1-9.

Tsai, K. H., & Yang, S. Y. (2013). Firm innovativeness and business performance: The joint moderating effects of market turbulence and competition. Industrial Marketing Management, 42(8), 1279-1294.

Tu, Q., Vonderembse, M. A., Ragu-Nathan, T. S., & Sharkey, T. W. (2006). Absorptive capacity: Enhancing the assimilation of time-based manufacturing practices. Journal of Operations Management, 24(5), 692-710.

Uhl-Bien, M., & Arena, M. (2018). Leadership for organizational adaptability: A theoretical synthesis and integrative framework. The Leadership Quarterly, 29(1), 89-104.

Unal, B., & Donthu, N. (2014). Role of absorptive capabilities in outsourcing the headquarters selling task in the United States. Industrial Marketing Management, 43(6), 1079-1084.

Vakharia, A. J. (2013). Elwood S. Buffa Doctoral Dissertation Competition. Decision Sciences, 44(2), 377-394.

Van Den Bosch, F. A., Volberda, H. W., & De Boer, M. (1999). Coevolution of firm absorptive capacity and knowledge environment: Organizational forms and combinative capabilities. Organization Science, 10(5), 551-568.

Van der Heijden, H. (2004). User acceptance of hedonic information systems. *MIS quarterly*, 695-704.

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. MIS Quarterly, 115-139.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS quarterly*, *36*(1), 157-178.

Vickery, S. K., Dröge, C., & Markland, R. E. (1997). Dimensions of manufacturing strength in the furniture industry. Journal of Operations Management, 15(4), 317-330.

Vokurka, R. J., & O'Leary-Kelly, S. W. (2000). A review of empirical research on manufacturing flexibility. Journal of Operations Management, 18(4), 485-501.

Volberda, H. W. (1996). Toward the flexible form: How to remain vital in hypercompetitive environments. Organization Science, 7(4), 359-374.

Vorhies, D. W., & Morgan, N. A. (2005). Benchmarking marketing capabilities for sustainable competitive advantage. Journal of Marketing, 69(1), 80-94.

Wagner, S. M. (2008). Innovation management in the German transportation industry. Journal of Business Logistics, 29(2), 215-231.

Wagner, S. M., & Sutter, R. (2012). A qualitative investigation of innovation between third--party logistics providers and customers. International Journal of Production Economics, 140(2), 944-958.

Walker, G., & Weber, D. (1987). Supplier competition, uncertainty, and make-or-buy decisions. Academy of Management Journal, 30(3), 589-596.

Wallenburg, C. (2009). Innovation in logistics outsourcing relationships: proactive improvement by logistics service providers as a driver of customer loyalty. Journal of Supply Chain Management, 45(2), 75-93.

Wang, C. L., & Ahmed, P. K. (2007). Dynamic capabilities: A review and research agenda. International Journal of Management Reviews, 9(1), 31-51.

Wang, C., & Hu, Q. (2017). Knowledge sharing in supply chain networks: Effects of collaborative innovation activities and capability on innovation performance. Technovation.

Wang, H. M. D., & Sengupta, S. (2016). Stakeholder relationships, brand equity, firm performance: A resource-based perspective. Journal of Business Research, 69(12), 5561-5568.

Wang, Q., Zhao, X., & Voss, C. (2016b). Customer orientation and innovation: A comparative study of manufacturing and service firms. International Journal of Production Economics, 171, 221-230.

Weber, B., & Heidenreich, S. (2018). When and with whom to cooperate? Investigating effects of cooperation stage and type on innovation capabilities and success. Long Range Planning, 51(2), 334-350.

Wernerfelt, B. (1984). A resource‐based view of the firm. Strategic Management Journal, 5(2), 171-180

Wetzels, M., Odekerken-Schröder, G., & Van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. MIS quarterly, 177-195.

Wheeler, B. C. (2002). NEBIC: A dynamic capabilities theory for assessing net-enablement, Information Systems Research, 13(2), 125-146.

Whitehead, K. K., Zacharia, Z. G., & Prater, E. L. (2016). Absorptive capacity versus distributive capability: the asymmetry of knowledge transfer. International Journal of Operations & Production Management, 36(10), 1308-1332.

Williamson, O. E. (1979). Transaction-cost economics: the governance of contractual relations. The Journal of Law and Economics, 22(2), 233-261.

Williamson, O. E. (2008). Outsourcing: Transaction cost economics and supply chain management. Journal of Supply Chain Management, 44(2), 5-16.

Wold, H. 1982. "Soft Modeling: The Basic Design and Some Extensions," in Systems Under Indirect Observations: Part II, K. G. Jöreskog and H. Wold (eds.), Amsterdam: North-Holland, pp. 1-54.

Wong, D.T.W. & Ngai, E.W.T, (2019). Critical review of supply chain innovation research (1999- 2016), Industrial Marketing Management, 82, 158-187

Wong, D. T. W. & Ngai, E. W. T. (2020). "Supply Chain Innovation: Conceptualization, Instrument Development and Influence on Supply Chain Performance". Working Paper, Department of Management and Marketing, The Hong Kong Polytechnic University, 2020.

Wright, R. T., Campbell, D. E., Thatcher, J. B., & Roberts, N. H. (2012). Operationalizing Multidimensional Constructs in Structural Equation Modeling: Recommendations for IS

Research. CAIS, 30(23), 367-412.

Wu, L., Yue, X., Jin, A., & Yen, D. C. (2016). Smart supply chain management: a review and implications for future research. The International Journal of Logistics Management, 27(2), 395-417.

Wycisk, C., McKelvey, B., & Hülsmann, M. (2008). “Smart parts” supply networks as complex adaptive systems: analysis and implications. International Journal of Physical Distribution & Logistics Management, 38(2), 108-125.

Yalcinkaya, G., Calantone, R. J., & Griffith, D. A. (2007). An examination of exploration and exploitation capabilities: Implications for product innovation and market performance. Journal of International Marketing, 15(4), 63-93.

Yi, C. Y., Ngai, E. W. T., & Moon, K. L. (2011). Supply chain flexibility in an uncertain environment: exploratory findings from five case studies. Supply Chain Management: An International Journal, 16(4), 271-283.

Yin, Y., Stecke, K. E., & Li, D. (2018). The evolution of production systems from Industry 2.0 through Industry 4.0. International Journal of Production Research, 56(1-2), 848-861.

Yli-Renko, H., Autio, E., & Sapienza, H. J. (2001). Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms. Strategic Management Journal, 22(6-7), 587-613.

Yu, K., Cadeaux, J., & Song, H. (2017). Flexibility and quality in logistics and relationships. Industrial Marketing Management, 62, 211-225.

Zacharia, Z. G., Nix, N. W., & Lusch, R. F. (2011). Capabilities that enhance outcomes of an episodic supply chain collaboration. Journal of Operations Management, 29(6), 591-603.

Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. Academy of Management Review, 27(2), 185-203.

Zhao, X., Flynn, B. B., & Roth, A. V. (2006). Decision sciences research in China: a critical review and research agenda—foundations and overview. Decision Sciences, 37(4), 451-496.

Zhao, X., Huo, B., Flynn, B. B., & Yeung, J. H. Y. (2008). The impact of power and relationship commitment on the integration between manufacturers and customers in a supply chain. Journal of Operations Management, 26(3), 368-388.

Zhao, X., Huo, B., Selen, W., & Yeung, J. H. Y. (2011a). The impact of internal integration and relationship commitment on external integration. Journal of Operations Management, 29(1-2), 17-32.

Zhao, X., Huo, B., Selen, W., & Yeung, J. H. Y. (2011b). The impact of internal integration and relationship commitment on external integration. Journal of Operations Management, 29(1-2), 17-32.

Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis. Journal of Consumer Research, 37(2), 197-206.

Zhou, H., & Benton Jr, W. C. (2007). Supply chain practice and information sharing. Journal of Operations Management, 25(6), 1348-1365.

Zhou, J., Mavondo, F. T., & Saunders, S. G. (2018). The relationship between marketing agility and financial performance under different levels of market turbulence. Forthcoming, at Industrial Marketing Management.

Zhou, K. Z., Gao, G. Y., Yang, Z., & Zhou, N. (2005). Developing strategic orientation in China: antecedents and consequences of market and innovation orientations. Journal of Business Research, 58(8), 1049-1058.

Zhou, K. Z., & Li, C. B. (2012). How knowledge affects radical innovation: Knowledge base, market knowledge acquisition, and internal knowledge sharing. Strategic Management Journal, 33(9), 1090-1102.

Zhu, K., Dong, S., Xu, S. X., & Kraemer, K. L. (2006). Innovation diffusion in global contexts: determinants of post-adoption digital transformation of European companies. European Journal of Information Systems, 15(6), 601-616.

Zimmermann, R., Ferreira, L. M. D. F., & Moreira, A. C. (2016). The influence of supply chain on the innovation process: a systematic literature review. Supply Chain Management: An International Journal, 21(3), 289-304.