Does Supply Chain Innovation Pay Off?

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Abstract The purpose of this chapter is to investigate the relationship among supply chain innovation and performance in terms of market and operational performance. The chapter is built on empirically data subject to 187 useable responses from a questionnaire-survey among Danish manufacturers. A conceptual model was developed and subsequently two major hypotheses were formulated. Linear regression was performed using SPSS software 22.0 to tests the developed hypotheses. Supply chain innovation is unfolded through the components of business processes, networks structure and technology. Data reveals that supply chain innovation does pay off in terms of improved market and operational performance. The chapter also reveals that the strongest relationship is obtained with supply chain innovation and operational performance. Market performance may be influenced by a number of different factors beyond supply chain innovation. The chapter provides interesting findings of the network component with empirical evidence that it has a positive influence on both market and operation performance. The chapter concludes by suggesting new areas of research including also the relationship to financial performance.

1 Introduction

Supply chain innovation undoubtedly has become the most essential feature for any firm to survive in today's dynamic and competitive marketplace (Zimmermann et al. 2016). It has been widely acknowledged in both academia and practice that companies supply chains are vital sources for future competitiveness (Arlbjørn et al. 2011; Hazen et al. 2012; Narasimhan and Narayanan 2013). Innovation processes are important both from a single company perspective and from a network perspective with a focus on shared processes (Arlbjørn and Paulraj 2013; Ojha et al. 2016;

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Wagner 2012). Supply chain innovation has received increased academic awareness (Arlbjørn et al. 2011; Lee et al. 2011; Vijayasarathy 2010; Yoon et al. 2016); however, with varied proposals for its content. Extant literature discusses supply chain innovation in relation with performance and has demanded this relationship further explored (Hazen et al. 2012; Panayides and Lun 2009). From a practical perspective, the supply chain area in general contains high cost impact in many companies and comprises much complexity about why a continued need to innovate in this area is important to remain competitive (DeTienne et al. 2015; Lee et al. 2011; Yoon et al. 2016). This chapter builds on the perception of supply chain innovation consisting of three components: (1) business processes, (2) network structure and (3) technology (Arlbjørn et al. 2011; Munksgaard et al. 2014). The major intention of supply chains is to build up their stability via continuous innovations as well as strategies to adapt to existing and new markets.

The role of supply chain innovation in developing the overall firm performance in terms of both market and operations seems still to be unexplored. Supply chain innovation helps the firms in sustaining their position in their market by providing original products, processes, and services. This in turn supports firms to also sustain their superior performance at an optimum level (Lee et al. 2011; Zimmermann et al. 2016). It is believed that supply chain innovation recommends firms to organize the three major components of business process innovation, network structure innovation, and technology innovation in order to achieve competitive edge and sustain superior performance by satisfying the needs of the customers and suppliers (Arlbjørn et al. 2011). This chapter induces supply chain innovation as an important capability that helps the firms in sustaining their overall performance in terms of market and operational performance.

Accordingly, the purpose of this chapter is to advance the understanding of supply chain innovation by testing how the overall supply chain innovation construct and its three individual components affect market and operational performance (Golicic and Smith 2013).

2 Theoretical Frame of Reference

This section describes the theoretical frame of reference which builds on supply chain innovation and market and operational performance. These two separate sections lead to the development of an overall theoretical model for the chapter presented in the third subsection.

2.1 Supply Chain Innovation

The phenomenon of supply chain innovation has been conceptualized by Arlbjørn et al. (2011) into three concurrent business components: (1) Business processes, (2) network structure and (3) technology. They define supply chain innovation as:

> a change (incremental or radical) within a supply chain network, supply chain technology, or supply chain process (or a combination of these) that can take place in a company function, within a company, in an industry or in a supply chain in order to enhance new value creation for the stakeholder (Arlbjørn et al. 2011, p. 8).

The framework has been used in various subject areas such as green supply chain innovation (Kronborg Jensen et al. 2013); humanitarian supply chain innovations (Heaslip et al. 2015), offshore wind energy sector supply chains (Stentoft et al. 2016a) and in relation to offshoring and backshoring of manufacturing (Stentoft et al. 2016b). In the following, the three components of the supply chain innovation framework are unfolded. We refer to Appendix for an operationalization of the different variables invested under each component.

2.1.1 Business Processes

The first component in the supply chain innovation framework is business processes. In the SCM literature, there is a strong agreement that business process thinking constitutes one of the backbones of supply chain management (Ellram and Cooper 2014; Lambert and Cooper 2000; Mentzer et al. 2001; Stock and Boyer 2009). This chapter uses the eight business processes developed by the Global Supply Chain Forum (Lambert and Cooper 2000) (see Appendix).

2.1.2 Network Structure

The second component in the SCI framework is the supply chain network structure. This component is about the how the focal company is positioned in the business network; the number of tiers across the supply chain (horizontal aspects), vertical aspects such as the number of dyads within tiers (Lambert and Cooper 2000) as well as internal alignment business different business functions. Furthermore, the component also includes aspects about the depth and width of relationships both upstream and downstream (Chen and Paulraj 2004) and different types members (e.g. customers, suppliers, competitors, universities and public agencies).

2.1.3 Technology

The third component of the supply chain innovation framework is supply chain technology. It is important to stress that SCI is not about the relevant technology itself [e.g. ERP, automation and additive manufacturing, and other disruptive technologies (Stentoft et al. 2017; Vyas 2016)] but it is in the novel use of technology in a supply chain context (Stentoft et al. 2016b). Technology may be applied in isolation or in combination with other technologies to create SCI (Munksgaard et al. 2014). Examples of technologies are enterprise resource planning (ERP) systems, identification systems (e.g. bar codes and radio frequency identification), analytical technologies, drone technology and Industry 4.0 technologies (e.g. robots, 3D printing and big data) (see Appendix).

2.2 Market and Operational Performance

Supply chain innovation supports the firms in effectively sustaining its competitive position and share in today's dynamic market and successively helps in sustaining their overall performance at an optimum level (Lee et al. 2011). Firm performance measurement describes the practice of evaluating firm's competence and effectiveness and it is crucial for effective firm management. Firm performance has in literature been used in several ways. In this chapter, we apply two of the three categories of firm performances as outlined by Golicic and Smith (2013). These two categories are market-based and operational-based performances. Market-based performance are concerned with indicators reflecting market goals such as meeting customer needs and includes market share, competitive advantage, customer loyalty, brand equity (see Appendix). Operational-based performance is concerned with operational efficiency with indicators such as process reliability, responsiveness, agility, costs and capacity utilization (see Appendix).

Market performance leads to superior customer value and profits (Flint et al. 2005; Min et al. 2007). Market performance measures increases the ability of the firms to assess the market condition and to accurately forecast the gains and performance (Cheng and Leung 2004). In addition, Ramaswami et al. (2009) states that firms should assess their market-based capabilities which include customer-driven development, cross functional integration, customer value, customer responsiveness, information sharing, and supply chain leadership. Market-based performance measures are not subjective to firm-specific traits (Ahmad and Jusoh 2014) instead they are more about external-oriented characteristics.

Operational performance relates to the activities that contribute towards consistency, responsiveness, productivity, costs and efficiency (Stank et al. 1999). Operational-oriented performance measures are more about internal-oriented traits and supports supply chain to continuously succeed in today's dynamic markets (Blome et al. 2013; Stank et al. 1999). In addition, Blome et al. (2013) describes operational performance measures as service-level accomplishments that lead to supply chain quality, supply chain efficiency, supply chain productivity, supply chain costs, and supply chain reliability. Operational performance also has positive impact on supply chain production planning and long-term firm perspectives (Brandon-Jones et al. 2014). Moreover, it is believed that high operational performance can be gained by networking with suppliers and customers (Patel et al. 2013; Rungtusanatham et al. 2003).

Above all, this chapter claims that supply chain innovation which includes business process, network structure, and technology leads to superior firm performance in terms of market-based as well as operational performance (Gunasekaran et al. 2004; Lee et al. 2011; Rungtusanatham et al. 2003).

2.3 Theoretical Model

The theoretical framework presented in Fig. 1 includes two major components, namely, supply chain innovation and performance. Supply chain innovation is a multidimensional construct which includes three dimensions business process (BP) innovation, network structure (NS) innovation, technology (TE) innovation. Likewise, the component performance includes market performance (PEMAR), and operational performance (PEOPR). The proposed model includes two major hypotheses (H1 and H2). In addition, this chapter will also investigate the relationship between the individual elements of supply chain innovation (business process, network structure, and technology) and performance (market and operational performance). The first dimension of supply chain innovation, business process includes customer relationship management (BPCRM), supplier relationship management (BPSRM), customer service management (BPCSM), demand management (BPDEM), order fulfilment (BPORF), manufacturing flow management (BPMFM), product development and commercialization (BPPDC), and returns management (BPREM). The second dimension of supply chain innovation, network structure includes internal functions (NSINT), customers (NSCUS), suppliers (NSSUP), third party provider logistics (NS3PL), competitors (NSCOM), consultants (NSCON), universities (NSUNI), and public authorities (NSPUB). The third dimension of supply chain innovation, technology includes planning and execution systems (TEPLA), identification systems (TEIDF), communication systems (TECOM), analytics technology (TEANA), electronic marketplaces (TEELM), advanced

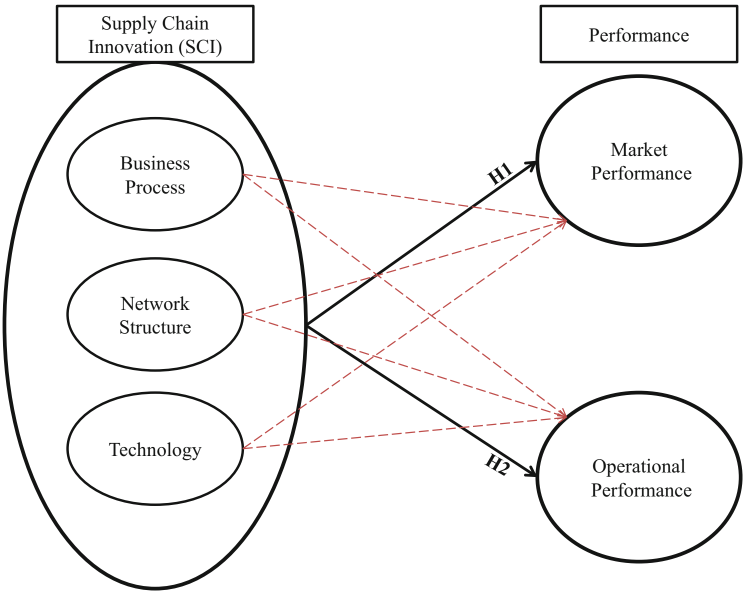

Fig. 1 Theoretical framework

manufacturing technologies (TEAMT), advanced materials (TEADM), big data (TEBIG), and drones (TEDRO). The various aspects of supply chain innovation were adopted from the extant literature (e.g., Arlbjørn et al. 2011). With respect to performance measures, the market performance measure comprises market share (PEMAR1), competitiveness (PEMAR2), customer loyalty (PEMAR3), and brand equity/value (PEMAR4) and the operational performance measure comprises reliability of supply chain processes (PEOPR1), supply chain responsiveness (PEOPR2), supply chain agility (PEOPR3), supply chain costs (PEOPR4), and effective capacity utilization (PEOPR5). The various aspects of performance measures were adopted from the existing literature (e.g., Golicic and Smith 2013).

A known fact, firms always aspire for innovation to achieve sustainable competitive advantage (Arlbjørn et al. 2011; Narasimhan and Narayanan 2013). Likewise, supply chain innovation help firms to achieve superior performance and new value creation (Arlbjørn et al. 2011; Arlbjørn and Paulraj 2013). Today, firms rely more on their supply chain partners to bring in greater innovation process (Bellamy et al. 2014) and therefore it is important to include all the three components of supply chain innovation (Arlbjørn et al. 2011) as well to concentrate equally on them to achieve higher firm performance. Most of the previous studies primarily concentrate on operational performance (e.g., Gligor and Holcomb 2012). On the contrary, this chapter planned to examine the firm performance in terms of both market and operational performance (Ahmad and Jusoh 2014; Patel et al. 2013; Swink et al. 2005). As discussed earlier, the primary objective of this chapter is to determine whether supply chain innovation could increase the firm performance in terms of market and operational performance. Accordingly, this chapter proposes the following two hypotheses:

H1 Supply chain innovation has a positive impact on market performance.

H2 Supply chain innovation has a positive impact in operational performance.

3 Method

This chapter is based on data gathered through a questionnaire-survey that was distributed among Danish manufacturing firms with at least 50 employees in the autumn 2016. The population of the companies was identified using the Danish company database "Names and numbers, business" (NN Markedsdata 2016). This chapter believes that medium and large enterprises work most systematically with supply chain innovation. The database allowed searching for these companies in a structured manner and the process resulted in a gross of 1580 companies. The selected companies were then telephoned and asked to be transferred to the person with the overall responsibility of supply chain management. This process provided us with a net population of 879 companies. Then email with a link to the electronic questionnaire (SurveyXact 2016) was sent to all the participating companies. Reminder e-mails were also sent to increase the response rate and allow comparison of early and late responses (before and after the initial deadline). This process finally resulted in 187 companies who provided valid responses with a response rate of approximately 21.3%.

The survey questionnaire was developed to test how different aspects of supply chain innovation affect different performance outcomes. The questionnaire included questions related to supply chain innovation in terms of business processes, network structure and technology (IT), and performance outcomes in terms of market based and operational based performance. The questions are grounded in the extant literature and validated by the industry representatives.

This chapter includes five constructs of which the first three are related to supply chain innovation and the other two are related to performance. The three constructs of supply chain innovation (the independent variables) was operationalized based on Arlbjørn et al. (2011) in terms of business process, technological and network innovations. The construct business process innovation was operationalized using the work of Lambert et al. (1998) and Lambert and Cooper (2000) in which the authors have defined eight supply chain processes. The respondents were asked to answer to what extent their company is pursuing innovation in relation to these eight supply chain business processes on a Likert-scale (from 1 very low degree to 5 very large degree). Technology usage in a supply chain management context is concerned with information technology (Arlbjørn et al. 2011; Vijayasarathy 2010) and this chapter believes that it is necessary to group the various technologies based on their purpose. First, identified measures within information management and operationalized it based on Vijayasarathy (2010) and Akkermans et al. (2003). Then, questions from general management literature were supplemented by including advanced manufacturing technologies and materials (Brennan et al. 2015; Vyas 2016) as well as analytics technologies and big data (Souza 2014; Wang et al. 2016). The respondents were specifically asked to answer to what extent their company is working with different technologies in their supply chain on a Likert-scale (from 1 very low degree to 5 very large degree). The construct network innovation was operationalized based on Pilav-Velić and Marjanovic (2016) as well as Fitjar and Rodríguez-Pose (2013) in which the authors have defined it as a company's external collaboration effort. The respondents were specifically asked to what extent their company innovates together with different supply chain actors on a Likert-scale (from 1 very low degree to 5 very large degree). Finally, the two constructs of performance (the dependent variables) were operationalized based on Golicic and Smith (2013) in which the authors identify market-based and operational-based performance as the two most frequently used dimensions of firm performance in business and supply chain management research (e.g. Gunasekaran and Kobu 2007; Hult et al. 2008a, b; Vachon and Klassen 2006). The respondents were specifically asked to indicate how they perceive their company's performance compared to their competitors on a Likert-scale (from 1 much worse to 5 much better).

This chapter uses the SPSS 22.0 software to evaluate the linear regression among the questions of interest. This analysis specifically identifies the relationship among the components of supply chain innovation and performance in terms of operational and market performance. As a first step of analysis, the relationship between the independent variable (supply chain innovation which includes business process, network and technology innovation) and the dependent variables market-based and operational-based performance was examined using linear regression. Then, the relationship between each individual components of supply chain innovation (business process, network and technology innovation) and performance (market-based and operational-based) was analyzed.

The complete list of indicators used to measure the various constructs are presented in Appendix. During the analysis, the indicator used to measure the construct business process (BP) innovation was supplier relationship management (BPSRM). The indicators used to measure the construct network structure (NS) innovation were public agencies (NSPUB), suppliers (NSSUP), third party providers (NS3PL), customers (NSCUS), competitors (NSCOM), universities (NSUNI), and consultants (NSCON). The indicators used to measure the construct technology (TE) innovation were identification systems (TEIDF), communication systems (TECOM), analytics technology (TEANA), electronic marketplaces (TEELM), advanced manufacturing technologies (TEAMT), and big data (TEBIG). The indicators used to measure the construct market performance (PEMAR) were market share (PEMAR1), competitiveness (PEMAR2), customer loyalty (PEMAR3), and brand equity/value (PEMAR4). The indicators used to measure the construct operational performance (PEOPR) were reliability of supply chain processes (PEOPR1), supply chain responsiveness (PEOPR2), supply chain agility (PEOPR3), supply chain costs (PEOPR4), and effective capacity utilization (PEOPR5).

4 Findings and Discussion

This section presents the results of the hypotheses tests (H1 and H2), including the standardized coefficient of each path in the proposed theoretical model. As a first step of analysis, reliability test was performed to observe the internal consistency and it is measured using the Cronbach's alpha value. This reliability designates the degree of correlation between the selected items. The reliability can be verified using Cronbach alpha value and the coefficient value of the construct should be 0.7 or higher (Hulland 1999; Nunnally and Bernstein 1994). In the reliability test, the Cronbach's alpha value for the construct market performance was 0.765 and operational performance was 0.796. The indicators for the constructs business process, network structure, and technology were directly used for the analysis except for market and operational performance.

Linear regression was performed to primarily examine the two proposed hypotheses. First, a simple linear regression was executed to predict the dependent/outcome variable (market performance) based on the independent/predictor variable (supply chain innovation). The result clearly indicates that supply chain innovation, without any doubt improves the market performance (see Table 1). In other words, the independent variable has a positive impact on the dependent variable and is statistically significant with an F-value of 1.866 ($p\text{-value} \leq 0.05$). Considering the

Table 1 Linear regression—supply chain innovation and market performance (H1)

	Dependent (market performance)
	Standardized coefficients Beta
BPSRM	−0.037
NSCUS	0.136
NSSUP	0.074
NS3PL	−0.171*
NSCOM	−0.059
NSCON	−0.195+
NSUNI	0.241*
NSPUB	0.093
TEIDF	0.021
TECOM	0.079
TEANA	0.098
TEELM	−0.176*
TEAMT	0.021
TEBIG	−0.070
Number of observations	186
F-value	1.866*
Adjusted R^2	0.061

*Significance at $p \leq 0.05$
+Significance at $p \leq 0.10$

components of the supply chain innovation, it is obvious that the emphasis is more on network with third-party logistics (NS3PL, p-value $\leq$ 0.05), network with consultants (NSCON, p-value $\leq$ 0.10), network with universities (NSUNI, p-value $\leq$ 0.05), and electronic marketplaces technology (TEELM, p-value $\leq$ 0.05) pertaining to market-based performance (see Table 1).

Then, a simple linear regression was executed to predict the dependent/outcome variable (operational performance) based on the independent/predictor variable (supply chain innovation). It is evident from the result that supply chain innovation helps in improving the operational performance (see Table 2). In particular, the independent variable has a positive impact on the dependent variable and is statistically significant with an F-value of 2.634 (p-value $\leq$ 0.01). Now, considering the components of the supply chain innovation, it is obvious that the emphasis is more on network with competitors (NSCOM, p-value $\leq$ 0.10), network with consultants (NSCON, p-value $\leq$ 0.01), network with universities (NSUNI, p-value $\leq$ 0.01), and electronic marketplaces technology (TEELM, p-value $\leq$ 0.10) concerning operational performance (see Table 2).

It is apparent from Tables 1 and 2 that supply chain innovation does payoff, however it can also be noticed that the more focus is on operational performance than that of market performance. Certainly, supply chain management is more of customer-driven, supply-driven, and market-driven, therefore, it is surprising that the results indicate there is less emphasis towards market performance. From a research

Table 2 Linear regression—supply chain innovation and operational performance (H2)

	Dependent (operational performance)
	Standardized coefficients Beta
BPSRM	0.020
NSCUS	0.109
NSSUP	0.028
NS3PL	0.012
NSCOM	0.148+
NSCON	−0.293**
NSUNI	0.245**
NSPUB	0.014
TEIDF	0.096
TECOM	0.037
TEANA	0.128
TEELM	−0.146+
TEAMT	0.036
TEBIG	0.063
Number of observations	186
F-value	2.634**
Adjusted R^2	0.110

**Significant at $p \leq 0.01$
+Significance at $p \leq 0.10$

perspective, the extant literature also shows less importance on market-oriented measures while measuring the firm performance and demonstrates insignificant results while statistically examining the market performance (Ahmad and Jusoh 2014; Swink et al. 2005). Therefore, it is obvious that there is a potential gap in both research and practice. Now, this chapter claims that the research should focus on market-oriented performance measures and also firms should start concentrating equally on both operational and market performance. Furthermore, this chapter recommends that market oriented firms will experience increased customer focus which in turn helps in customer satisfaction, synchronized marketing to advance the competitiveness and market share as well as profit orientation (e.g., Min et al. 2007). As mentioned earlier, firms should also concentrate on market based performance as it increases their existing market oriented capabilities. Above all, market-oriented performance assists firms in modifying their firm and network capabilities on the basis of their opportunities of the future firm performance (e.g., Golicic and Smith 2013; Ramaswami et al. 2009). On the other hand, it is interesting to notice that firms are continuing their emphasis on operational performance however there is still potential for further improvement. The overall results of the major hypotheses are presented in Fig. 2.

In addition to the main hypotheses (H1 and H2), this chapter also made an attempt to examine the relationship between the individual components of supply chain

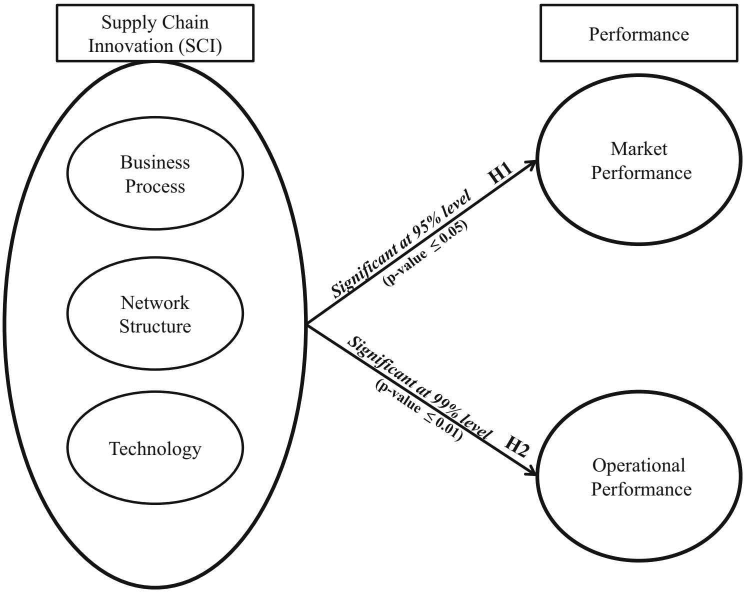

Fig. 2 Hypotheses—results

innovation such as business process, network structure as well as technology and performance in terms of market and operational performance. The results of the individual components of the supply chain innovation with respect to performance are presented in Fig. 3.

As an initial step, this study examined the relationship between business process and performance. In regard to the element business process, the only indicator considered for analysis was supplier relationship management (BPSRM). From Fig. 3, it is evident that business process has a positive relationship with only operational performance (F-value: 4.577, p-value $\leq$ 0.05) and not with market performance. Most of the earlier studies have concentrated more on operational performance measures than that of market performance and this could be the reason for this insignificant result with respect to business process and market performance. Another explanation for this could be that it might be easier to relate and isolate an innovation effort of a specific business processes to operational performance than to market performance. An improved market performance might be caused by other factors also than business process innovations. In contrast, operational performance improvements might a have stronger and direct relation to business process innovations. However, this chapter argues that firms should not consider only operational performance as long-term instead they should perceive both market performance and operational performance as long-term objectives.

As a next step, this study examined the relationship between network structure and performance. It is clear from Fig. 3 and Table 3 that network structure has a positive relationship with market performance (significant at 99% level). In addition,

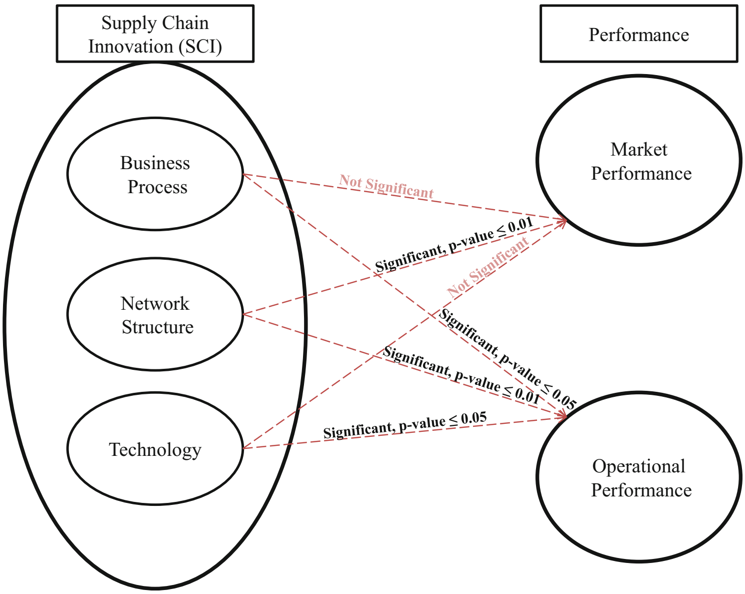

Fig. 3 Components of supply chain management

considering the indicators of network structure, it is obvious that the emphasis is more on third party provider logistics (NS3PL, p-value $\leq$ 0.05), consultants (NSCON, p-value $\leq$ 0.10), universities (NSUNI, p-value $\leq$ 0.05) pertaining to market performance.

From Fig. 3 and Table 4 it is evident that network structure has a positive relationship with operational performance (significant at 99% level).

In addition, considering the indicators of network structure, it is obvious that the emphasis is more on competitors (NCOM, p-value $\leq$ 0.10), consultants (NSCON, p-value $\leq$ 0.05), universities (NSUNI, p-value $\leq$ 0.01) concerning operational performance. Therefore, in general, the component network structure has a positive relationship with both market and operational performance. This is an interesting result since an earlier empirical study on this supply chain innovation framework found that the network structure component received the lowest mean value of 3.3 on a 5 point Likert scale on the respondents' perceptions of the components importance in creating supply chain innovations (Arlbjørn et al. 2013, p. 40). The technology component received an average of 3.5 and the business process component received an average of 3.8. The new findings of the survey reported in this chapter indicate that companies have become aware of the fact that they are dependent on their network actors' relationship in order to obtain both market and operational performance improvements.

Finally, this study examined the relationship between technology and performance. It is obvious from Fig. 3 and Table 5 that technology has no relationship with

Table 3 Linear regression—network structure and market performance

	Dependent (market performance) Standardized coefficients Beta
NSCUS	0.107
NSSUP	0.077
NS3PL	−0.195*
NSCOM	−0.082
NSCON	-0.180^{+}
NSUNI	0.224*
NSPUB	0.116
Number of observations	186
F-value	2.885**
Adjusted R^2	0.066

**Significant at $p \leq 0.01$
*Significance at $p \leq 0.05$
$^{+}$Significance at $p \leq 0.10$

Table 4 Linear regression—network structure and operational performance

	Dependent (operational performance) Standardized coefficients Beta
NSCUS	0.088
NSSUP	0.087
NS3PL	0.013
NSCOM	0.143^{+}
NSCON	−0.241*
NSUNI	0.274**
NSPUB	0.032
Number of observations	186
F-value	3.911**
Adjusted R^2	0.099

**Significant at $p \leq 0.01$
*Significance at $p \leq 0.05$
$^{+}$Significance at $p \leq 0.10$

market performance. This insignificant result could be because it might be difficult to relate a specific technology being the reason for improved market share and customer loyalty. Another explanation could be that companies still need to develop the strategic links between technology strategies and market performance.

On the other hand, it is evident from Fig. 3 and Table 6 that there is a positive relationship between technology and operational performance (significance at 95% level). Thus, it can be inferred that the respondents do perceive their technology innovations efforts and this efforts will certainly have an impact on their operational performances (e.g. more reliable processes, better cost performance and improved responsiveness).

Table 5 Linear regression—technology and market performance

	Dependent (market performance)
	Standardized coefficients Beta
TEIDF	0.031
TECOM	0.042
TEANA	0.122
TEELM	−0.177*
TEAMT	0.007
TEBIG	−0.057
Number of observations	186
F-value	0.934
Adjusted R^2	−0.002

*Significance at $p \leq 0.05$

Table 6 Linear regression—technology and operational performance

	Dependent (operational performance)
	Standardized coefficients Beta
TEIDF	0.133
TECOM	0.015
TEANA	0.136
TEELM	−0.068
TEAMT	0.036
TEBIG	0.079
Number of observations	186
F-value	2.230*
Adjusted R^2	0.038

*Significance at $p \leq 0.05$

Largely, the results of the analysis of the individual elements of supply chain innovation clearly indicate that there is more concentration on the element network structure than that of business process and technology. According to Arlbjørn et al. (2011), the supply chain innovation should include all the three elements and the firms should focus on all three elements equally to experience supply chain innovation. However, the firms at the moment are not focusing much on business process and technology pertaining to market performance. It is great that firms understand the importance of networking with their supply chain partners to innovate and to achieve greater performance in terms of market and operational performance. On the contrary, this chapter insists firms to realize the importance of business process and technology with reference to market performance. Firms need to start focusing equally on all the three elements of supply chain innovation to achieve higher performance in terms of both market and operational performance. Firms to achieve sustainable growth in terms of both market and operation should establish strong business process practice and employ robust technologies. Having said this, concerning network structure, it is evident that firms are not utilizing the entire available network. Firms again should recognize the value existing in the supply chain network to experience greater innovation and firm performance. Most importantly, taking all the three elements of supply chain innovation into account, supply chain innovation does pay off in terms of market and operation performance however the strongest relationship is for operational performance.

5 Conclusion

The objective of this chapter was to investigate the relationship between supply chain innovation and market and operational performance. In view of this objective, the data was analyzed and the results reveal that there is a positive relationship between supply chain innovation and market performance (significant at 95% level) and operation performance (significant at 99% level). Thus, the overall construct of supply chain innovation does pay off in terms of market and operation performance as measured in this chapter. The strongest relationship is for operational performance which indicates that the companies are aware of the fact that they need to innovate with their supply chains in order to lever their competitive parameters. It is also interesting to see that their innovations efforts also have a positive impact on market performance which indicates that the respondents have understood the importance of operating and developing market oriented supply chains (Green et al. 2006; Min et al. 2007; Min and Mentzer 2000).

When decomposing the overall supply chain innovation construct into its three constituting components: (a) the results reveal that business process innovation component seems to be more operational (significant at 95% level) focused than on market; (b) the results show that network structure innovation component has a positive relationship with both market and operation performance (both significant at 99% level); (c) the results show that technology innovation component seems to have a positive relationship with only operational performance (significant at 95% level) and not with market performance.

From a theoretical perspective, this chapter shows the positive relationship supply chain innovation and performance in terms of market and operational performance and in turn provides a road map for the researchers to continue their study focusing on other performance measures, for instance, financial performance measures. Supply chain innovation is an interesting and well established concept; therefore it is also opportunity to further develop this initial work grounding on various theories (e.g. dynamic capability, resource-based view, etc.). This will be a definite contribution to the prevalent literature to understanding the concept. The next phase of this study will be examining the individual indicators of business process, network structure and technology with respect to financial performance measures (including market and operational performance) (e.g., Shi and Yu 2013). In addition, several other hypotheses will be formulated and various other advanced statistical tests will be performance to evaluate the relationships between supply chain innovation (business process, network structure, and technology innovation) and performance (market, operational, and financial performance). Most importantly, it will be more stimulating to extend the current theoretical model with moderators such as firm size, technology intensity, industry clockspeed, innovation, ambidexterity, absorptive capacity etc. These moderating factors might have a significant impact and will provide more insights concerning the relationship between supply chain innovation and performance in terms of market, operation and finance. This study also tried to test the model with some of the above mentioned moderators and the results did show positive impact for some moderators and negative impact for some moderators concerning the explanation of the overall relationship between supply chain innovation and performance. However, this chapter did not include the results showing the impact of these moderators on the overall theoretical model. Furthermore, the extension of this current study will be certainly explored in the future research including extensive analysis of the moderators explaining the relationship between supply chain innovation and performance with reference to market, operation and finance. Besides theoretical contribution, this chapter recommends firms to observe supply chain innovation in connection with business process innovation, network structure innovation, and technology innovation to realize superior performance in terms of both market and operational performance. The results of this chapter inform firms that they are not focusing on market performance measures at the moment. Therefore, to achieve long-term objectives, firms should not just pursue supply chain innovation and measure their performance only in terms of operational; instead, they have to strategically integrate all the elements of supply chain innovation and measure their performance in terms of both market and operational.

Appendix

Business Processes

To what extent is your company pursuing innovations in the following supply chain management business processes?

- Customer Relationship Management (CRM)
- Supplier Relationship Management (SRM)
- Customer Service Management (CSM)
- Demand Management (DeM)
- Order Fulfilment (OrF)
- Manufacturing Flow Management (MFM)
- Product Development and Commercialization (PDC)
- Returns Management (ReM)

Network Structure

To what extent does your company innovate together with the following supply chain network actors?

- Internal functions
- Customers
- Suppliers
- Third party providers (e.g. logistics providers)
- Competitors
- Consultants
- Universities
- Public agencies

Technology

To what extent does your company work with the following technologies in your supply chain?

- Planning and execution systems (e.g. enterprise resource planning systems, advanced planning systems, material requirements systems)
- Identification systems (e.g. barcodes, radio frequency identification)
- Communication systems (e.g. electronic data interchange, web-based communication tools, mobile communication solutions, cloud technology)
- Analytics technology (e.g. business intelligence, statistics and analytics software, algorithms)
- Electronic marketplaces (e.g. e-portals, e-auctions, supplier collaboration tools)
- Advanced manufacturing technologies (e.g. advanced robotics, 3D-printing)
- Advanced materials (e.g. ultra-light or high-strength materials)
- Big data
- Drones

Market Performance

Indicate how you perceive your company's performance relative to your competitors?

- Market share
- Competitiveness
- Customer loyalty
- Brand equity

Operational Performance

Indicate how you perceive your company's performance relative to your competitors?

- Reliability of supply chain processes
- Supply chain responsiveness
- Supply chain agility
- Supply chain costs
- Effective capacity utilization

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