African Journal of Business Management Vol. 6(19), pp. 5939-5949, 16 May, 2012
Available online at http://www.academicjournals.org/AJBM
DOI: 10.5897/AJBM11.1136
ISSN 1993-8233 ©2012 Academic Journals

Full Length Research Paper

Impact of supply chain management practices on innovation and organizational performance in Iranian Companies

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Accepted 16 August, 2011

Supply chain management (SCM) is effective way to improve innovation and organizational performance. This research conceptualizes and develops five dimensions of SCM practice (strategic supplier partnership, customer relationship, information technology, information sharing, and Supply chain integration) and tests the relationships between SCM practices, innovation and organizational performance. A survey is conducted on 186 Iranian managers. Data are analyzed using principal components analysis and relationships are tested using linear regression. Results show the importance of supply chain management practices adoption. It reveals their positive impacts on innovation and organizational performance.

Key words: Supply chain management, innovation performance, organizational performance.

INTRODUCTION

Over the past two decades, supply chain management (SCM), emphasizing the interdependence of buyer and supplier firms working collaboratively to improve the performance of the entire supply, has generated extensive interest in both academic and practitioner communities (Shin et al., 2000; Narasimhan and Kim, 2007).

Supply chain management is an integrated approach beginning with planning and control of materials, logistics, services, and information stream from suppliers to manufacturers or service providers to the end client; it represents a most important change in business management practices (Fantazy et al., 2010). It is one of the most effective ways for firms to improve their performance (Ou et al., 2010).

In supply chain management, the emphasis is on how well a chain or group of companies performs in these terms, in order to create value for the final customer (Brewer and Speh, 2001). Carter and Narasimhan (1996) saw SCM as a primary future trend important for purchasing and supply management professionals in the 21st century.

SCM often refers either to a process-oriented management approach to sourcing, producing and delivering goods and services to end consumers or, in a broader meaning, to the co-ordination of the various actors belonging to the same supply chain (Harland, 1996). SCM includes a set of approaches and practices to effectively integrate suppliers, manufacturers, distributors and customers for improving the long-term performance of the individual firms and the supply chain as a whole in a cohesive and high-performing business model (Chopra and Meindl, 2001).

A successful SCM implementation is expected to enhance the relationship between upstream suppliers and downstream customers, and thereby increase customer satisfaction and firm performance. Prior research has indicated SCM as a key driver of firm performance (Kannan and Tan, 2005).

Everyone agrees that effective supply chain management can provide a major source of competitive advantage. The goal of a supply chain manager must therefore be to link the end customers, the channels of

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distribution, the production processes and the procurement activity in such a way that customers' service expectations are exceeded and yet at a lower total cost than the competition.

Organizations seek competitive capabilities that enable them to exceed customers' expectations and enhance market and financial performance (Hayes and Pisano, 1994; Lado et al., 1992). Effective and efficient supply chain management has become a key component of corporate strategy, competitive advantage, and success (Narasimhan and Talluri, 2009). SCM is critical to organizational performance (Vanichchinchai and Igel, 2009).

Despite the importance of certain supply chain activities (e.g. transportation and warehousing) in cost containment, supply chain management was long overlooked as a potential area for achieving sustainable competitive advantage (Coyle, 1990; Fawcett and Clinton, 1997; van Amstel and Starreveld, 1993).

Studies on supply chain management practices in different industrial sectors allow their special features to be distinguished to the applied practices, and improvement of SCM theories. These studies have been very valuable. To date, studied industrial sectors are, for example, pharmaceutical (Lurquin, 1996), automobile (Helper, 1991; Choi and Hong, 2002), apparel (Christopher and Peck, 1997), chemical (Vlasimsky, 2003), computer (Magretta, 1998), telecommunication (Catalan and Kotzab, 2003), toy (Chee et al., 2005) and grocery (Fernie, 1995; Zairi, 1998).

Many SCM studies were conducted in developed countries. SCM in many developing countries is different from SCM in developed countries. This study focuses on Iranian companies. The purpose of this study is therefore to empirically test a framework identifying the relationships among SCM practices, innovation and organizational performance in Iranian companies.

SCM practices are defined as the set of activities undertaken by an organization to promote effective management of its supply chain. The practices of SCM are proposed to be a multi-dimensional concept, including the downstream and upstream sides of the supply chain. The remainder of the paper is organized as follows: Subsequently the study provides a literature review that helps develop the research model and sets out the study's hypotheses. Research methodology is then discussed next, followed by results and discussions and lastly the study presented conclusions and Implications.

LITERATURE REVIEW AND HYPOTHESES

The SCM framework developed in this study is shown in Figure 1. The model proposes that SCM practices implemented by organizations in Iran will improve their organizational and innovation performance. The SCM practices and organizational and innovation performance constructs are discussed subsequently.

SCM practices

SCM practices are defined as the set of activities undertaken by an organization to promote effective management of its supply chain (Koh et al., 2007). Donlon (1996) describes the evolution of SCM practices, which include supplier partnership, outsourcing, and cycle time compression, continuous process flow, and information technology sharing.

Alvarado and Kotzab (2001) include in their list of SCM practices concentration on core competencies, use of inter-organizational systems such as electronic data interchange (EDI), and elimination of excess inventory levels by postponing customization toward the end of the supply chain. Bayraktar's et al. (2009) studies identify a set of 12 SCM practices: close partnership with suppliers, close partnership with customers, just in time supply, strategic planning, supply chain benchmarking, few suppliers, holding safety stock, e-procurement, outsourcing, subcontracting, 3PL, many suppliers.

Tan et al. (2002) identify six aspects of SCM practice through factor analysis: supply chain integration, information sharing, supply chain characteristics, customer service management, geographical proximity and Just-in-time (JIT) capability.

Sahay and Mohan (2003) proposed that SCM practices to be measured in four dimensions, and they are: alignment between supply chain strategies with business strategies, supply chain integration, partnerships and information technologies. Chen and Paulraj (2004) use supplier base reduction, long-term relationship, communication, cross-functional teams and supplier involvement to measure buyer–supplier relationships.

Min and Mentzer (2004) identified SCM practices as agreed vision and goals, information sharing, risks and awards sharing, cooperation, integration of process, long term relationship and agreed supply chain leadership. Li et al. (2006) identify five aspects of SCM practice through factor analysis: strategic supplier partnership, customer Relationship, level of Information sharing, Quality of information sharing and postponement.

Burgess et al. (2006) stated that SCM practices should include leadership, intra-organizational relationships, inter organizational relationships, logistics, process improvement orientation, business results and outcomes, and Information systems. Koh et al. (2007) proposed SCM practices from the following perspectives: close partnership with suppliers, close partnerships with customers, just in time supply, strategic planning, supply chain benchmarking, few suppliers, holding safety stock and sub-contracting, e-procurement, outsourcing and many suppliers.

Based on the previous literature, SCM practices are

portrayed from different perspectives with a common aim of improving organizational performance. In reviewing and consolidating the literature mentioned five dimensions of SCM practices emerge, namely strategic supplier partnership, customer relationship, information technology, information sharing and supply chain integration. A more detailed discussion of these dimensions is provided subsequently.

Strategic supplier partnership

Strategic supplier partnership represents the long-term relationship between the organization and suppliers. An effective supplier partnership can be a critical component of a leading edge supply chain (Noble, 1997). Through strategic supplier partnerships, organizations can work closely with suppliers who can share responsibility for the success of the products (Li et al., 2005).

Survey conducted by Radas and Boz˘ic´ (2009) on Crotian companies from manufacturing and service sectors showed that collaboration with other firms or organizations, also include suppliers, has positive significant impact on process innovation and incremental product innovation. Such strategic supplier partnerships should enable successful SCM.

Customer relationship

Organizations depend on their customers and therefore should understand current and future customer needs, meet customer requirements, and strive to exceed customer expectations (ISO, 2010). Customer relationship management (CRM) is an important component of SCM (Noble, 1997; Tan et al., 1999).

Kalakota and Robinson (1999) considered that customer relationship management can be seen as the consistent organizational activity under usage of integrated selling, marketing and service strategy. That is, trying to define the real need of the customer, by the enterprise integrating various process and technology, in asking internal product and service improvement, in order to dawn effort of enhancing customer satisfaction and loyalty.

In 2001, they also offered the concept of CRM system to synthesize with functions of sales, customer service, and marketing activity, all based on customer orientation. Customer loyalty and customer satisfaction are the main goals of SCM.

Information technology

Information technology (IT) is an essential enabler of effective supply chain management (Gunasekaran and Chung, 2004), and global competition success (Ngai et al., 2008). Information technology is a tool that facilitates information management and enhances information flow, thereby making the supply chain more robust and resilient without undermining its efficiency (Pereira, 2009). Organizations increasingly rely on information technology (IT) to improve the supply chain process. Manufacturers are increasingly dependent on the benefits brought about by IT to: improve supply chain agility, reduce cycle time, achieve higher efficiency, and deliver products to customers in a timely manner (Radjou, 2003).

IT technologies, such as the electronic data interchange (EDI), enterprise resource planning (ERP), and customer relationship management (CRM) systems can improve supply chain performance.

Information sharing

Information sharing is a key ingredient for any SCM system (Moberg et al., 2002). Information sharing means the information communicated between partners where the accuracy, adequacy, and timeliness refer to the quality of information.

Li et al. (2006) defined information sharing in the supply chain as the extent to which vital and proprietary information is communicated to the company's supply chain partner. The advantage of information sharing in SCM has been intensively discussed (Cachon and Fisher, 2000).

Information sharing improves coordination between supply chain processes to enable the material flow and reduces inventory costs. Information sharing impacts the supply chain performance in terms of both total cost and service level (Zhao et al., 2002).

Supply chain integration

Supply chain integration is an important component of SCM. Supply chain integration has been regarded as one of the most important competencies in supply chain management (Pearcy and Giunipero, 2008). It aims to achieve effective and efficient flows of information, products and services, resources, and cash to provide maximum value to the customer at low cost and high speed (Flynn et al., 2010).

Supply chain integration has been approached in the literature from different perspectives. For example, Narasimhan and Das (2001) distinguish between customer integration, information integration, logistics and distribution integration and supplier integration.

Differences have been also highlighted on the basis of the type of process involved: for example, De Toni and Nassimbeni (1999) classify supply chain integration mechanisms into design links, quality links and logistic links. Romano (2003), in his review, identifies four

streams of literature, focusing, respectively, on functional integration, logistic integration, information integration and process integration. Integration is frequently taken as a standard requirement of successful management of the supply chain, that integration will take place (Stank et al., 1999; Frohlich and Westbrook, 2001).

Innovation performance

Organizational innovativeness is examined in many disciplines, such as management/strategy, entrepreneurship, political science and marketing. Vigoda-Gadot et al. (2005) view innovativeness as a multi-dimensional organizational trait. They define organizational innovativeness as including five dimensions: creativity, risk-taking, openness to change, future orientation, and pro-activeness. Existing literature presents different classifications of organizational innovativeness.

For example, Subramanian and Nilakanta (1996) classify organizational innovation into two categories: (1) technological innovation, including product, services and processes, as well as (2) administrative innovation, including organizational structure, administrative process and programs.

Similarly, Pacharn and Zhang (2006) propose two types of innovation, namely organizational innovation and technological innovation. Popadiuk and Choo (2006) classify organizational innovation into three categories: technological innovation, market innovation, and administrative innovation.

Subramaniam (2005) identifies four classifications of organizational innovation, including organizational innovation, innovation climate, team innovation and individual innovation. Based on the above literature and characteristics of the research context, the present study adopts two dimensions of innovation performance including administrative and technical innovation performance.

Organizational performance

Organizational performance is an indicator which measures how well an enterprise achieves their objectives (Hamon, 2003). (Ho, 2008) defined organizational performance in terms of how well an organization accomplishes its objectives. Schermerhorn et al. (2002) point out that performance refers to the quality and quantity of individual or group work achievement. Delaney and Huselid (1996) suggest two ways to assess OP: organizational performance and market performance. Koh et al. (2007) and Petrovic-Lazareric et al. (2007) however, look at organizational performance from the perspective of SCM organizational performance.

Koh et al. (2007) rightly pointed out that although organizational performance is measured by both financial and market criteria, the short-term objectives of SCM are to enhance productivity and reduce inventory and lead time. Tippins and Sohi (2003) propose organizational performance measures on four dimensions: relative profitability, return on investment, customer retention, and total sales growth. Based on the above literature, we focus on five dimensions of organizational performance including sales growth, lead time, cost reduction, quality improvement and return on investment.

Research hypotheses

SCM practice is expected to increase an organization's market share, return on investment. (Shin et al., 2000). Koh et al. (2007) in their study on Turkish SMEs found that SCM practices have a direct and significant impact on operational performance. For example, strategic supplier partnership has been reported to yield organization-specific benefits in terms of financial performance (Stuart, 1997).

Therefore the following hypothesis is proposed:

H_1: SCM practices have a positive impact on organizational performance: It is important to determine if SCM practices have a positive influence on the innovation performance of organizations. Such information might promote product innovation among supply chain partners. Soosay et al. (2008) in their study also found that collaboration through information sharing can have a positive impact on innovation in the supply chain. Thus it is hypothesized that:

H_2: SCM practices have a positive impact on innovation performance: There is an extant of literature on the impact of innovation on organization performance. Innovation is a key element of entrepreneurial style or posture and numerous studies have linked entrepreneurial style to performance (Covin et al., 2002).Gopalakrishnan (2000) showed that there is a relationship between the different dimensions of innovation – speed and magnitude and the organizational performance of firms. Camisn and Lpez (2010) conclude that organizations that pursue manufacturing flexibility should develop innovation capabilities to obtain an improvement in organizational performance. Cheng et al. (2010) discover that while process innovation has a greater influence on conflict resolution among employees, product innovation has greater impact on OP. Therefore the following resolution among employees, product innovation has greater impact on OP. Consequently, the following hypothesis is proposed:

H_3: Innovation performance has a positive impact on

Table 1. Scale reliability.

Scales	Factors	Alpha score
SCM practices	Strategic supplier partnership	0.769
	Customer relationship	0.731
	Information technology	0.823
	Information sharing	0.812
	Supply chain integration	0.705
Innovation performance	Administrative innovation	0.754
	Technical innovation	0.782
Organizational performance scales	Sales growth	0.867
	Lead time	0.758
	Cost reduction	0.806
	Quality improvement	0.774
	Return on investment	0.741

organizational performance.

RESEARCH METHODOLOGY

A survey instrument was developed in order to test the research model. Although the items and questions in the proposed questionnaire were adopted from existing studies, the questionnaire was pre-tested with several managers from a manufacturing and service firm to ensure that the wording and format of the questions were appropriate.

Respondents were chosen according to their knowledge about SCM. One hundred and eighty six respondents were involved; they were either executive managers or managers of different services: financial team, logistics, production, marketing, human resources, and sales. Questions involved measures of SCM practices, innovation performance and organizational performance using a 5 point Likert scale (from 1: disagree very strongly to 5: agree very strongly).

Assessing reliability

The reliability of the measurements in the survey was tested using Cronbach's alpha (α). Hair et al. (1998) stated that a value of 0.70 and higher is often "considered the criterion for internally consistent established factors. Scales reliability is presented in Table 1. The Cronbach's alpha coefficients indicating the internal consistency reliability of the measures in the twelve factors are all above the suggested value of 0.70 (Hair et al., 1998).

Exploratory factor analysis

Exploratory factor analysis with Varimax rotation was performed on SCM practices, innovation performance and organizational performance. For SCM practices, a factor analysis was conducted using the 24 items that measure the five dimensions. The results support five factors of SCM practices that have eigenvalues greater than 1 and explain 57.66% of the cumulative variance, as shown in Appendix 1. For the Innovation performance, a factor analysis was conducted using the 9 items that measure the two dimensions. The results support two factors with eigenvalues greater than 1 and explain 68.89% of the cumulative variance, as shown in Appendix 2. As for the Organizational performance, the five items used, that the results, as shown in Appendix 3.

ANALYSIS AND RESULTS

This study attempts to understand the relationships among SCM practices, innovation performance and organizational performance. Table 2 displays the means, standard deviations, and correlations of all variables. Table 3 presents the results of regression analysis regarding the effects of SCM practices on organizational performance.

Coefficients of strategic supplier partnership, customer relationship, information technology and supply chain integration are positive and significant for sales growth ($p<0.05$). Strategic supplier partnership, customer relationship, information technology and information sharing have positive and significant effects on lead time ($p<0.05$).

Coefficients of strategic supplier partnership, information sharing and supply chain integration are positive and significant for cost reduction ($p<0.05$). Strategic supplier partnership and information sharing have positive and significant effects on quality improvement ($p<0.05$). Similarly, customer relationship and information technology have positive and significant effects on return on investment ($p<0.05$). These findings indicate that firms would achieve a higher level of organizational performance if they have well-developed strategic supplier partnership, customer relationship, information technology, information sharing and supply chain integration.

Accordingly, the results moderately support Hypothesis 1, which states that SCM practice has a positive impact

Table 2. Means, standard deviations, and correlations.

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1.Strategic supplier partnership	4.48	1.93	1.00											
2.Customer relationship	5.35	2.06	0.21	1.00										
3.Information technology	5.21	1.08	0.31	0.42	1.00									
4.Information sharing	5.18	1.04	0.28	0.38	0.42	1.00								
5.Supply chain integration	5.26	0.72	0.36	0.27		0.28	1.00							
6.Administrative innovation	5.98	0.93	0.12	0.09	0.39	0.41	0.40	1.00						
7.Technical innovation	5.35	0.86	0.07	0.34	0.38	0.52	0.06	0.31	1.00					
8.Sales growth	5.04	1.2	0.32	0.58	0.43	0.11	0.36	0.34	0.46	1.00				
9.Lead time	5.33	1.14	0.45	0.43	0.38	0.37	0.42	0.43	0.36	0.28	1.00			
10.Cost reduction	5.56	1.72	0.44	0.14	0.37	0.36	0.39	0.45	0.54	0.48	0.28	1.00		
11.Qauality improvement	4.48	0.83	0.37	0.14	0.13	0.38	0.11	0.29	0.66	0.43	0.31	0.12	1.00	
12.Return on investment	5.35	0.86	0.10	0.40	0.12	0.15	0.14	0.38	0.43	0.39	0.35	0.36	0.32	1.00

Two-tailed test. Correlations with absolute value greater than 0.16 are significant at $p<0.05$, and those greater than 0.21 are significant at $p < 0.01$.

Table 3. Results of regression analyses of organizational performance.

Variable	Organizational performance				
	Sales growth	Lead time	Cost reduction	Quality improvement	Return on investment
SCM practices					
Strategic supplier partnership	0.141**	**0.176	0.182**	0.152**	0.059
Customer relationship	0.296**	0.167**	0.093	0.09	0.17**
Information technology	0.158**	0.145**	0.082	0.076	0.13**
Information sharing	0.054	0.146**	0.148**	0.157**	0.114
Supply chain integration	0.152**	0.165**	0.163**	0.057	0.106
R2	0.156	0.16	0.112	0.071	0.083
F	6.655**	6.832**	4.536**	2.76**	3.275**

Two-tailed test; Standardized coefficients are reported; ** $p<0.05$.

on organizational performance. The results support the previous studies from Li et al. (2006) and Koh et al. (2007).

Table 4 shows the results of regression analyses of the effects of SCM practices on innovation performance. Coefficients of information technology and information sharing are positive and significant for administrative and technical innovation ($p<0.05$). Similarly, supply chain integration has positive and significant effects on administrative innovation ($p<0.05$) and customer relationship has positive and significant effects on technical innovation ($p<0.05$). These findings indicate that firms would achieve a higher level of innovation performance if they have well-developed customer relationship, information technology, information sharing and supply chain integration. Accordingly, the results moderately support Hypothesis 2, which states that SCM practice has a positive impact on innovation performance.

Next, we examine how innovation performance affects organizational performance. Table 5 presents the results of regression analysis regarding the effects of innovation performance on organizational performance. In summary, both administrative and technical innovation have positive and significant effects on all the organizational performance dimensions ($p<0.05$). These findings indicate that firms would achieve a higher level of organizational performance if they have well-developed administrative and technical innovation performance.

Accordingly, the results support Hypothesis 3, which states that innovation performance has a positive impact on organizational performance. The results support the previous studies from Gopalakrishnan (2000), Aragón-Correa et al. (2007) and Guan et al. (2006).

DISCUSSION

This study examines the relationships among SCM practices, innovation performance and organizational performance. Our results indicate that SCM practice has

Table 4. Results of regression analyses of innovation performance.

Variable	Innovation performance	
	Administrative innovation	Technical innovation
SCM practices		
Strategic supplier partnership	0.114	0.03
Customer relationship	0.06	0.149**
Information technology	0.146**	0.171**
Information sharing	0.158**	0.254**
Supply chain integration	0.154**	0.021
R2	0.085	0.121
F	3.333**	4.953**

Two-tailed test; Standardized coefficients are reported; ** p<0.05.

Table 5. Results of regression analyses of organizational performance.

Variable	Organizational performance				
	Sales growth	Lead time	Cost reduction	Quality improvement	Return on investment
Innovation performance					
Administrative innovation	0.148**	0.166**	0.185**	0.132**	0.162**
Technical innovation	0.189**	0.147**	0.208**	0.459**	0.206**
R2	0.062	0.055	0.083	0.246	0.071
F	6.095**	5.281**	8.288**	29.796**	7.033**

Two-tailed test; Standardized coefficients are reported; ** p<0.05.

positive and significant effects on innovation and organizational performance. Also results show that innovation performance has positive and significant effects on organizational performance. These findings highlight the critical roles of SCM practice in the process of innovation and improve organizational performance.

The findings of this study contribute to the theoretical development of a conceptual model for explaining the relationships among SCM practices, innovation performance and organizational performance. The second contribution of this study is the derivation of empirical support for the model's prediction using data from actual cases.

This study contributes to the literature by empirically examining the relationships among SCM practices, innovation performance and organizational performance. The study shows that the validated SCM practices are applicable to developing countries such as Iran.

Although past studies from Prajogo and Sohal (2001, 2004) have suggested that innovation performance can be improved via TQM, this study has shown that SCM practices also have positive and significant relationships with innovation performance.

The study shows that the most important SCM practices in terms of affecting innovation and organizational performance are Information sharing and Information technology. This supports the previous work from Chong and Ooi (2008) and Chong et al. (2009) in which they focused on information sharing among supply chain partners and forming a collaborative supply chain. Combining the use of IT and strategic sharing of information, firms are therefore able to provide more innovative Administrative and Technical. The study also found that firms with higher levels of innovation performance lead to high level of organizational performance.

CONCLUSIONS AND IMPLICATIONS

This study integrates all the activities of the supply chain management in an overall structure and links these activities to the innovation and organizational performance. It examines empirically the relationship between the various variables studied within the framework of the Iranian company and examines the consequences of SCM on the innovation and organizational performance companies. The empirical results suggest that SCM practices can improve firms' innovation and organizational performance. Also, the results suggest that innovation performance can improve firms' organizational performance.

This study has several implications. First, the findings of this study will help decision makers in companies to

know the importance of SCM and how SCM practices influence innovation performance.

Therefore, decision makers should focus on improve their SCM practices. Secondly, the findings also indicate that innovation performance significantly affects organizational performance. Therefore, managers should focus on improve their firms' innovation performance. Finally, the analysis of the relationship between SCM practices and organizational performance indicates that SCM practices might directly influence organizational performance. Therefore, decision makers should continue to improve their firms' SCM practices.

There are several limitations of this study that suggest further research. Perhaps, the most serious limitation of this study was its narrow focus on Iranian firms. Future studies could use the model developed in this study and test it in other developing countries. The complexity of SCM practices in Iran can also constitute a limit. Future studies can also examine the proposed relationships by bringing some contextual variables into the model, such as industry type, organizational size and supply chain structure.

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Appendix 1. Results of factor analysis for “SCM practice”.

Items	Factors				
	1	2	3	4	5
Strategic supplier partnership					
Our suppliers support us to development of our products, services, or processes and provide technical support	0.87				
We have long-term relationship with suppliers	0.76				
We consider quality as our number one criterion in selecting suppliers	0.85				
We regularly solve problems jointly With our suppliers.	0.72				
we choose reliable suppliers based on their quality	0.78				
Customer relationship					
We frequently interact with customers to set reliability, responsiveness, and other standards for us.		0.81			
We frequently determine future customer expectations.		0.83			
We frequently measure and evaluate customer satisfaction.		0.85			
We periodically evaluate the importance of our relationship with our customers.		0.78			
Information technology					
Our IT facilitates acquisition of supply chain knowledge			0.64		
Our IT facilitates processing of supply chain knowledge			0.66		
Our information technology throughout the supply chain is up-to-date			0.55		
In our company Information exchange with suppliers through IT			0.61		
The IT system throughout the supply chain are adequate			0.72		
Information sharing					
We and our trading partners exchange information that helps establishment of business planning.				0.54	
Our trading partners share business knowledge of core business processes with us.				0.76	
Our trading partners share proprietary information with us.				0.65	
We and our trading partners keep each other informed about events or changes that may affect the other partners.				0.54	
Supply chain integration					
Our company has capability to control sales/distribution network					0.54
We Establish more frequent contact with supply chain members					0.76
We try Enhance integration in new product development					0.75
Our Supply chain integration reduces uncertainties of knowledge loss					0.64
We have Data integration among internal functions through network					0.76
Our company has On-time delivery capability					0.51
Eigenvalue	3.56	3.27	2.92	2.35	1.75
Percentage of variance	14.86	13.61	12.15	9.76	7.28
Cumulative percentage of variance	14.86	28.47	40.62	50.38	57.66

Appendix 2. Results of factor analysis for “innovation performance”**.**

Items	Factors	
	1	2
Administrative innovation		
We have Innovative administration in planning procedures	0.84	
We have Innovative administration in process control systems	0.76	
We have Innovative administration in integrated mechanisms	0.85	
Our company seeks new ways of doing things	0.91	
Technical innovation		
The company has continuously used innovative technology to improve the quality and speed of production and services to our customers		0.74
we make an effort to anticipate the potential of new manufacturing practices and technologies		0.76
We describe ourselves as a firm focusing on process innovation		0.85
We use up-to-date/new technology in the process		0.81
We are able to produce products with novelty features		0.74
Eigenvalue	3.35	2.85
Percent of variance	37.25	31.64
Cumulative Percent of variance	37.25	68.89

Appendix 3. Results of factor analysis for “Organizational performance”.

Items	Factor
Organizational performance	
Sales growth	0.91
Lead time	0.86
Cost reduction	0.95
Quality improvement	0.81
Return on investment	0.84
Eigenvalue	3.48
Percent of variance	69.60
Cumulative Percent of variance	69.60