

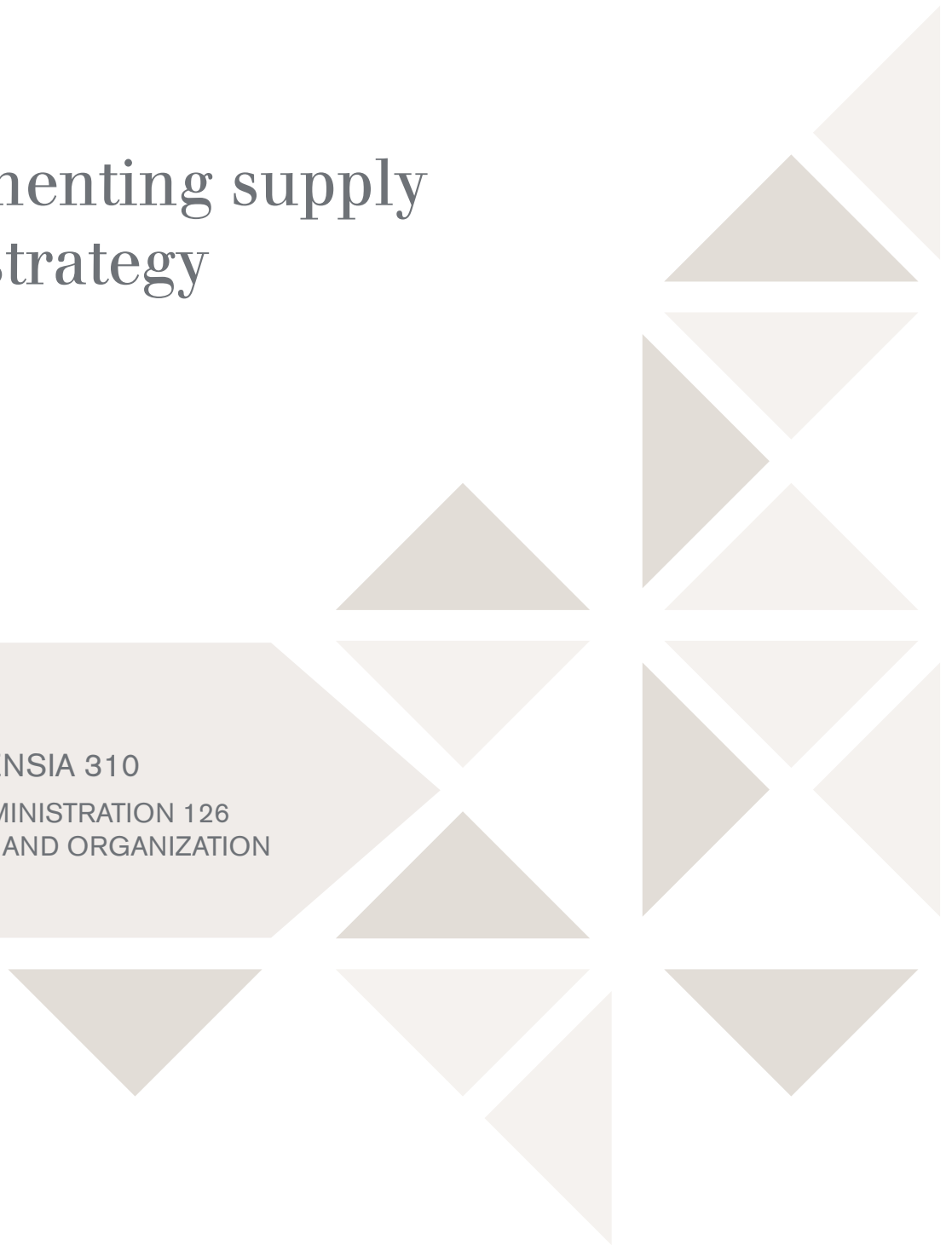


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ILKKA SILLANPÄÄ

Implementing supply chain strategy

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	Sivumäärä 20:	Kieli Englanti
Julkaisun nimike Toimitusketjun strategian implementointi		
Tiivistelmä <p>Toimitusketjun strategian implementointi on prosessi, joka yhdistää strategisen johtamisen, toimitusketjun johtamisen ja toimittajien kehittämisen. Aiempi kirjallisuus strategian implementoinnista ja toimitusketjun johtamisesta on hajanaista ja käsittää vain osittaisia sekä irrallisia näkökulmia. Aiemmat tutkimukset osoittavat, että useasti strategian implementointi epäonnistuu. Tästä syystä tutkimuksen päätavoite on integroida aiheeseen liittyvät teoriat sekä luoda toimitusketjun strategian implementointiin viitekehys.</p> <p>Tämä tutkimus on laadullinen usean tapauksen tutkimus, joka noudattaa hermeneuttista tutkimusparadigmaa. Tutkimus on empiirisesti fokuoitetun ja koostuu useista eurooppalaisista ja aasialaisista yrityksistä. Tutkimus koostuu johdannosta, teorian muodostuksesta sekä kuudesta artikkelista.</p> <p>Tulokset syventävät ymmärrystä toimitusketjun strategian implementoinnista ja muodostavat toimitusketjun strategian implementoinnin viitekehysten, mikä yhdistää ala-viitekehukset, jotka ovat toimitusketjun strategian viitekehys, valmistaa tai ostaa päätöksenteon malli, toimitusketjun strategian implementoinnin haasteiden viitekehys, toimittajien kehittämisen viitekehys sekä toimitusketjun suorituskyvyn mittaamisen viitekehys.</p> <p>Tutkimuksen uutuusarvo on tutkimuksessa kehitetty toimitusketjun strategian implementoinnin viitekehys, jota voi käyttää toimitusketjun strategian implementointiin yrityksen sisällä, mutta myös strategian implementoinnissa yrityksen toimittajaverkoston.</p>		
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Abstract <p>Supply chain strategy implementation is the process which merges together strategic management, supply chain management and supplier development. The prior literature on strategy implementation and supply chain management is fragmented and provides only partial and often disconnected views. There is also evidence that much strategy implementation fails. Therefore the main objective of this research is to integrate related theories and configure the supply chain strategy implementation framework.</p> <p>This study is a multiple qualitative case study research with hermeneutic research paradigm. The research is empirically focused and uses case studies from several companies in Europe and Asia. The study consists of an introduction, theoretical development and six journal articles.</p> <p>The results deepen knowledge of supply chain strategy implementation and create a supply chain strategy implementation framework, which merge together sub-frameworks: supply chain strategy framework, make or buy decision-making model, supply chain strategy implementation challenges framework, supplier development framework, supply chain information integration framework and supply chain performance measurement framework. The results highlight the importance of the different approaches and sub-framework of the supply chain strategy implementation framework.</p> <p>The originality and the value of the research is a developed supply chain strategy implementation framework, which could be used when supply chain strategy is implemented inside a company and into the company's supply chain network.</p>		
Keywords strategic management, strategy implementation, supply chain management, supplier development		

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The story behind this thesis began with a Management conference in Slovenia in 2011. At that time I had recently completed my first Ph.D. (eng.) thesis in the field of Industrial engineering and management. I had also started to write a number of journal and conference articles. Business administration and especially strategic management has been my ambition while studying, but I had never had the possibility to deepen my knowledge in that field.

During that conference I met a very special person, Professor Dr. Josu Takala and we had great discussions during that time. He encouraged me to start a second Ph.D (econ.) research, because it could be done at the same time as doing post-doctoral research. This idea was so good that we decided to start the journey. Quite soon after that Professor Takala introduced me to Professor Dr. Marko Kohtamäki, who was interested in my research topics and plans. The University of Vaasa nominated Professor Kohtamäki and Professor Takala as my supervisors officially in 2012.

This research journey has been very interesting because of my background in engineering. The main challenge for me has been how to change my engineering focus into an economic one. Professor Kohtamäki and Professor Takala have been very successful in changing my way of thinking in the economic field. Both of my supervisors have been more than just supervisors: they have been mentors! It has been my pleasure to work with these gentlemen!

During my research I have met so many great people, some of whom I would like to introduce and give special thanks. It is quite some time since I started this project, I met Dr. Jari Koskinen who had a somewhat similar background and way of thinking to me: working in the global business environment. We have also another similar interest: Lapland, where we have met many times. Khuram Shahzad I met for the first time when I started this research. I was lucky because Khuram was planning to start Ph.D research soon and we had a similar research area. During research I also met Nurul Aida Binti, who came from Malaysia to Vaasa. Thank you all for your cooperation and assistance!

I would like to thank my cousin Sebastian Sillanpää. We realized that we did research in the same field and cooperated well together. My sister Elina Sillanpää has been a great support during the whole research period. She was at first a full time researcher, but after a while we were in the same situation: both working in private companies and doing research as a hobby. Elina has been one of the best opponents ever and I hope I can help her to finalize her research.

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Special thanks also to my pre-examiners Professor Dr. Stefan Bojnec and Professor Dr. Joanna Paliszkiewicz who gave me very good comments and feedback from the thesis. I was lucky to have you both as pre-examiners! Thanks to Alan Pembshaw who has been my mentor during the last 6 years. Alan has been also a language consultant during my research and helped me a lot! He is an very inspiring mentor and it has been my pleasure to learn many aspects of leadership from him. Thanks to the case companies which took part in this research and thanks to all those people who were interviewed.

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This journey has been something special. Even though this is the second time to complete a thesis, this was totally different to the first one and I would certainly do this whole journey again! Life is a learning journey!

Budapest 31.5.2014

Ilkka Sillanpää

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Abbreviations:

ABM	Lean, Activity Based Management
BPR	Business Process Reengineering
JIT	Just in Time
LT	Lean Thinking

SC	Supply chain
SCM	Supply chain management
SD	Supplier development
TBM	Time-Based Management
TQC	Total Quality Control
TQM	Total Quality Management

This dissertation consists of an introductory chapter and the following six publications:

- 1 Sillanpää, Ilkka, Sillanpää, Sebastian (2013). Supply chain strategy – empirical case study in Europe and Asia. *Management* 9 (2): 95-115
- 2 Sillanpää, Ilkka (2013). Strategic decision-making model for make or buy decisions. *International Journal of Logistics Economics and Globalisation* (forthcoming)
- 3 Sillanpää, Ilkka, Shahzad, Khuram, Sillanpää, Elina (2013). Supplier development and buyer-supplier relationship strategies – a literature review. *International Journal of Procurement Management* (forthcoming)
- 4 Sillanpää, Ilkka, Abdul Malek, Nurul Aida Binti, Takala, Josu (2013). Critical attributes on supply chain strategy implementation: case study in Europe and Asia. *Management and Production Engineering Review* 4:4 (December), 73-82
- 5 Sillanpää, Elina, Sillanpää, Ilkka (2013). Developing the elements of information integration in the real estate and user services. *Facilities* (forthcoming)
- 6 Sillanpää, Ilkka (2013). Empirical study of measuring supply chain performance. *Benchmarking International journal* (forthcoming)

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International Journal of Logistics Economics and Globalisation:

<http://www.inderscience.com/jhome.php?jcode=IJLEG>

International Journal of Procurement Management:

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1 INTRODUCTION

1.1 Background

Supply chain strategy implementation is central in today's globalizing world when the business environment is dynamic. Supply chain (SC) strategy implementation is challenging when a company operates in a dynamic business environment and when supply chains are complex and not integrated. SC strategy should be implemented and executed into the whole corporate supply chain as well as into the supplier network. Previous researches are fragmented and have concentrated on the individual areas of SC strategy implementation: strategic management, strategy implementation, supply chain management (SCM) and supplier development (SD).

There are three different scientific disciplines from which the different fields of strategic management research have grown: economics, sociology and psychology (Ramos-Rodríguez & Ruíz-Navarro, 2004). Economics has been the founding theory for such strategic management fields as evolutionary economics, transaction cost theory, industrial economics, resource-based view of the firm and agency theory. Sociology with its different theories is the foundation for such fields as contingency theory, resource-dependence theory, organisational ecology and ecosystem. The most popular psychological views of strategic management include power and pattern views to strategy creation. (Hoskisson, Hitt, Wan, & Yiu, 1999)

Evolutionary economics theories explain the movement of something over time or why something is what it is at the moment in time in terms of how it got there, and how some random elements generate or renew some variation in the variables in question, and what mechanisms systematically winnow extant variation (Valentino & Christ, 1990). Transaction cost theory studies the make or buy decisions through a contractual or exchange-based approach (Kujala, Lillrank, Kronström, & Peltokorpi, 2006). If the transaction costs of markets are high, hierarchical governance modes will enhance efficiency, although they can have their own bureaucratic costs (Hoskisson, Eden, Lau, & Wright, 2000). The prime contributions of industrial economics to strategic management literature are the structure-conduct-performance paradigm and the study of strategic groups (Porter, 1980; Porter, 1985; Ramos-Rodríguez & Ruíz-Navarro, 2004). There are three potentially successful generic strategic approaches to attaining competitive advantage and thereby outperforming other firms in an industry: differentiation, cost-leadership and focus. (Porter, 1980)

The resource-based view is a complement to the traditional emphasis of industrial economics on industry structure and strategic positioning within that structure as a source of competitive advantage (Eisenhardt & Martin, 2000; Hoskisson et al., 1999; Newbert, 2007). Agency theory deals with relationships that arise when one self-interested individual, the principal delegates some decision-making authority to another individual, the agent according to a mutually agreed contract (Eisenhardt, 1989a; Pavlou, Huigang, & Yajiong, 2007; Schulze, Lubatkin, Dino, & Buchholtz, 2001).

Strategy implementation is a multifaceted and highly complex organizational phenomenon (Noble, 1999b; R. Wernham, 1985). To obtain an in-depth understanding of strategy implementation it is necessary to merge process, content, and context into a three-dimensional view of strategy implementation (Bryson & Bromiley, 1993; Pettigrew, 1985). Strategy implementation communicates a willingness to overcome the barriers between the content and process paradigms, which consist of five managerial levers of strategy implementation: goals, organizational structure, leadership, communications and incentives (Noble & Mokwa, 1999; Noble, 1999a; Noble, 1999b).

Prior research states that the majority of the strategies fail to be implemented (Noble, 1999b). One of the reasons for implementation failure is caused by the element which was under management control (P. C. Nutt, 1999). When the strategy is ready and formulated, challenges are often encountered during the subsequent implementation process (Alexander, 1985). One of the common reasons is that plans do not work out as intended (P. C. Nutt, 1999; R. Wernham, 1984). There is also a fundamental disconnect between the strategy formulation process and the implementation of strategy. The implementation problem is seen to be the all too frequent failure to create change after seemingly viable plans have been developed (P. C. Nutt, 1983). In many companies implementation creates a frustration during the implementation process (Noble, 1999a). Because the strategy implementation is a complex problem and the failure rate is high, the implementation should be a topic of research scholars and managers who are taking care of the strategy implementation. The most important problems in strategic management are coming from strategy implementation. (Flood, Dromgoole, Carroll, & Gorman, 2000)

Even if the strategy implementation is a very complex problem, strategy implementation receives relatively limited research attention (Cravens, 1998; Noble, 1999b). The research of strategy implementation has been out of fashion during the past quarter century (O'Toole, 2000). Researchers who are interested in the subject of strategy implementation still face the challenge of the lack of a signifi-

cant body of literature on which to base new efforts (Noble, 1999b). There are no clear models on which to build as the research on strategy implementation remains rather fragmented (Klein & Sorra, 1996; Noble, 1999b). There is no integrating framework for the sources of strategy implementation failure or success (Hrebiniak & Joyce, 1984; Reed & Buckley, 1988).

Many scholars state that SC strategy must reflect the corporate strategy (Chopra & Meindel, 2007; Christopher, Peck, & Towill, 2006; Harrison & New, 2002; Schnetzler, Sennheiser, & Schönsleben, 2007; Waters, 2009). According to a survey conducted by Harrison et al. (2002), two-thirds of all respondents thought that their SC strategy was significant or highly significant in terms of corporate strategy (Harrison & New, 2002). There still exists a major gap between corporate strategies and SC strategies (Rose, 2012).

Literature review presents various holistic frameworks regarding the relation of SC strategy to corporate strategy and the different subfields of SC strategy. The purpose of SC strategy is to strike a balance between responsiveness and efficiency, according to the premises of operations management that fits with the corporate strategy. To reach this goal, a company must structure the right combination of the three logistical elements: facilities, inventory and transportation; and three cross-functional drivers: information, sourcing and pricing. Chopra and Meindel (2007) see corporate strategy as a competitive strategy relating to the works of Porter (1980, 1985), and that is why their framework is largely divided between efficiency and cost-leadership; and responsiveness and differentiation. (Chopra & Meindel, 2007; Porter, 1980; Porter, 1985)

SC strategy implementation into the supplier network could be done using SD. The factors of SD infrastructure affect the performance of buyers and suppliers (Humphreys, Li, & Chan, 2004). Transaction-specific SD is the basic practice for buying organizations to develop suppliers' performance and capabilities (Krause, 1999). SD efforts should focus on future capabilities in technology and product development rather than on current quality and cost (Watts & Hahn, 1993). Effective communication plays a key role between buyers and suppliers to motivate them (Giunipero, 1990; Newman & Rhee, 1990) and communication enhances the mutual understanding of both parties and reassures the conflict resolution (Spekman, 1988).

A long term commitment of the buying firm assures a relationship with suppliers where suppliers willingly can make changes in their operations to fulfil the requirements of the buyer (Lascelles & Dale, 1989). Trust between buyer and supplier is needed to improve the performance and capabilities of the supplier and specially when they jointly invest into a business.

The research gap is that according to the literature review there are no frameworks to implement SC strategy into the corporate supply chain but also into the supplier and partner network. Strategic management has been researched a lot in the past, but the research focus has been rather theoretical and focused on strategy. Strategy implementation speciality in SCM seems to be a unique research field and there is a research gap to be filled. This research fills the gap creating the SC strategy implementation framework, which consists of the main approaches: SC strategy framework, make or buy decision-making model, SC strategy implementation challenges framework, SD framework, SC information integration framework and SC performance measurement framework.

1.2 Research objectives and research question

SC strategy implementation is one of the main challenges in a dynamic business environment. To increase company profit and efficiency, SC strategy should be implemented and integrated not only into the company's own corporate structure but also into the whole SC including suppliers and partners. There is a research gap in the literature, because the literature on SC strategy implementation is fragmented and there are no suitable frameworks for SC strategy implementation. Based on the research gap, research goal and research questions are presented.

The research goal can be captured as follows:

The goal is to deepen knowledge in SC strategy implementation.

The research problem is how to implement supply chain strategy?

Research questions to answer the research problem are:

(RQ1) What are the main supply chain strategy approaches?

(RQ2) How can the supply chain strategy be implemented?

Research problem aim is to find out how to implement SC strategies. The purpose of the first research question is to create an SC strategy framework as well as present the latest studies regarding strategic management and SCM. The second research question presents the prior literature, analyzes the SC strategy implementation in the manufacturing and service industry and creates the supply chain strategy implementation framework.

1.3 Research design

The present study is designed to deepen the knowledge of strategic management, strategy implementation, SCM and SD and to develop an SC strategy implementation framework. SC strategy framework is conducted according to the theories of the strategy, strategy implementation, SCM and SD and is based on a sub-framework of SC strategy implementation approaches presented in the six journal articles. The research goal was formed from the research gap and, based on the research goal and research problem, the research questions were developed. The research questions and the plan for answering those are presented as following:

The research problem is:

How to implement supply chain strategy?

Research questions are:

What are the main supply chain strategy approaches?

Journal articles 1 and 2 provide answers to the research question ‘what are the main SC strategy approaches?’. In those articles SC strategy framework are presented and created from the corporate strategy and SC strategy approaches. SC strategy framework is developed based on prior theories and empirical case study research. Make or buy decision-making model is conducted according to the prior theory and empirical case study and presented as one of the most critical approaches in the SC strategy.

How can the supply chain strategy be implemented?

SC strategy implementation sub-frameworks are presented in the journal articles 1, 2, 3, 4, 5 and 6. SC strategy implementation framework is created according to the journal articles outcomes: SC strategy framework, make or buy decision-making model, SC strategy implementation challenges framework, SD framework, SC information integration framework and SC performance measurement framework.

The present study begins with a literature review that focuses on the prior empirical research on strategy, strategy implementation, SCM and SD. In the empirical case study research data collection methods are interviews, workshops, questionnaires and observations in the case companies. During the empirical research and data collecting, theory matching and analysis of the results is done in parallel. The

result of the research is the SC strategy implementation framework, which is the conducted according to the journal articles.

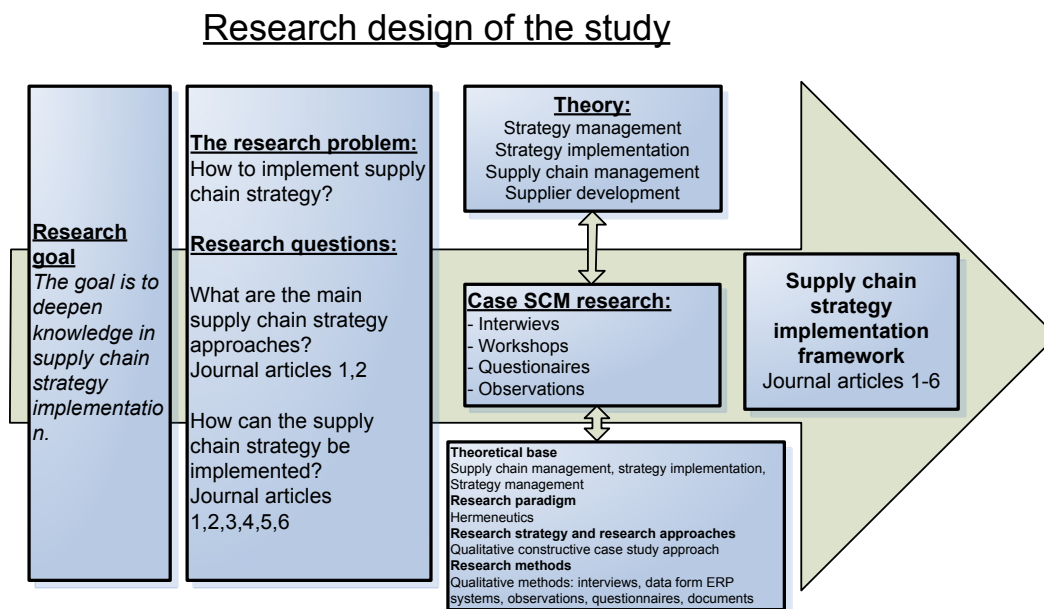


Figure 1. Research design of the study.

1.4 The structure of dissertation

The introduction chapter presents the background of the research and the research gap. Research objectives and questions are presented and research design describes how the research is going to be done. The second chapter presents the theoretical foundation of the research where the selected theories are strategic management, strategy implementation, SCM and SD. Chapter 3 describes the research methodology where scientific paradigms, case study research method and research approach for this study is presented. The next chapter introduces journal articles of the study. Every journal articles' research objectives, result and contributions are presented. Chapter 5 presents the main result of the study which is SC strategy implementation framework based on the journal articles presented in chapter 4. Final chapter discusses the conclusion, implications and limitation of the thesis and raise up future research themes.

The second part of the manuscript consists of reprints of the six original articles, each of which has its own implications.

Table 1. Focus and results of the articles

Focuses on	Title of the article	Results in
Literature review with the latest literature and most cited journal articles in the field of strategic management and SCM.	SC strategy – empirical case study in Europe and Asia	SC strategy framework, which was tested and verified in the case SCs. Main approaches are business environment, corporate strategy, SC demand and SC strategy.
Literature review of make or buy decision-making approaches: transaction cost economics, make or buy triggers, competitive factors, McIvor's outsourcing framework, Tayles and Drury sourcing decision model, balanced scorecard.	Strategic Decision-making Model For Make Or Buy Decisions	Empirically tested and verified strategic make or buy decision-making model, which includes: competitive factors, balanced scorecard, McIvor's outsourcing framework and competitive factors.
Literature review of supplier management, supplier policies and procedures, buyer-supplier relationship, SCM, SD.	SD and buyer-supplier relationship analysis - literature review	According to the literature review it was conducted a model Operational breakdown of the values of buying firms' approaches to develop supplier performance.
SCM strategy approaches, SCM strategy implementation and challenges in SCM strategy implementation.	Critical attributes on SC strategy implementation: case study in Europe and Asia	Result of the Sense and Respond method analyses was that there are differences and similarities of critical attributes that affect SC strategy implementation in Asian and European companies.
Literature review of elements of information integration, information in real estate and user services and service SCM.	Developing the Elements of Information Integration in the Real Estate and User Services	According to the literature review and deep case study research it was conducted framework Developing information integration.
Literature review of the most relevant literature related to SC performance measurement.	Empirical study of measuring SC performance	Created SC performance measurement framework was empirically tested and verified in the case company.

2 THEORETICAL FOUNDATIONS

2.1 Strategy implementation

The concept of strategy coming from the Greek strategos, “a general”, and is a compound of stratos; meaning “army” and “to lead.” The concept of strategos meant both a military general himself and his warfare skills, “the art of the general” (Bracker, 1980). Strategy is the major intended and emergent initiatives taken by general managers on behalf of owners, involving utilization of resources, to enhance the performance of firms in their external environments (Nag, Hambrick, & Chen, 2007). There are three different scientific disciplines from which the different fields of strategic management research have grown: economics, sociology and psychology (Hoskisson et al., 1999). Economics has been the founding theory for such strategic management fields as evolutionary economics, transaction cost theory, industrial economics, resource-based view of the firm and agency theory. Sociology with its different theories is the foundation for such fields as contingency theory, resource-dependence theory, organisational ecology and ecosystem. The most popular psychological views of strategic management include power and pattern views to strategy creation. (Hoskisson et al., 1999; Ramos-Rodríguez & Ruíz-Navarro, 2004)

Evolutionary economics theories try to explain the movement of something over time or why something is what it is at the moment in time in terms of how it got there. Theories also seek how some random elements generate or renew some variation in the variables in question, and what mechanisms systematically eliminate extant variation. (Valentino & Christ, 1990) Transaction cost theory studies the relationship between a firm and its environment through a contractual or exchange-based approach (Kujala et al., 2006). If the transaction costs of markets are high, hierarchical governance modes will enhance efficiency, although they can have their own bureaucratic costs (Hoskisson et al., 2000).

The prime contributions of industrial economics to strategic management literature are the structure-conduct-performance paradigm and the study of strategic groups. Differentiation, cost-leadership and focus are potentially successful generic strategic approaches to attaining competitive advantage and thereby outperforming other firms in an industry (Porter, 1980). According to the resource-based view, the resources of a firm can be the source of a competitive advantage as long as resources are valuable, rare, inimitable and non-substitutable (Eisenhardt & Martin, 2000; Hoskisson et al., 1999; Newbert, 2007). Agency theory deals with relationships that arise when one self-interested individual delegates

some decision-making authority to another individual according to a mutually agreed contract (Eisenhardt, 1989a; Pavlou et al., 2007; Schulze et al., 2001). Contingency theory suggests that there is no optimal strategy for all organizations and posits that the most desirable choice of strategy variables alters according to certain factors, termed contingency factors (Zajac, Kraatz, & Bresser, 2000; Zott & Amit, 2008). The resource dependence theory proposes that organizational success and ultimately survival occur by maximizing power through the acquisition of scarce and valuable resources in a stable and low-cost manner (Carter & Rogers, 2008; Rai & Bush, 2007). Organisational ecology theory applies evolutionary and ecological perspectives, such as populations and communities of populations, in the domain of strategy and organisation theory (Baum & Shipilov, 2006; Lovas & Ghoshal, 2000).

An ecosystem consists of all those companies that depend on each other in terms of their success. Most importantly, a company's performance is increasingly dependent on the performance of something where the firm doesn't have direct control. Therefore, ecosystem-based approach encourages collaboration with those firms that are clearly part of the ecosystem. (Iansiti & Levien, 2004) The most influential views of psychology-based strategic management have been the power view, which studies strategy formulation as a political process, and the concept of pattern, which sees that strategy is often consistency in behaviour in the past, not a pre-described plan. (Mintzberg, Ahlstrand, & Lampel, 2009; Ramos-Rodríguez & Ruíz-Navarro, 2004)

Strategy implementation is important in turbulent and dynamic business environment (D'aveni, 2010; Volberda, 1996). It is a multifaceted and highly complex organizational problem (Noble, 1999a; R. Wernham, 1985). Well-formulated strategies only produce superior performance for an organization when they are successfully implemented (Bonoma, 1984). The best strategies are worthless if they cannot be implemented successfully (Schilit, 1987). Strategic success requires an appropriate strategy but also requires that the strategy is implemented successfully (Hussey, 1996). Strategies that fail to be implemented can be very costly, both in terms of formulation costs and foregone benefits (P. C. Nutt, 1998). Implementation is difficult and complex because the process is complicated, ambiguous and often involves many departments in the firm (Noble, 1999a; Schofield, 2004).

There is a debate in the strategy implementation literature that should strategy formulation and implementation be treated as separate or merged processes. Strategy formulation has been treated as a separate stage before the strategy implementation (Hofer & Schendel, 1978; Wheelen & Hunger, 2011). Strategy im-

plementation literature treats strategy implementation as a rational and top-down process where the strategy is implemented with the use of a diverse set of control mechanisms (Galbraith & Kazanjian, 1986; Hambrick & Cannella Jr., 1989; Hrebiniak & Joyce, 1984; Hussey, 1996). In rational and top-down approaches, top management formulates the strategy and then delegates implementation through the organization (Andersen, 2000; Wooldridge & Floyd, 1989). Strategy implementation is seen as a centralized process managed by top management, where top management team work on the strategic plan and the implementation is done by the rest of the organization (Andersen, 2000).

Many strategy implementation frameworks identify a set of levers with which management can implement a strategy (Galbraith & Kazanjian, 1986; Hambrick & Cannella Jr., 1989; Hussey, 1996; Noble, 1999a; Pennings, 1998; Peters & Waterman, 1982). These levers often include organization structure, reward systems, staff, culture, and information and control systems. Management can use these levers for implementing strategy into the organizations. A common perspective in the strategic management literature is that implementation is synonymous with control. (Noble, 1999b) Strategy implementation is an act of monitoring and control (Hrebiniak & Joyce, 1984). The greater the internal change required by an implementation effort, the more important the role played by effective incentives (Bourgeois & Brodwin, 1984). There is clear empirical evidence that individuals desire personal control (Greenberger & Strasser, 1986). Numerous studies have indicated that people prefer choice and control over no choice or no control (Erez & Kanfer, 1983).

There are many approaches in academic research to strategy implementation. Strategy implementation is a process by which large, complex and potentially unmanageable strategic problems are factored into smaller manageable proportions. Implementation is a series of interventions concerning organizational structures and key personnel action (Hrebiniak & Joyce, 1984). Implementation is the process that turns plans into action assignments and ensures that such assignments are executed (Kotler, 1984). Strategy implementation is the communication, interpretation, adoption, and enactment of strategic plans (Noble & Mokwa, 1999; Noble, 1999a). Table 2 presents the summary of the strategy implementation studies.

Table 2. Strategy implementation studies.

Author	Explanation
(Aaker, 2008)	The implementation stage involves converting strategic alternatives into an operating plan.
(Bonoma, 1984)	Implementation is turning drawing board strategy into marketplace reality.
(Bryson & Bromiley, 1993)	The implementation process is defined as a set of generic activities that occur across an entire problem-solving sequence.
(Cespedes, 1991)	Implementation deals with organizational issues, with development of specific marketing programs, and with the execution of programs in the field.
(Flood et al., 2000)	Strategy implementation is the successful implementation of strategic decisions.
(Floyd & Wooldridge, 1992)	Implementation is the managerial interventions that align organizational action with strategic intention.
(Hrebiniak & Joyce, 1984)	Strategy implementation is a process by which large, complex, and potentially unmanageable strategic problems are factored into progressively smaller, less complex, and hence more manageable proportions. Implementation is a series of interventions concerning organizational structures, key personnel actions, and control systems designed to control performance with respect to desired ends.
(Kotler, 1984)	Implementation is the process that turns plans into action assignments and ensures that such assignments are executed.
(Laffan, 1983)	During the implementation phase, a policy decision must be spelled out in operational detail and resources allocated among programs.
(S. Miller, Wilson, & Hickson, 2004)	Strategy implementation refers to all the processes and outcomes, which are related to a strategic decision once authorization has been to go ahead and put the decision into practice.
(Noble, 1999b)	Strategy implementation is the communication, interpretation, adoption and enactment of strategic plans.
(P. C. Nutt, 1983; P. C. Nutt, 1986)	Implementation is a series of steps taken by responsible organizational agents in planned change to elicit compliance needed to install changes. Implementation is a procedure directed by a manager to install planned change in an organization.

To obtain an in-depth understanding of strategy implementation it is necessary to merge process, content, and context into a three-dimensional view of strategy implementation (Bryson & Bromiley, 1993; Pettigrew, 1985). There are numerous links between context and process, and between process and outcomes. Strategy implementation process, content, and context are strongly interrelated and cannot be taken apart and examined in isolation. (Knemeyer & Murphy, 2004) Process, context, and outcomes could be seen as interconnected, but the content is placed into the planning process (Boal & Bryson, 1987). Diagnostic framework of strategy implementation has six levers of strategy implementation: organization structure, control and information systems, reward systems, selection and socialization, power and politics and organization culture (Pennings, 1998). Strategy implementation communicates a willingness to overcome the barriers between the content and process paradigms, which consist of five managerial levers of strategy implementation: goals, organizational structure, leadership, communications and incentives. The model is organized around four major stages of the implementation effort: pre-implementation, organizing the effort, the ongoing management of the process and maximizing cross-functional performance. (Noble, 1999a)

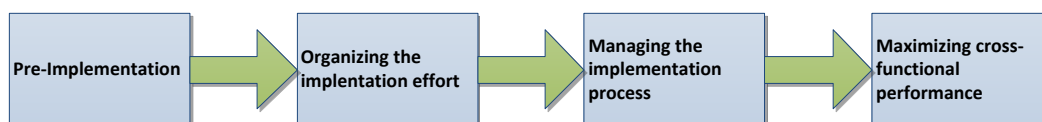


Figure 2. Strategy implementation stages.

In earlier research, there have been several empirical studies in strategy implementation in service business, healthcare organizations, bank business, manufacturing industry, hotels and those empirical studies have been conducted mainly in USA and Europe. The main findings of the empirical studies are presented in the table. The conclusion of the findings is that there are several factors which are the basis for successful strategy implementation.

Table 3. Empirical studies in strategy implementation and the findings of the studies.

Authors	Empirical study	Findings
(Aaltonen & Ikävalko, 2002)	Service business	Main challenges in strategy implementation are poor communication and lack of understanding of strategy
(Al-Ghamdi, 1998)	United Kingdom	Successful strategy implementation are based on communication, management support and information systems.
(Dooley, Fryxell, & Judge, 2000)	Hospitals in United Kingdom	Strategy content, internal and external contexts and strategy process are key success factors for strategy implementation.
(Kargar & Blumenthal, 1994)	Small commercial banks in USA	Those Banks which had fewer problems during implementation were successful.
(S. Miller, 1997)	Manufacturing and service business in USA	Four implementation factors were identified for successful strategy implementation: backing, clear aims, planning and conducive climate.
(P. C. Nutt, 1998)	Manufacturing business	Four identified factors for successful strategy implementation: intervention, participation, persuasion and edict.
(P. C. Nutt, 1999)	Manufacturing and service business in USA and Canada	Strategy implementation fails because managers impose solutions, limiting the search for alternatives and using power to implement plans.
(Okumus, 2001)	Hotels in United kingdom	Successful strategy implementation consists of strategy content, internal and external contexts and strategy process.
(R. Wernham, 1985)	Telecommunication in United Kingdom	Unit managers did not understand the goals and strategies accepted by the top management.

2.2 Supply chain management

New concepts and methods have been introduced in the strategic management research during decades. SCM merge together concepts Just in Time (JIT), Total Quality Control (TQC), Total Quality Management (TQM), Time-Based Management (TBM), Lean Thinking (LT) and Lean, Business Process Reengineering (BPR) and Activity Based Management (ABM). (Laamanen & Tinnilä, 2002).

SCM approaches can be divided into quality-based approaches, time-based approaches and combinations of these. JIT is known as minimizing stocks and delivering products just at the right time. TQM is a business concept that develops quality in the whole SC, starting from the designing and ending up into after sales. (L. J. Krajewski & Ritzman, 2002; L. J. Krajewski, Ritzman, & Malhotra, 2007)

The focus of LT has essentially been on elimination of waste and it's developed in the Toyota Production Systems (Christopher & Towill, 2001). TBM target is to reduce the time from development phase to product delivery to the customer via SC. The idea of the concept is to decrease time spent in all processes in the SC. (Stalk & Hout, 1990) ABM and BPR were founded in the 1990's and ABM philosophy is the management of activities to increase customer value (Plowman, 2001).

2.2.1 *The concept of supply chain management*

SCM has been a well-known research area and is recognised as a management concept of the 2000's. SCM merges together different management concepts from the 1980 -2000. SCM is a concept of strategic management where the flow of the material, information and money is managed effectively to meet customer and business requirements. (Christopher, 1998; Christopher & Ryals, 1999; Christopher & Towill, 2001; Christopher & Towill, 2002; Christopher & Lee, 2004; Christopher, Lawson, & Peck, 2004; Christopher et al., 2006; Stevens, 1989)

SCM connects the organizations to develop the cooperation, where every part of the chain is working together to develop and deliver new products into markets (Aitken, Childerhouse, Christopher, & Towill, 2005). SCM incorporates the cooperation, coordination and collaboration across the organizations and through the whole SC and it creates long-term benefit for all the parties which are involved in the SC (Simchi-levi, Kaminsky, & Simchi-levi, 2004; Stank, Keller, & Daugherty, 2001).

SCM consists of four processes: plan, source, delivery and return. The planning process balances demand and delivery planning. Source transforms product to a finished state to meet planned or actual demand. Delivery is a process where goods are delivered to a customer. Return is a process of returning or receiving returned products. (Supply Chain Council, 2010) SCM synchronises firms' SC processes of customer relationship, order fulfilment and supplier relationship to meet customer demand and to deliver products through the SC to the customer (Ben Naylor, Naim, & Berry, 1999; L. J. Krajewski et al., 2007; Stevens, 1989).

2.2.2 *Supply chain integration*

SC integration links together various functions, partners and suppliers through the SC to create cooperation and to develop the SC (Christopher, 1998; Paulraj, Chen, & Flynn, 2006). SC integration is a process of collaboration where the members of SC work together to create cooperation to achieve common agreed targets (Pagell, 2004). The process of integration from upstream and downstream in the SC is defined as SC integration (Christopher, 1998; Lambert, Cooper, & Pagh, 1998). SC integration organisations make strategic cooperation with their partners and manage processes to create effective material, information and money flow (Bowersox, Closs, & Stank, 1999; Frohlich & Westbrook, 2001; Zhao, Huo, Flynn, & Yeung, 2008).

There are key processes that can be integrated across the SC: product development, customer relationship management, demand management, order fulfilment, procurement and manufacturing (Lambert et al., 1998). SC integration targets are JIT delivery, evaluating suppliers, long-term cooperation with suppliers and reduction of the supplier base. Demand information integration into the SC is one critical element of SC integration. When demand information is known in SC there is a better possibility to create agile and more flexible SC and it supports efficient manufacture and delivery of product. (de Treville, Shapiro, & Hameri, 2004; Lambert et al., 1998)

2.2.3 *Lean, agility and leagility in the supply chain management*

Agility is the trend of SCM in the 2000's and the concept of agility is based on TBM and LT philosophies. In SCM research agility is a synonym for flexibility and responsiveness. Agile SC is demand-driven and its more information-based concept. (Christopher et al., 2004) Agility is SC-wide capability, which develops organizational structures, SC processes and information integration (Harrison & Van Hoek, 2008). It is the ability of an organization to respond rapidly to demand

changes (Aitken et al., 2005; Christopher & Towill, 2000; Christopher, 2000). Agility is a organization-wide capability that embraces organisational structures, logistics processes and mind-sets (Aitken et al., 2005; Christopher et al., 2006).

Lean management is focused on eliminating all waste from the SC and it works in the SC where demand is stable, well-forecasted and where product variety is low (Ben Naylor et al., 1999; Christopher & Towill, 2001). When demand is volatile and forecasting is challenging, agility is required (Agarwal, Shankar, & Tiwari, 2006). Leagility merge lean and agility concepts together and is the combination of these concepts (Mason-Jones, Naylor, & Towill, 2000). In a dynamic business environment agility will maximize the profitability of the business. (Ben Naylor et al., 1999; Mason-Jones et al., 2000)

2.2.4 *Performance measurement in supply chain context*

SC performance measurement is applicable when managing and developing SC. There are many approaches for SC performance measurement. Managerial approach measures performance of SC at the operational, tactical and strategic managerial levels (Gunasekaran, Patel, & Tirtiroglu, 2001). Performance could be measured using a balanced scorecard framework (Thakkar, Deshmukh, Gupta, & Shankar, 2007). SC performance measurement approaches could be classified into financial and non-financial metrics, qualitative or quantitative approach, flexibility and performance measurement systems. SC performance measurement systems are tailor-made according to the SC needs. In SC performance measurement framework there are four categories presented: time, order book analysis, profitability and managerial analysis (Sillanpää, 2010).

SC performance can be measured by using different approaches:

- A Performance measurement matrix (Keegan, Eiler, & Jones, 1989)
- Financial and/or non-financial metrics (Gosselin, 2005; Ittner & Larcker, 2003; Ittner, Larcker, & Randall, 2003; R. S. Kaplan & Norton, 1992; Lambert & Pohlen, 2001; Neely, 1999; Tangen, 2004; Tapinos, Dyson, & Meadows, 2005)
- Qualitative or quantitative approach (Beamon, 1999; F. T. S. Chan, 2003)
- Balanced scorecard approaches (Bhagwat & Sharma, 2007; Chia, Goh, & Hum, 2009; X. Xu & Li, 2008)
- Performance prism (Neely et al., 2000)
- Performance measurement questionnaire (Dixon, 1990)
- Van Hoek's matrix model (Hoek, 1998)
- Cost and non-cost (De Toni & Tonchia, 2001; Gunasekaran et al., 2001)
- Quality, cost, delivery and flexibility (Shepherd & Gunter, 2006)

- Cost, quality, resource utilization, flexibility, visibility, trust and innovativeness (Bhagwat & Sharma, 2007; Bigliardi & Bottani, 2010; Brewer & Speh, 2000; Brewer & Speh, 2001; Chia et al., 2009; Dror, 2008; Epstein & Manzoni, 1998; R. Kaplan, 1993; R. S. Kaplan & Norton, 1996; R. S. Kaplan & Norton, 2001; R. S. Kaplan, 1996; Lawrie & Cobbold, 2004; Thakkar et al., 2007; X. Xu & Li, 2008)
- Resources, outputs and flexibility (Beamon, 1999)
- SC collaboration efficiency; coordination efficiency and configuration (Shepherd & Gunter, 2006)
- Input, output and composite measures (F. T. S. Chan, 2003)
- Strategic, operational or tactical management approach (Gunasekaran et al., 2001)
- SC process based measuring approach (F. T. S. Chan, 2003; Shepherd & Gunter, 2006)
- Six-sigma approaches (Dasgupta, 2003; Lin & Li, 2010; Ramaa, Rangaswamy, & Subramanya, 2009; Wang, Du, & Li, 2004; J. Xu, 2008)
- Measuring SC in multiple levels (Lin & Li, 2010; Shepherd & Gunter, 2006)

SC performance measurement approaches are frameworks, performance measures and performance measurement systems, which could be classified as follows: quality, cost, delivery, flexibility, agility, responsiveness, non-financial, qualitative and quantitative. Table 4 presents the most recognized frameworks and categorizes those.

Table 4. Supply chain performance measurement frameworks

Author	Framework / Performance measures / Performance Measurement System (Quality (Q) Cost (C) Delivery(D) Flexibility (F) Agility (A) Responsiveness(R) Non-financial (NF) Qualitative (QL) Quantitative (QN))	Category of Measure
(Beamon, 1999)	Resources, output and flexibility	QN
(Holmberg, 2000)	Performance model with system perspective, cost, speed and customer service level, agility	C, A, Q
(Suwignjo, Bititci, & Carrie, 2000)	Quantitative model	QN
(Gunasekaran et al., 2001)	Strategic, operational and tactical focus	QN, QL
(Stephens, 2001)	Measures based on process	C,R, QN
(De Toni & Tonchia, 2001)	Cost and non cost	C, NF
(Hieber, 2002)	Supply chain collaboration efficiency; coordination efficiency and configuration	Q, QN
(F. T. S. Chan & Qi, 2003a)	Cost, quality, resource utilization, flexibility, visibility, trust and innovativeness	C, Q, QN, F, A
(F. T. S. Chan & Qi, 2003b)	Innovative Performance Measurement Method	Q, QN, QL
(Gunasekaran, Williams, & McGaughey, 2005)	Framework for measuring costs and performance	C, NF
(Fynes, Voss, & De Búrca, 2005)	Quality, framework incorporating dimensions of SC relationships and quality performance	Q, QN

2.3 Supplier development

The term “supplier development” was used to describe efforts by manufacturers to improve suppliers’ performance (Leenders, 1966). There is a large variety of actions that can be deployed to improve suppliers’ performance, starting from low involvement activities such as supplier evaluation to much more developed and demanding activities such as investing in production equipment and training of supplier employees (Arroyo-López, Holmen, & de Boer, 2012; Modi & Mabert, 2007; Wagner & Krause, 2009). Critical elements in SD are that firms involved in SD also perceive their suppliers as partners: two-way multifunctional communication, top management commitment, and cross-functional teams and buyer have a greater percentage of the supplier’s sales (Krause & Ellram, 1997a).

Supplier commitment and a level of inter-firm communication are seen as foundations to SD. Success factors for SD include buyers appreciate their suppliers as partners. Top management commitment along with supplier recognition, investment in the suppliers’ operations, communication skills, and secure multiple contact points between the buyer and seller are success factors. (Krause & Ellram, 1997a; Krause & Ellram, 1997b; Krause, 1997) Supplier commitment, trust, and alignment of organisational cultures are critical success factors in SD (Handfield, Krause, Scannell, & Monczka, 2000; Hartley & Choi, 1996).

Process-oriented SD model aim to help suppliers develop their processes. The steps of the model are: to assess the supplier’s readiness for change; to build commitment through collaboration; to implement system-wide changes; and to transform the supplier’s organisation. (Hartley & Choi, 1996)

2.3.1 *The content of supplier development*

The purchasing literature states the importance of SD in supporting a firm’s SC strategy by ensuring suppliers’ performance and capabilities meet the needs of the buying firm (Hahn, Watts, & Kim, 1990; Hartley & Choi, 1996; Monczka, Trent, & Callahan, 1993). Manufacturing firms have realized the importance of supplier performance in establishing and maintaining their competitive advantage. Also purchasing research has focused on SD programs and explored how these initiatives impact purchasers’ and suppliers’ performance. (Humphreys, Shiu, & Chan, 2001; Krause, 1997; Watts & Hahn, 1993) SD programs are activities undertaken by the buying firms in their efforts to measure and improve the products or services they receive from their suppliers (Handfield et al., 2000). The buying firms typically select a small number of critical suppliers to focus their improvement effort (Watts & Hahn, 1993).

Previous research shows that those buying firms who were satisfied with their SD efforts communicate more effectively with suppliers and put more effort into such activities as supplier evaluation, supplier training and supplier award programs (Krause & Ellram, 1997b). The majority of buying firms involved in SD perceived their suppliers as partners (Krause & Ellram, 1997a). SD consists of infrastructure factors, strategic goals, effective communication, long-term commitment, top management support, supplier evaluation, supplier strategic objectives and trust. The clarity of long-term strategic goals determines the effectiveness of SD. (Humphreys et al., 2004) SD efforts should focus on developing suppliers' future capabilities in technology and product development. To develop supplier capability and flexibility are the key elements of SD (Watts & Hahn, 1993). Open and frequent communication between buying firm personnel and their supplier was identified as a key approach in motivating suppliers (Giunipero, 1990; Newman & Rhee, 1990).

Purchasers should select their suppliers carefully and evaluate them regularly to have effective and reliable suppliers (Monczka et al., 1993). Supplier evaluation results could provide valuable information about general areas of weakness where performance improvements were needed (Hahn et al., 1990). SD is a program which requires mutual recognition by the purchaser and supplier (Monczka et al., 1993).

The majority of buying firms involved in SD will perceive their suppliers as partners (Krause & Ellram, 1997a). Adopting a partnership strategy means that a buying firm pursues a long-term relationship with suppliers. Without a buyer's commitment, the suppliers may be unwilling to make changes in their operations to accommodate the requirements of that buyer (Lascelles & Dale, 1989). Top management is the main enabler in initiating a SD program based on the firm's competitive strategy (Hahn et al., 1990; Hines, 1994).

Transaction-specific investments will increase the purchaser's dependence on the particular trading relationship and expose them to greater risk and uncertainty (Krause, 1999). Buyers must safeguard themselves against the hazards of opportunism of suppliers (Williamson, 1985). Trust has been seen as a more effective means of safeguarding specialized investments (Hill, 1995). Purchaser trust in the same supplier would enhance the effect of buyer asset specificity on joint action in buyer-supplier relations (Joshi & Stump, 1999). Table 5 presents the SD approaches and factors, and explanations of the approaches.

Table 5. Supplier development approaches.

Factor	Author	Explanation
Communication	(Galt & Dale, 1991; Krause, 1997; Wen-Li, Humphreys, Chan, & Kumaraswamy, 2003)	Interaction between supplier and buyer
Competitive pressure among suppliers	(Krause, 1997)	Use of two suppliers to create competition
Contract	(Galt & Dale, 1991)	Contract between the buyer and supplier
Customer base	(Chakraborty & Philip, 1996)	Suppliers number of customers
Demographic information	(Krause & Scannell, 2002; Watts & Hahn, 1993)	Information like gross annual contract sales, number of employees etc.
Direct involvement	(Krause, 1997; Krause & Scannell, 2002)	Buyer firm site visits, product knowledge, training of suppliers personnel, investment to suppliers operation
Interdependence	(Chakraborty & Philip, 1996)	The relationship with buyer and supplier
Level of involvement in supplier development programs	(Krause & Ellram, 1997a; Watts & Hahn, 1993)	Management support for supplier development projects
Local versus international sourcing	(Galt & Dale, 1991)	Product is produced locally or sourced from abroad
Product development involvement	(Chakraborty & Philip, 1996)	The role that the supplier plays in product development
Supplier base	(Galt & Dale, 1991; Krause, 1997)	Number of suppliers in buyer firm supplier base
Supplier certification	(Galt & Dale, 1991; Krause & Scannell, 2002)	Buyer nominate best performing suppliers
Supplier development incentives	(Krause, 1997; Krause & Scannell, 2002)	Promising current benefits, promising future business, recognition achievement
Supplier development outcomes	(Hartley, Zirger, & Kamath, 1997)	Result oriented, process oriented
Supplier development program objectives	(Watts & Hahn, 1993)	To improve quality, on time deliveries, technical capability etc.
Supplier development program perspective	(Krause & Ellram, 1997a; Watts & Hahn, 1993)	New sources or long-term cooperation.
Supplier development program team	(Watts & Hahn, 1993)	Nominated teams for supplier development.
Supplier evaluation	(Hahn et al., 1990; Humphreys et al., 2004; Krause & Ellram, 1997a; Krause, 1997; Watts & Hahn, 1993; Wen-Li et al., 2003)	Buyer personal is assigned to study the present system followed by supplier or supplier itself providing the required data about their present system to the buyer
Supplier selection	(Galt & Dale, 1991)	Selection of suppliers according piece, quality, on time deliveries etc.
Supplier training	(Galt & Dale, 1991; Krause, 1997)	Training program with supplier organized by buyer firm
Task Structure	(Chakraborty & Philip, 1996)	Unstructured, semi-structured, structured
Vendor selection methods	(Chakraborty & Philip, 1996)	Open tender, closed tender, direct selection

2.3.2 Knowledge sharing in supplier development

Knowledge is usually divided into two types: explicit and tacit (Grant, 1996a; Grant, 1996b; Kogut & Zander, 1992; Nonaka, 1994; Szulanski, 1996). Interfirm knowledge-sharing routine is a regular pattern of interfirm interactions that permits the transfer, recombination, or creation of specialized knowledge (J. H. Dyer & Singh, 1998). Knowledge is considered one of the firm's core resources and learning from partner firms a way to acquire new knowledge and develop new capabilities. One target for SD is to transfer capabilities from the customer to the supplier. The transmission of capabilities may be accomplished through multiple activities and the implementation of organizational routines, which facilitate interaction, the interchange of information and the integration of best practices to intensify the quality of the knowledge to be transferred. (J. H. Dyer & Hatch, 2004; Hartley et al., 1997; Krause, Scannell, & Calantone, 2000; Sako, 2004)

Learning routine is a regular pattern of interactions among individuals that permits the transfer, recombination, or creation of specialized knowledge (Grant, 1996a; Grant, 1996b; Grant, 1997). Previous research presents that organizations that are effective at learning have developed routines that allow them to effectively develop, store, and apply new knowledge on a systematic basis (Cohen & Levinthal, 1990; Levitt & March, 1988; Nelson & Winter, 1982; Nonaka, 1994).

There are substantial barriers to knowledge transfers that make it difficult to transfer knowledge within the firm (Knott, 2003; Leonard-Barton, 1998; Szulanski, 1996). The major barriers to intra-firm transfers of knowledge include lack of absorptive capacity on the part of the recipient of knowledge; lack of credibility on the part of the source of knowledge; lack of motivation on the part of the source or recipient of knowledge; arduous relationship between the source and recipient (Szulanski, 1996).

3 RESEARCH METHODOLOGY

3.1 Scientific paradigms

Ontology question is “What exists?” and reality can be reviewed in a nominalistic manner or in a realistic manner. Epistemology is a theory of information, a doctrine of concept of information, and it concerns the nature of scientific knowledge that is produced from a phenomenon by means of research. The classic definition of information is information is well-justified true belief. (Burrell & Morgan, 1998; Järvinen & Järvinen, 2004; Niiniluoto, 1997)

3.1.1 *Research approaches*

The hermeneutic view perceives knowledge as soft, often subjective and experience-based as well as insights of a personal nature, and also can be a research approach in the qualitative and quantitative research. The aim of qualitative research is to understand the phenomenon being studied. (Burrell & Morgan, 1979; Burrell & Morgan, 1998) Inductive reasoning is a method of reasoning that starts from a group of observations and forms a generalization or a theory regarding it. Deductive reasoning is a method of reasoning in which the true premises are necessarily followed by a true conclusion. (Ghauri & Grønhaug, 2005)

The constructive approach is problem solving in a real-life organizational setting through the establishment of a management system. Constructive method is a solution-oriented normative method where target-oriented and innovative step-by-step developments of a solution are combined, and in which empirical testing of the solution is conducted and utility areas are analysed. (Kasanen, Lukka, & Siitonen, 1993; Labro & Tuomela, 2003; Lukka, 2000)

3.1.2 *Case study research*

Case study research is aimed at understanding comprehensive and relevant phenomena in real life (Eisenhardt, 1989b; Yin, 2009). Case study research is usually finding the answer to the research questions how and why. There are three types of case study research: explorative, descriptive and explanatory research. (Yin, 2009)

The data can be collected using various means in case study research. The most common method for data collection is documents, interviews, archives and obser-

vations. The researcher has an opportunity to change data collection methods during the case study research. The researcher has to be able to create a chain of evidence to increase the reliability of the case study research. (Eisenhardt, 1989b; Yin, 2009)

In case study research the challenges are data collection methods, results generalizations and reliability of the results. In a single case study research the results cannot always be generalized according to the scientific laws. Data collection process could have social interaction and may affect the opinions of the research. (Yin, 2009)

3.2 Research approach for this study

In this case study research, the hermeneutic view is a research approach for this study. Qualitative methods are used to collect information in the case study research. Furthermore, a constructive approach is a research approach for this study, when the theory framework is created.

The empirical part of this study consists of multiple case study researches. The research problem is presented as a question: How to implement supply chain strategy? Research questions are: What are the main supply chain strategy approaches? How can the supply chain strategy be implemented?

The research consists of six publications focusing on the areas of strategic management, strategy implementation, SCM, SD, information integration and measuring performance. Methods that have been used in publications and input data for the publications are summarised in Table.

Table 6. Summary of the methods and data in the publications.

Title of the article	Methods	Data
SC strategy – empirical case study in Europe and Asia	Systematic literature review, qualitative case study research	Literature review with the latest literature and most cited journal articles in the field of strategy and SCM. Interviews: 25 interviewees with Europe and Asia case company's top management and owners.
Strategic Decision-making Model For Make Or Buy Decisions	Literature review and qualitative case study research with interviews.	Literature review of make or buy decision-making approaches: transaction cost economics, make or buy triggers, competitive factors, McIvor's outsourcing framework, Tayles and Drury sourcing decision model, balanced scorecard. 10 interviews with case company's (Europe and Asia) top management and owners.
SD and buyer-supplier relationship analysis - literature review	Literature review.	Literature review of supplier management, supplier policies and procedures, buyer-supplier relationship, SCM, SD. Close to 200 most relevant and cited papers were viewed and half of those were selected into the more close consideration.
Critical attributes on SC strategy implementation: case study in Europe and Asia	Qualitative case study research with interviews. Quantitative sense and response analyse method.	Interviews: 15 interviews with the case company's management and case company's supplier's management and owners in Europe, Asia and America. Questionnaire contained 36 attributes in three categories: SCM strategy approaches, SCM strategy implementation and challenges in SCM strategy implementation. Analyses were done according to Sense and Respond method.
Developing the Elements of Information Integration in the Real Estate and User Services	Qualitative case study research.	Literature review of elements of information integration, information in real estate and user services and service SCM.
Empirical study of measuring SC performance	Qualitative case study research. Quantitative measurements in case study companies.	Literature review of the most relevant literature related to SC performance measurement. According to the literature reviews it was developed SC performance measurement framework. More than 30 interviews, measurements in the case company and data collection from case company ERP.

The thesis consists of six articles in which every article includes wide literature review and most of the articles include empirical case studies from manufacturing industry or service business. The main methodological choices are presented in the table.

Table 7. The main methodological choices in this study.

Research discipline	Strategic management
Theoretical base	Strategic management, SCM, strategy implementation
Research paradigm	Hermeneutics
Research strategy and research approaches	Qualitative and quantitative research, constructive research and case study research approach
Research methods	Qualitative methods: interviews, data from ERP systems, observations, questionnaires, documents. Quantitative methods: questionnaires and analyses based on numerical data.

4 PUBLICATIONS

This thesis covers six international journal articles about implementing SC strategies'. All of the papers have been published or publication is forthcoming in high ranked international journals. Theory is based on the literature review and empirically tested in case study researches in Europe and Asia. Output and the results of the journal papers are sub-frameworks of SC strategy implementation framework. Table presents the input data, publications and output of the articles.

Table 8. Input data, publications and output of the articles.

Input data	Title of the article	Output
Literature review with the latest literature and most cited journal articles in the field of strategy and SCM. Interviews: 25 interviewees with Europe and Asia case company's top management and owners.	SC strategy – empirical case study in Europe and Asia	According to literature review it was conducted as a SC strategy framework. Framework was tested and verified in case SCs A and B. Main approaches are business environment, corporate strategy, SC demand and SC strategy.
Literature review of make or buy decision-making approaches: transaction cost economics, make or buy triggers, competitive factors, McIvor's outsourcing framework, Tayles and Drury sourcing decision model, balanced scorecard. 10 interviews with case company's (Europe and Asia) top management and owners.	Strategic Decision-making Model For Make Or Buy Decisions	Empirically tested and verified strategic make or buy decision-making model, which includes: competitive factors, balanced scorecard, McIvor's outsourcing framework and competitive factors. Model consists of four stages: 1. Define core activities, 2. Evaluate relevant value chain activities, 3. Total cost analysis of core activities, 4. Relationship analysis.
Literature review of supplier management, supplier policies and procedures, buyer-supplier relationship, SCM, SD. Close to 200 most relevant and cited papers were viewed and half of those were selected for deeper consideration.	Supplier development and buyer-supplier relationship analysis - literature review	According to the literature review it was conducted as a model Operational breakdown of the values of buying firms' approaches to develop supplier performance: supplier assessments, competitive pressure, supplier incentives, direct involvement.
Interviews: 15 interviews with the case company's management and case company's supplier's management and owners in Europe, Asia and America. Questionnaire contained 36 attributes in three categories: SCM strategy approaches, SCM strategy implementation and challenges in SCM strategy implementation. Analyses were done according to Sense and Respond method.	Critical attributes on SC strategy implementation: case study in Europe and Asia	Result of the Sense and Respond method analyses was that there are differences and similarities of critical attributes that affect SC strategy implementation in Asian and European companies. There are two attributes that have consistent trend for both regions: innovation and organizational structure.
Literature review of elements of information integration, information in real estate and user services and service SCM.	Developing the Elements of Information Integration in the Real Estate and User Services	According to the literature review and deep case study research it was conducted framework Developing information integration. Main information attributes are quality, form, availability, information sharing practices, information channels, and time related issues.
Literature review of the most relevant literature related to SC performance measurement. According to the literature reviews it was developed SC performance measurement framework. More than 30 interviews, measurements in the case company and data collection from case company ERP.	Empirical study of measuring SC performance	Created SC performance measurement framework was empirically tested and verified in the case company. Framework consists of four approaches: order book analysis, profitability, managerial analysis and time.

4.1 Supply chain strategy – empirical case study in Europe and Asia

Objective

The purpose of this case study research is to present a literature review of SC strategy approaches, develop SC strategy framework and to validate a framework in empirical case study. Literature review and case study research are the research methods for this article.

As the concept of SC strategy is quite loosely established, there is little academic literature that explicitly relates corporate strategy to SC strategy. However, academic literature that relates corporate strategy to SCM concepts is somewhat larger (Trkman, Stemberger, Jaklic, & Groznik, 2007). There are many scholars who state that corporate strategies with a focus on cost-leadership require lean SC processes, whereas corporate strategies with a focus on differentiation require agile SC processes (Chen & Paulraj, 2004; Morash, 2001).

Many scholars state that supply chain strategy must reflect the corporate strategy (Chopra & Meindl, 2007; Christopher et al., 2006; Harrison & New, 2002; Schnetzler et al., 2007; Waters, 2009). According to the survey conducted by Harrison et al. (2002), two-thirds of all respondents thought that their SC strategy was significant or highly significant in terms of corporate strategy. According to Rose (2012) however, there still exists a major gap between corporate strategies and SC strategies (Rose, 2012).

Being loosely established, SC strategies can be studied from multiple different perspectives. Rose (2012) isolates five different research fields: SCM, marketing, operations management, organizational theory and contractual perspective (Rose, 2012). SCM perspective of SC strategy discusses the different strategies in relation to the five different parts of the SCOR model: plan, source, make, deliver and return. Marketing perspective highlights designing an SC according to the requirements of the customer. Operations management discuss whether to make the SC efficient (lean) or responsive (agile). Organizational theory concentrates on integration of the SC. Finally, contractual perspective emphasizes the importance of different kind of contractual agreements that can exist between the different actors in the SC.

Results and main contributions

The need for SC integration has been explained by resource-based view of the firm (Cousins & Menguc, 2006). According to this view, firms have realized that

some strategic resources may lie beyond the boundaries of the firm and that the competitive advantage may be explained by a network of inter-firm relationships. On the other hand, supply strategies that concern supplier selection have been relatively loosely tied to corporate strategies, and if some are used, they are most often transaction cost or agency theory (Leiblein, Reuer, & Dalsace, 2002). According to transaction cost theory, cooperation with suppliers is limited to the transaction costs of managing the interaction. Agency theory postulates that in a healthy relationship with suppliers, incentives of both sides are aligned.

SC strategy framework merges together business environment, corporate strategy, SC demand and SC strategy. SC strategy framework is based on business environment where the main approaches are high and low volume. Corporate strategy is divided into cost leadership and differentiation and SC demand is based on predictable or unpredictable demand. SC strategy approaches are efficiency and lean or responsiveness and agile SC. SC strategy framework is tested in one empirical case study where two SCs are analysed. Empirical case study validates developed SC strategy framework.

4.2 Strategic Decision-Making Model For Make Or Buy Decisions

Objective

Purchasing should be accounted for as a significant function, which needs to be considered as a part of the corporate planning process to ensure that supply conditions are reflected in it. Strategic approaches for a particular function, for example sourcing, need to be linked to other functional strategies, linked to strategies for particular business units and linked at the corporate level where there are perceived synergistic benefits. The make or buy decisions have been under discussion since the industrial revolution. Yet, its strategic role has not been admitted until now, at the same time as the strategic role of sourcing has started to have been appreciated.

This journal article's goal is to analyze factors that are related to make or buy decisions. Research will help to understand how outsourcing and subcontracting can affect a company's business, operations and profitability. This research creates a tool for make or buy decision-making which can be used as an aid to evaluate the reasonableness of outsourcing analytically. Until now, this kind of tool has not been created and there is no systematically way to make these decisions.

Results and main contributions

The aim of make or buy decision-making is to minimize total costs. Working in collaboration with suppliers and by outsourcing and subcontracting, it is possible to achieve a more flexible, more efficient and more agile SC. The first step to make outsourcing analysis is usually identifying a company's core competence. Traditionally outsourcing decisions have been bounded between core and non-core competencies and the latter can be considered for outsourcing. However, this is a very simplified point of view for there are many companies which have successfully outsourced functions which are also crucial to their core business.

There are only a few frameworks in the literature for make or buy decision-making models. McIvor's outsourcing framework integrates three concepts associated with the decision-making process: value chain analysis, core competency thinking and supply base influences. The framework proposes that all non-core activities should be outsourced but that also core activities can be strategically outsourced.

Another sourcing model is made by Tayles and Drury. This model does not make the actual decision, but it rather develops a decision logically. While not seeking the automatic decision, it ensures that wider issues are considered in a logical manner, that the process is transparent and that strategic thinking is transformed into practice. The biggest difference between these two models is that Tayles and Drury model suggests that core activities or products are not outsourced in any situation. Balanced scorecard is also introduced as one framework for make or buy decision-making. Its objective is to measure those things on which success is depending and it includes indicators from four internal and external perspectives: customer, innovation and learning, process and economical.

Strategic decision-making model is based on balanced scorecard, McIvor's outsourcing framework and for competitive factors. The aim of the strategic model is to consider the make or buy issue via four perspectives of the balanced scorecard, so that all factors relevant to the decision are considered. Innovation and learning perspective covers core competency identification and thinking, process perspective is about processes and resources and economical perspective covers the cost calculations and estimates. The fourth perspective, customer perspective, considers the customer's interests: quality, delivery reliability and accuracy, and service ability.

4.3 Supplier development and buyer-supplier relationship analysis – literature review

Objective

SD was used by Leenders (1996) first to explain the determination by manufacturers to enhance the supplier's numbers and to improve their performance (Leenders, 1966). After that, researchers in SCM started a discussion of SD. At the same time, organizational theorists began discussion of complex-product businesses that considered the high degree of mutual interdependence between transitional module makers and ultimate assemblers (Pfeffer & Salancik, 1978; Thompson, 1967).

Moreover, Supplier performances and capabilities have significant existence and play a vital role maintaining the manufacturing firms' competitive advantage (Humphreys et al., 2001; Krause, 1997; Watts & Hahn, 1993). SD may include goal setting, supplier evaluation, performance measurement, supplier training, and other related activities (Krause, Handfield, & Tyler, 2007).

Previous studies state that buying firms can communicate more efficiently with suppliers if they put efforts in SD including supplier evaluation, supplier training, and supplier award programs (Krause & Ellram, 1997b). Furthermore, they perceive their suppliers as partners and place a better emphasis on some serious issues (Krause & Ellram, 1997a). The buying firm's tendency to engage in SD was affected by its perception of supplier obligation, its anticipation of relationship endurance and operative buyer-supplier communication (Krause, 1999).

Results and main contributions

A detailed literature overview of SD strategies and buyer-supplier relationship is presented. SD activities can be summarized as 1) introduction of competition to the supply base, 2) supplier evaluation for further development, 3) supplier certification, 4) elevation of performance expectations/goals, 5) recognition and rewards, 6) promise of future benefits, 7) training and education of suppliers' staff, 8) direct investment in the supplier by the buying firms, 9) exchange of personnel between buyer and supplier organizations, 10) supplier plant visits, 11) intensive information exchange with suppliers, 12) collaboration with suppliers to improve the material and development of new materials, and 13) involvement of suppliers in new product development process. (Krause & Ellram, 1997a; Krause & Ellram, 1997b; Krause, 1997)

One objective of SD is to transfer competencies from the customer to the supplier. These capabilities gradually develop the basic skills to guarantee the performance index towards continuity of development and innovation. For the purpose, this transmission of competencies may be accomplished through different actions and the execution of organizational procedures facilitating an association and interactions, sharing the information, and integration of best practices to strengthen or enhance the quality of knowledge to be transferred (J. H. Dyer & Hatch, 2004; Hartley et al., 1997; Krause et al., 2000; Sako, 2004). Moreover, there are some critical elements in SD that play an important role to improve supplier performance. These elements include the involvement of buyer building a perception as partners. Two-way multifunctional communication, top management interest, and building cross functional teams are most significant factors making SD strategies. (Krause & Ellram, 1997a; Krause & Ellram, 1997b; Krause, 1997)

SD is a key factor and positively effects the buyer's performance especially in product development integration, collaborative planning and information system integration. Suppliers with a high performance rating have strong process improvement capabilities with involvement of the purchasing function and considering it with top priority. (Droge, Jayaram, & Vickery, 2004; Ellram, Zsidisin, Siferd, & Stanly, 2002; Frohlich & Westbrook, 2002; Narasimhan & Kim, 2002; Petersen, Ragatz, & Monczka, 2005; Rosenzweig, Roth, & Dean Jr., 2003) In the same vein, information sharing is a significant factor which foresees the competitive existence of a buyer and helps to measure the process of supplier assortment (Kannan & Tan, 2002).

4.4 Critical attributes on supply chain strategy implementation: case study in Europe and Asia

Objective

This case study research aims at comparing the performance of the implementation of SCM strategies within Asian and European Companies. The case study measures the company's opinions of SC strategy implementation through the utilization of Sense and Response methodology. Critical Factor Index (CFI), Balanced Critical Factor Index (BCFI) and Scaled Critical Factor Index (SCFI) are used in this study to represent the result of comparison between European and Asian companies. In this research, the analysis of SC strategy implementation was made for the needs of manufacturing industry.

There were five respondents represent each group. The interest is to seek for possible similarities of critical attributes to be focus on for improvement. The study also attempted to see possible trend in the implementation of SCM among both group.

Results and main contributions

This paper presents results of a comparative study that measures an organization's opinions regarding business performance from a SCM's point of view through utilization of Sense and Response methodology. There are three models used; CFI, BCFI and SCFI to portray the result of comparison between the two groups. Each attribute in the questionnaires is evaluated on how well each attribute has been carried out in their companies, how they see themselves compared to their competitors, and how they see each attribute developing compared to the situation 1 to 2 years before.

This paper aims to compare the performance of the implementation of SCM. The interest is to gain insight for possible similarities and differences of critical attributes to help decision makers to make adaptive adjustments on operations strategy in the dynamic business environment of Asia and Europe. Each model generates different critical attributes. However, as supported by past research, results which are yielded by SCFI model are more accurate than others. According to SCFI model, there is no critical attribute at the moment for both Asian and European companies. The trend indicates positive changes from expectation to experience values. However, almost 95 percent of all attributes are potentially critical in the future.

From the analysis of comparison of all S&R models, it can be concluded that there are differences and similarities of critical attributes that affect SC strategy implementation in Asian and European companies. This is understandable as different environments have different points of view. There are two attributes that have consistent trend for both regions; innovation and organization structure.

4.5 Developing the Elements of Information Integration in the Real Estate and User Services

Objective

Information is one of the most important elements for managing service SC. Therefore the functionality of the flow of information is an essential part of a service business. The aim of this study is to address this issue by looking into the meaning and development of the elements of information integration in real estate and user services. The purpose of the study is to formulate a model for information integration development.

This paper is a qualitative research into elements of information integration and developing them in real estate and user services. Collecting the data for the study consisted of three stages: a workshop and two rounds of interviews. The themes of data collection encompassed surveying the needs for information and the current practices of flow of information as well as the significance and development of information integration-related elements in real estate and user services.

Real Estate and user services involve the customer as a significant part of the SC, since these services are carried out in the premises of a customer. Real Estate and customers' needs are different and therefore Real Estate and User services have to be planned in a property-specific manner. This increases the importance of long-term customer relationships. Between the parties in Real Estate and User services there is a large critical information flow, such as confirming and forwarding of orders, answering to service requests and reporting customer satisfaction.

Information integration increases possibilities to react to sudden changes in an unstable demand environment. Information integration between the parties improves productivity, customer service and comprehensive performance in the market as well as coordination. Furthermore, it reduces storage costs and makes the SC more effective. Information integration has also a great deal of significance when carrying out coordination between organizations and establishing co-operation relationships.

Results and main contributions

If the information flow does not work it will affect both the customer and the service provider in a negative way. Services are managed by information and it is important that the information flows in both directions: from the customer to the service provider and from service provider to the customer. That is why both parties are interested in developing the information flow and information integration.

The bigger the organization is, the more the function of information flow and the needs of information are emphasized. That is the way to get real-time information and the right decisions.

In this study, the flow of information was analyzed with the help of elements of information integration. In the study it was noted that defining information attributes appeared as a prerequisite for developing information integration, since defining information attributes – that is form, quality and availability – helps to define the information needs of a customer. Furthermore, defining information attributes forms the basis for defining channels of information distribution.

Information has a major role in service management and therefore advancing communication plays a key role in functionality and development of services. The current practices in the information flow related to real estate and user services are immature even though sharing information has become more and more important to customers as well as to service providers. Customers demand a more and more sophisticated information flow and reporting practices. In particular, complications in information flow have been regarded as one of the obstacles for progress in the field.

4.6 Empirical study of measuring supply chain performance

Objective

SC performance measurement is the process of measuring the efficiency of the SC. This research presents the prior theories of SC performance measurement and based on the empirical research develops a SC performance measurement framework for manufacturing industry. This empirical case study research is a qualitative research with some quantitative measurements.

Prior theory is fragmented and does not consist of any relevant measurement system, tool or framework, which could be used for SC performance measurement in manufacturing industry. This research is carried out with interviews and a measurement of the case SC. SC performance measurement is the first step to start SC development and SC integration. Research goal is to deepen knowledge of SC performance measurement in the manufacturing industry.

Results and main contributions

According to the literature review and empirical case study SC performance measurement framework was conducted and it included order book analysis, profitability, time and managerial analysis. Order book analysis is the way to look backwards at the SC demand and manufacturing volumes but also to make demand and forecasting analysis. Profitability was measured using selected customers' deliveries during the case study research and analysed the profit of these customers. Time based measurements were selected to illustrate the SC order-delivery time, punctuality and manufacturing times. Managerial analyses were done at operational, tactical and strategic managerial levels. Every management levels needs its own measurement and analysis.

Measurements were done in two different time periods. The conclusion of the research is that developed SC performance measurement framework is empirically tested and validated and it is usable in manufacturing industry and also in other industries, because the literature review and SC measurement framework were developed according to the needs of any industry. Managerial implications related to day-to-day business needs to have a SC performance measurement system which could be used at different managerial levels. Theoretical contribution is the developed SC performance measurement framework, which consists of the main approaches of the present research in SC performance measurement.

4.7 Contribution of the author in the publications

Author contribution has been significant in every published journal article. The author has been corresponding author in five of the articles and the person in charge of planning data collection and collecting data. The author has been also responsible for analysis of the results in every article as well as writer of result and conclusion chapters in five articles. The summary of the author contribution is presented in the table.

Table 9. Contribution of the author in the publications.

Publication	Corresponding author	Planner of data collection process	Input data collection	Analysis of results	Writer of result and conclusion chapter
Supply chain strategy – empirical case study in Europe and Asia	X	X	X	X	X
Strategic Decision-making Model For Make Or Buy Decisions	X	X	X	X	X
Supplier development and buyer-supplier relationship analysis - literature review	X	X	X	X	X
Critical attributes on supply chain strategy implementation: case study in Europe and Asia	X	X	X	X	
Developing the Elements of Information Integration in the Real Estate and User Services		X	X	X	X
Empirical study of measuring supply chain performance	X	X	X	X	X

5 DISCUSSION

Strategy is the major intended and emergent initiatives taken by general managers on behalf of owners, involving utilization of resources, to enhance the performance of firms in their external environments (Nag et al., 2007). There are three different scientific disciplines from which the different fields of strategic management research have grown: economics, sociology and psychology. Economics has been the founding theory for such strategic management fields as evolutionary economics, transaction cost theory, industrial economics, resource-based view of the firm and agency theory. Sociology with its different theories is the foundation for such fields as contingency theory, resource-dependence theory, organisational ecology and ecosystem. The most popular psychological views of strategic management include power and pattern views to strategy creation. (Ramos-Rodríguez & Ruíz-Navarro, 2004)

SC strategy is a set of prioritized SCM objectives, strategic priorities and a way to operate them and to determine appropriate measures, in order to build up and capitalize on so-called logistics success potentials that can result in successful business performance (Schnetzler et al., 2007). SC strategy can also be emergent rather than deliberate and defines the concept as a deliberate and emergent conceptual framework by which a company involves its SC and SC members in its efforts to reach its own corporate strategic objective. (Rose, 2012).

5.1 How to implement supply chain strategy?

Answer to research problem is presented as a answer for research question:

(RT1) What are the main supply chain strategy approaches?

- Journal articles number 1 and 2

(RT2) How can the supply chain strategy be implemented?

- Journal articles number 2,3,4,5,6

5.2 What are the main supply chain strategy approaches?

At the highest level, strategy is described as a mission that gives the overall purpose and aims of an organisation. Corporate strategy then describes how the mission is achieved. SC strategy is functional strategy and it is vital that the functional strategy is in line with the business strategy. (Waters, 2009)

The importance of SC integration aroused scholars' attention during the 1990s (Cousins & Menguc, 2006; Frohlich & Westbrook, 2001; Storey, Emberson, Godsell, & Harrison, 2006). Global competition has forced firms to produce higher quality at a lower price, and this can be attained via SC integration. An integrative SC strategy recognizes that integrated business processes create value for the firm's customers and that these processes reach beyond the boundaries of the firm by drawing suppliers and customers into the value creation process. The clear definition of SC integration is not that well established as some scholars only include the upstream side of SC. However, it is much more general to include both upstream and downstream in the discussion of SC integration. (Vickery, Jayaram, Droge, & Calantone, 2003)

SC strategy framework is based on business environment, which could be high or low business volume. The main corporate strategy approaches are cost leadership and differentiation. SC demand is based on predictable or unpredictable demand. SC strategy has two approaches; efficiency or responsiveness, where efficiency is a lean SC strategy approach and responsiveness is an agile SC strategy approach. When the business environment and volume is high, then strategy approaches for SC are cost leadership corporate strategy, predictable SC demand and efficiency, and lean SC strategies. If the business environment and volume is low, then strategy approaches for SC are differentiation corporate strategy, unpredictable SC demand and responsiveness and agile SC strategies.

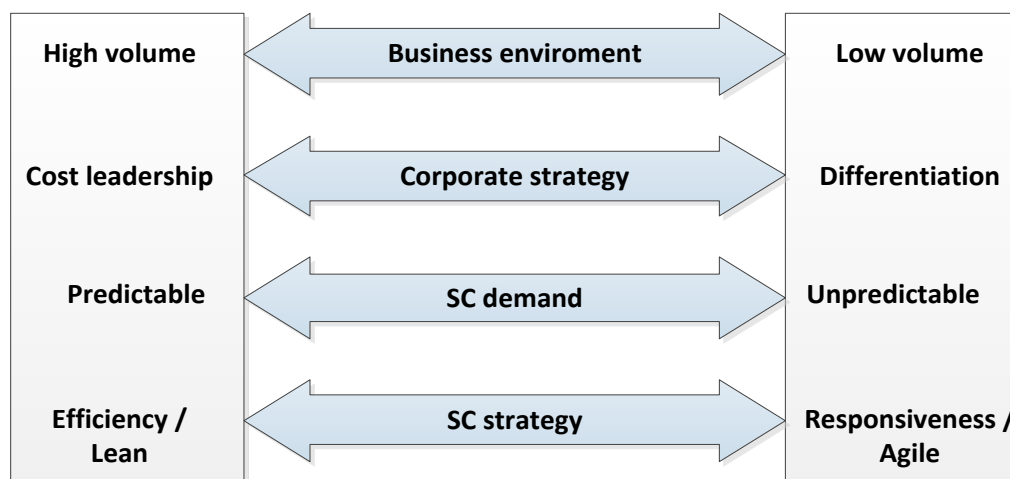


Figure 3. Supply chain strategy framework.

Make or buy is one way to develop a more agile SC. Working in collaboration with suppliers and by outsourcing and subcontracting it is possible to achieve a more flexible, more efficient and more agile SC. The first step to make an outsourcing analysis is usually identifying a company's core competence. Tradition-

ally outsourcing decisions have been bounded between core and non-core competencies while the latter can be considered for outsourcing. However, this is a really simplified point of view for there are many companies which have successfully outsourced functions, which are also crucial to their core business.

Strategic decision-making model is based on a balanced scorecard, McIvor’s outsourcing framework and competitive factors. The aim of the strategic model is to consider the make or buy issue via four perspectives of the balanced scorecard, so that all the factors relevant to the decision are considered. Innovation and learning perspective covers core competency identifying and thinking, process perspective is about processes and resources and economical perspective covers the cost calculations and estimates. The fourth perspective, customer perspective, considers the customer’s interests: quality, delivery reliability and accuracy, service ability.

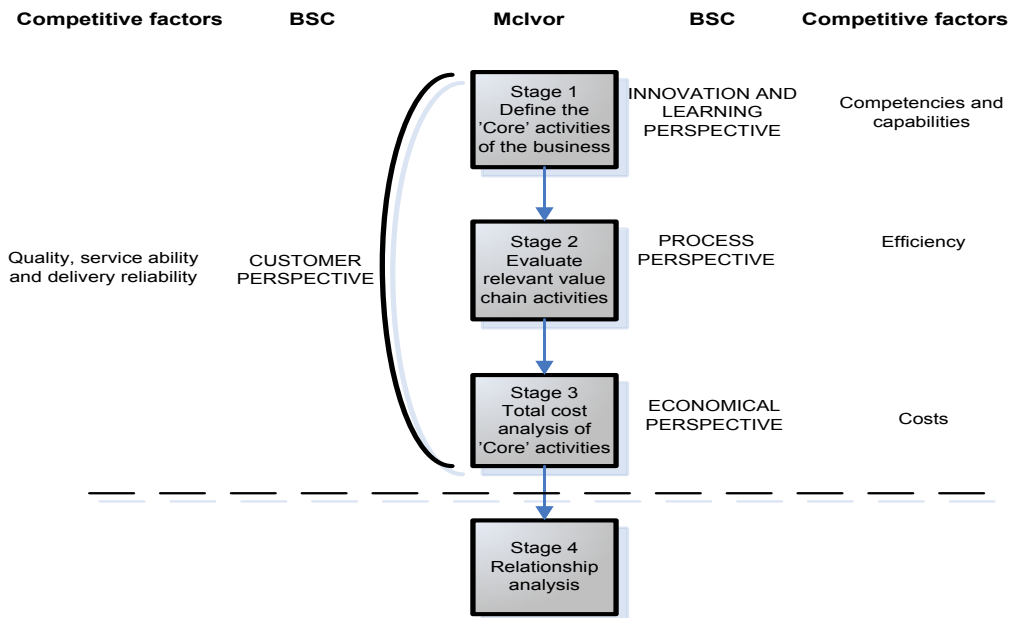


Figure 4. Strategic make or buy decision-making model.

5.3 How can the supply chain strategy be implemented?

Make or buy decision-making model is one part of SC strategy implementation and it was presented also in the answer. Make or buy decisions making model is based on the make or buy triggers, competitive factors, McIvor’s outsourcing framework, Tayles’ and Drury’s outsourcing decision model and balanced score-

card (R. S. Kaplan & Norton, 1992; McIvor, 2000; McIvor, 2003; Moschuris, 2007; Slack & Lewis, 2002; Slack, 2005; Tayles & Drury, 2001).

SD and buyer-supplier relationship need to be developed in a systematic way, which helps firms to organize the process and collaborate with suppliers for the improvement of product manufacturing capabilities. SD carries a process including 1) supplier assessment, 2) competitive pressure, 3) supplier incentives, 4) direct involvement that elaborates a detail version of steps to get a competitive advantage and to develop the buyer-supplier relationship. In the same vein, research framework indicates that companies follow an evolutionary route to develop their supplier's performances and relationships. They try to focus on adoption of total quality management followed by evaluation and culmination in SD strategies (Krause, Handfield & Scannell 1998).

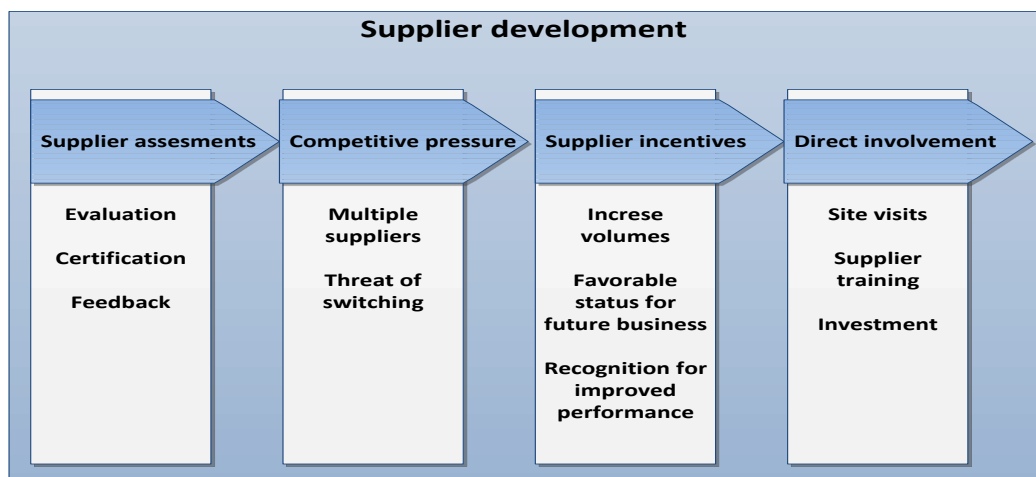


Figure 5. Supplier development framework.

SCM strategy implementation was researched within two groups of companies, namely Asian and European. The interest is to gain insight for possible similarities and differences of critical attributes to help decision makers to make adaptive adjustments on operations strategy in dynamic business environment of Asia and Europe. Each model generates different critical attributes. However, as supported by past research, results which are yielded by SCFI model, are more accurate than others. According to SCFI model, there is no critical attribute at the moment for both Asian and European companies. The trend indicates positive changes from expectation to experience values. However, almost 95 percent of all attributes are potentially critical in the future. From the analysis of comparison of all S&R models, it can be concluded that there are differences and similarities of critical attributes that affect SC strategy implementation in Asian and European companies. This is understandable as different environments have different points of

view. There are two attributes that have consistent trends for both regions; innovation and organization structure.

Table 10. List of attributes that share similar trends for all models.

Asia	Europe
Outsourcing own manufacturing to suppliers	Innovations
Innovations	Organization structure
Managing supply chain information	Strategy
Quality development in whole supply chain	Achieving visible results
Supplier development in the supply chain	Organizational structure
Punctuality	Organizational culture
Organization structure	
Organizational culture	
Implementation leadership	

Collaboration as well as processes and activities are the basis of nearly all areas having to do with developing the customer relationship. Thus they also form the basis for information integration in a service SC.

In the analysis of the data it was noted that defining the information attributes is the first and the most important stage in developing information integration in a service SC. Defining the information attributes helps to pin down the information needs of an organization by defining the form, quality and availability of information. Defining information attributes helps in finding out, amongst other things, in which form the information must be, how it should be available and how timeless it should be in order for it to create additional value for the organization.

Pinning down the information attributes is a significant element since only the necessary information is important for an organization, and a large number of organizations suffer from information overload. Defining the information attributes is the basis of pinning down the practices of information sharing. When the information attributes have been pinned down, it is possible to define the element of information sharing practices, that is, the channels through which it is cost-effective, functionally reasonable and necessary to both disseminate and receive information. The channels through which information is shared can be divided into traditional and advanced channels of communication. Figure 6 illustrates the development sequence of the elements.

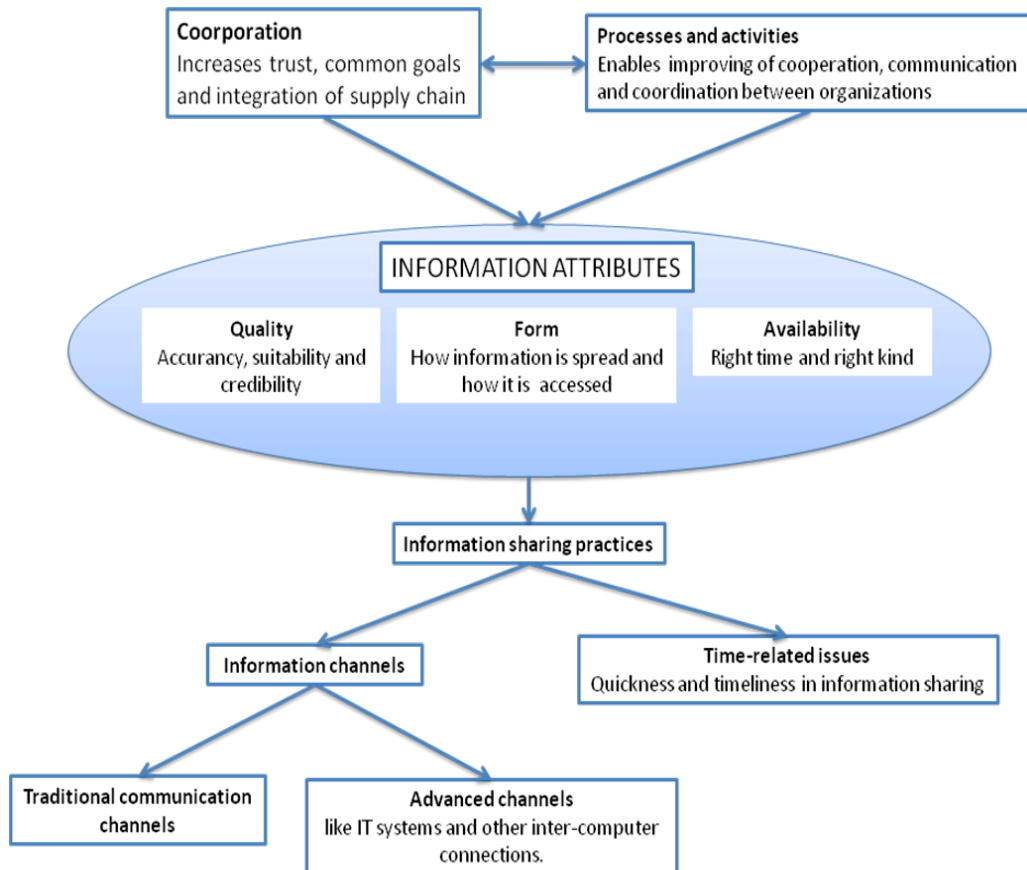


Figure 6. Developing information integration.

SCM strategy implementation should be measured to know how the implementation is proceeding. SC performance measurement framework consists of four approaches order book analysis, profitability, time and managerial analysis. The framework was developed based on the literature review and the empirical case study research.

The SC performance measurement was done during two different time periods. Order book analysis was done based on the production volumes during the measurement periods. Profitability is measuring the profitability of the SC and in this empirical case study there were two selected customers where profitability was measured. Time approach was measured during two different periods measuring lead-times and production times of selected customer orders. Managerial analysis is the approach where SC performance measurement is analysed into operational, tactical and strategic managerial levels.

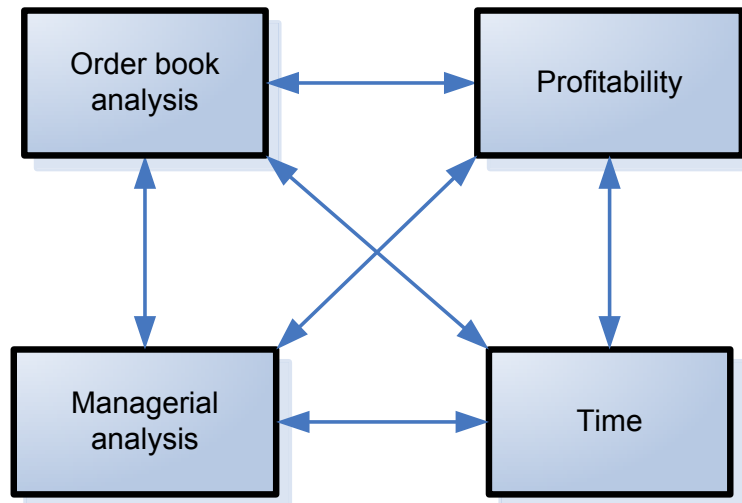


Figure 7. Supply chain performance measurement frameworks.

5.5 Supply chain strategy implementation framework

The research problem of how to implement SC strategy was answered by explaining answers to research questions. The conclusion of the study is the SC strategy implementation framework, which consists of every different approach presented in journal articles. SC strategy implementation framework consists of six elements, which are presented in the figure. SC strategy framework defines SC strategy for the company. Make or buy decision-making tool is essential part of SC strategy when outsourcing decisions to be done. SC strategy implementation attributes are the challenges which are going to be faced when implementing SC strategy. Information integration framework is the one of the key approaches when implementing SC strategy. SC strategy implementation into the supplier network could be done using SD framework. SC strategy implementation needs to be monitored and the best way to monitor it is to use SC performance measurement framework to get the information how SC strategy is affecting to the whole SC performance.

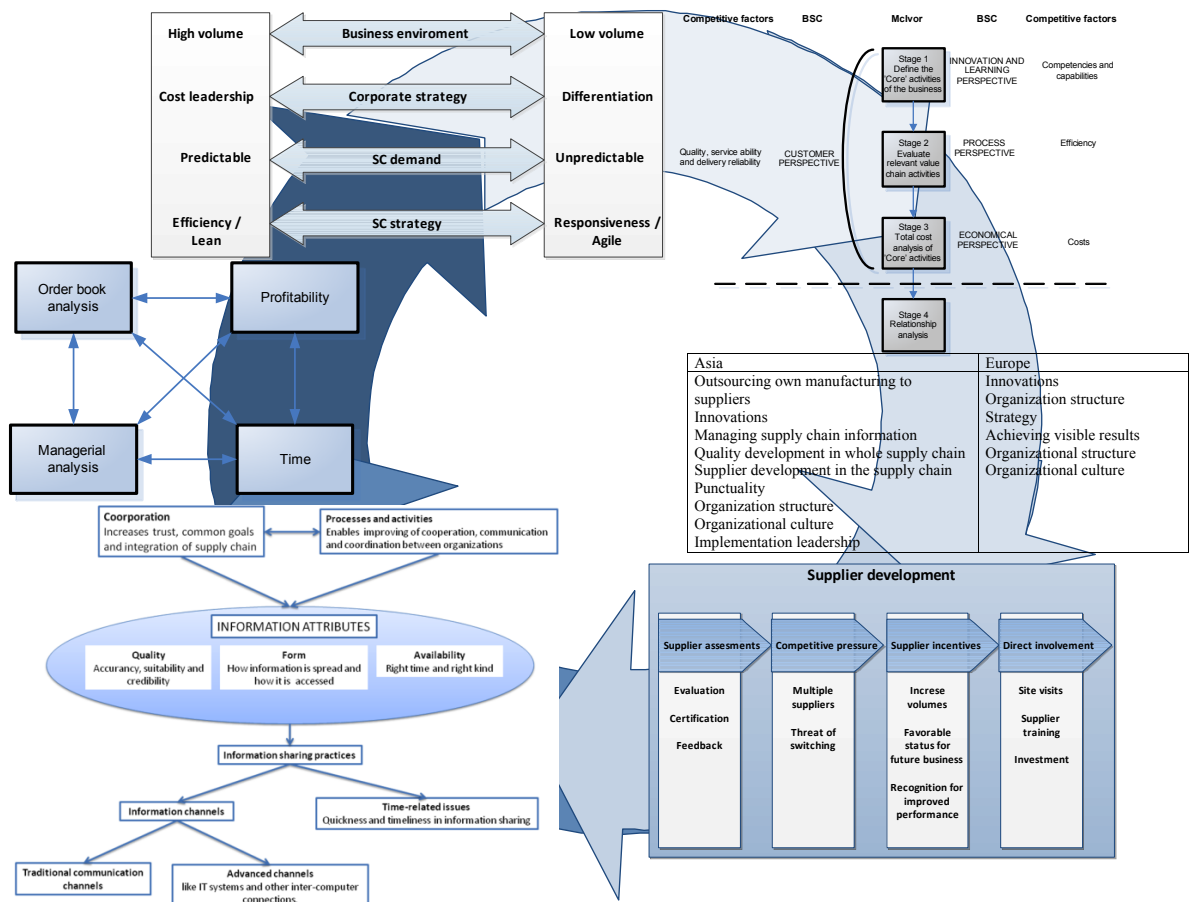


Figure 8. Supply chain strategy implementation framework.

SC strategy framework is a tool for managers to utilize when SC strategy is going to be implemented. It can be used when SC strategy is implemented in a dynamic business environment in internal and external SC. To implement SC strategy into the internal SC, inside the corporate operations and supply organization, there are relevant and valid sub-frameworks. Furthermore, when implementing strategy into the external SC to supply network including suppliers and partners, SC strategy implementation framework could be used. Framework is unique and is empirically tested as sub-frameworks in several case studies presented and published in the journal articles. The whole framework is not empirically tested and that is a valid topic for future research.

6 CONCLUSION

6.1 Conclusions

This research study was conducted in the field of SC strategy implementation. The literature review result was that there is a research gap in strategy implementation research in dynamic business environment. Strategic management has been researched in prior studies, but the research focus has been rather theoretical and focused on the research topics of strategy, strategy implementation, SCM and supplier development separately. Strategy implementation in SCM is a unique research field and there is a research gap to be filled. SC strategy is one functional strategy in any large corporate which should follow the corporate strategy. Challenges in SC strategy are that it should be implemented into the corporate SC and also to the SC network including thousands of suppliers.

The goal is to deepen knowledge in SC strategy implementation.

The research problem was presented as a question:

How to implement supply chain strategy?

Research questions are:

What are the main SC strategy approaches?

How can the SC strategy be implemented?

The conclusion of the study is the SC strategy implementation framework, which consists of approaches presented in journal articles and answers to research questions. SC strategy framework defines the SC strategy for the company. The make or buy decision-making tool is an essential part of SC strategy when outsourcing decisions need to be made. SC strategy implementation attributes describe the challenges which are going to be faced when implementing SC strategy. Information integration framework is one of the key approaches of how information should be integrated when implementing SC strategy. SC strategy implementation into the supplier network could be done using SD framework. SC strategy implementation needs to be monitored and the best way to monitor it is to use SC performance measurement framework to get the information of how SC strategy is affecting to the whole SC performance.

6.2 Contributions and implications

6.2.1 *Theoretical contribution*

The main theoretical contributions are the several developed frameworks related to SC strategy implementation. Frameworks are SC strategy framework, make or buy decision-making model, SC strategy implementation challenges framework, SD framework, SC information integration framework and SC performance measurement framework. Each of these frameworks was developed according to intense literature review and all of the frameworks except SD framework were empirically tested and verified in the case studies. SD framework was conducted according to literature review and theory development.

All of the developed frameworks establish SC strategy implementation framework, which is the main theoretical contribution of the study. Developed framework is unique and there are no similar frameworks in the literature, which could be compared to this developed SC strategy implementation framework. This framework is developed as a summary of the international journal articles.

6.2.2 *Managerial implications*

The focus of this research is very empirical and the research goal and research question were developed according to the business needs. In this way there are various managerial implications related to this study research's outcomes, which could be utilized in operational, tactical and strategic management levels.

The five developed SC strategy implementation frameworks were tested empirically in real life business environment as a case study research. One research framework related to SD was only literature review and theory development according to that literature review. SC strategy framework is a useful managerial tool for strategic level management to select the right SC strategy for the corporate entity. SC strategies can be chosen by selecting the right approaches for the business environment, corporate strategy and SC demand. Strategic make or buy decision-making model is based on balanced scorecard, McIvor's outsourcing framework and for competitive factors. The aim of the strategic model is to consider the make or buy issue via four perspectives of the balanced scorecard, so that all the factors relevant to the decision are considered. Innovation and learning perspective covers identifying core competency, process perspective consists of processes and resources. The economic perspective covers the cost calculations and estimates and customer perspective considers the customer's interests.

SD framework is the framework which could be used when the SC strategy is implemented into the supplier and partner network. The framework includes supplier assessments, competitive pressure, supplier incentives and direct involvement. Under those main approaches there are several more detailed categories to be followed. This SD framework is a practical tool for manager daily operations.

SC strategy implementation challenges framework aims to compare the attributes which are challenging in the implementation of SC strategy. The interest is to gain insight for possible similarities and differences of critical attributes to help decision makers to make adaptive adjustments on operations strategy in dynamic business environment.

SC information integration framework is a tool for management to utilize when information is going to be integrated. This framework consists of information attributes like quality, form and availability. Information sharing practices could be divided into information channels and time-related issues. Information channels are traditional communication channels or advanced channels.

SC strategy implementation should be measured to know how the implementation is proceeding. SC performance measurement framework consists of four different parts: order book analysis, profitability, time and managerial analysis. The framework was developed with strong cooperation with the case study company.

6.3 Reliability and validity of the study

Research quality is about reliability, validity, objectivity and relevance (Gummesson, 2000). Reliability means that there is transparency in how sense was made of the raw data. Generalization means that the concepts and constructs developed in this research can be generalized (Easterby-Smith, Thorpe, & Lowe, 2002). In a case study research there are three main approaches of validity: construct, internal and external validity. Construct validity establishes correct operational measures for the concepts being studied. Internal validity establishes causal relationships whereby certain conditions are shown to lead to other conditions. External validity establishes the domain to which a study's findings can be generalized. (Yin, 2009)

Multiple sources of evidence are the measurement of construct validity and in this case study research more than 50 interviews were done at different organizational levels in the case companies. The focus was to interview top management and the owners of companies who are the main persons in charge of SC strategy implementation and company strategy overall. Many data collection methods were used

in this research: interviews, documents, questionnaire, observations and data from ERP. This research follows scientific research protocol and reasoning and is one part of evidence for research quality.

External validity can be analysed comparing the results with other results presented in prior research and could be measured by using replication logic in multiple case studies. This case study has multiple cases but from the same industry area. Because different SC strategy approaches were researched in multiple case studies, replication logic was done and results were verified. The literature reviews were conducted in every case study and in every journal article and at the same time results were compared to earlier literature. Literature support follows the results of the journal papers and also the SC strategy implementation framework.

Reliability means that the data collection of the study can be repeated, with the same result, by another researcher (Yin, 2009). In this research, another researcher, using the same research methods, can find the same result. Using the same research paradigms, research method and case study research could be repeated if access to the same case study empirical data is available.

6.4 Limitations

In this study there are numbers of limitations related to the selected research methods, theories, available empirical data and selected cases. Every journal article contains discussion and limitations and therefore this section focused more on the general limitations made during the research.

Choices in research paradigms and research design are one of the main limitations. Research was positioned into hermeneutic case study researches, which in many cases were more qualitative focused than quantitative. Theory and especially references were selected as the most relevant and cited journal articles in the fields of strategic management, strategy implementation, SCM, SD. The main challenge was to limit the amount of valid journal articles and select only the most relevant ones into this research.

Empirical foundations were selected as specific companies in the manufacturing industry in Asia and Europe but also Finland-wide service industry. This is one limitation, which should be understood when analysing the result of this research. This research is strongly empirically focused, which is the clear limitation for this study.

6.5 Future research

This empirically focused case study research answered a specific research question. During the research process, several future research topics were identified. Generally in strategy implementation and SCM field there are not too many empirically case study researches published. Most of the research is academically focused and do not have a strong empirical relation. More empirical case study researches are needed to fulfil business needs and to develop companies operations.

Positivistic strategic management research has been published and that is the main recommendation to future research. Empirical qualitative case study research has been published, but positivistic quantitative research seems to be published in this research area rarely. Strategy management, strategy implementation, SCM, SD are the areas where there are major possibilities to make quantitative empirical research together with companies.

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Supply Chain Strategy: Empirical Case Study in Europe and Asia

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The purpose of this case study research is to present a literature review of supply chain strategy approaches, develop supply chain strategy framework and to validate a framework in empirical case study. Literature review and case study research are the research methods for this research. This study presents the supply chain strategy framework which merges together business environment, corporate strategy, supply chain demand and supply chain strategy. Research argues that all the different concepts that are currently used as supply chain strategy can be condensed into a presented supply chain strategy framework. Developed supply chain strategy framework is a practical tool for business managers. Future research could be multiple case studies in the global environment to develop further the supply chain strategy framework.

Key words: supply chain strategy, corporate strategy, supply chain management

Introduction

Supply chain management (scm) has been studied a great deal in the industrial economics field of research. Researchers of scm as well as the public have been interested in the published studies related to improving cost efficiency, optimizing the whole supply chain (sc), production control, stock management, agility, lean scm and sc integration.

scm is a management concept of the 2000's and it includes segments from the management concepts of the previous decades. Many definitions for scm have been presented but scm has been and is still regarded as a synonym for logistics, supply and sc control. Today the broader definition determined by the Global Supply Chain Forum is generally accepted as the norm (Lambert, Cooper and Pagh 1998; Cooper, Lambert and Pagh 1997): 'Supply Chain

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Management (scm) is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders.'

Supply Chain Council defined that there are four basic processes in the sc: plan, source, delivery and return. Plan refers to processes that balance aggregate demand and delivery requirements. Sources are processes that transform product to a finished state to meet planned or actual demand. Delivery is a process in which the finished goods are delivered to a customer. Return is defined as processes associated with returning or receiving returned products (Iskanius 2006).

Many scholars state that supply chain strategy must reflect the corporate strategy (Schnetzler, Sennheiser and Schönsleben 2007; Harrison and New 2002; Christopher, Peck and Towill 2006; Chopra and Meindl 2007; Waters 2009). According to a survey conducted by Harrison et al. (2002), two-thirds of all respondents thought that their supply chain strategy was significant or highly significant in terms of corporate strategy. According to Rose, Singh Mann and Rose (2012) however, there still exists a major gap between corporate strategies and supply chain strategies (Rose, Singh Mann and Rose 2012).

According to the literature review, the research gap is a relationship between corporate strategy and supply chain strategy. The goal of this research is based on the research gap and could be presented as to deepen knowledge in supply chain strategy approaches and to develop a supply chain strategy framework. The research problem is presented as a question: What are the supply chain strategy approaches?

Research Methodology

A literature review and a case study research were employed as the research methodologies in the study to develop a supply chain strategy framework. The literature on supply chain strategies was collected primarily from journals in the areas of strategic management, supply chain management, operations research and operations management. The target was to focus on the latest journals from last decade and that is why dissertations, textbooks, unpublished working papers, and conference papers were excluded. The literature search included journals published by numerous publishers and research was done using Scopus, which is one of the largest abstract, and citation databases of research literature. Several hun-

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dreds of journal articles were found and that is why the research has to focus on the most relevant, cited and newest journals.

Eisenhardt (1989) defines case study research as a research strategy that aims at understanding the internal dynamic of an individual case (Eisenhardt 1989). Case study research is aiming at understanding comprehensive and relevant phenomena of real life. In that case, the endeavour is to study the phenomena in their genuine context. Interface between the phenomenon and context is not often clear, which complicates the work of a researcher (Yin 2009).

Case study research is regarded as a good research method when the research problem can be described with the help of questions how and why. The method is very useful when a researcher cannot control the target. Furthermore, it is useful when the focus is on concurrent events in a real time manner especially when the border between the event and context is not clear. There are three types of case study research: explorative (seeking to find out more about a phenomenon) research, descriptive research and explanatory research. The purpose of explorative research is to obtain information regarding a phenomenon, find new ideas and possible research problems. In explorative research, already existing information is collected and sorted. The aim of descriptive research is to provide as accurate an image of an individual, group, situation or phenomenon as possible. In the research, the focus is not in clarifying connections between phenomena or factors interpreting behaviour, but only in describing a situation. The aim of explanatory research is to explain causal relations between phenomena and testing related hypotheses (Yin 2009).

In this study case study, research method is used to develop and validate supply chain strategy framework in the empirical case study.

Theory

CORPORATE STRATEGY

Nag, Hambrick and Chen (2007) define strategy as 'the major intended and emergent initiatives taken by general managers on behalf of owners, involving utilization of resources, to enhance the performance of firms in their external environments' (Nag, Hambrick and Chen 2007). Ramos-Rodríguez and Ruíz-Navarro (2004) identified the works that have had the greatest impact on strategic management research, which can be seen in table 1. They recognized that there are three different scientific disciplines from which the different fields of strategic management research have grown: eco-

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TABLE 1 Theoretical Roots of Strategic Management

Academic views on Corporate Strategy		
Economic-based	Sociology-based	Psychology-based
Evolutionary economics	Contingency theory	Power
Transaction cost theory	Resource dependence	Pattern
Industrial economics	Organisational ecology	
Resource-based view	Ecosystem	
Agency theory		

NOTES Adapted from Ramos-Rodríguez and Ruíz-Navarro 2004.

nomics, sociology and psychology. Economics has been the founding theory for such strategic management fields as evolutionary economics, transaction cost theory, industrial economics, resource-based view of the firm and agency theory. Sociology with its different theories is the foundation for such fields as contingency theory, resource-dependence theory, organisational ecology and ecosystem. The most popular psychological views of strategic management include power and pattern views to strategy creation (Ramos-Rodríguez and Ruíz-Navarro 2004).

Economics Based Strategic Management Fields

Evolutionary economics theories try to explain 1) the movement of something over time or why something is what it is at the moment in time in terms of how it got there, and 2) how some random elements generate or renew some variation in the variables in question, and what mechanisms systematically winnow extant variation (Valentino and Christ 1990).

Transaction cost theory is as old as evolutionary economics. It studies the relationship between a firm and its environment through a contractual or exchange-based approach (Kujala et al. 2006). According to Hoskisson et al. (2000), if the transaction costs of markets are high, hierarchical governance modes will enhance efficiency, although they can have their own bureaucratic costs (Hoskisson et al. 2000).

Ramos-Rodríguez and Ruíz-Navarro (2004) identify that the prime contributions of industrial economics to strategic management literature are the structure-conduct-performance paradigm and the study of strategic groups (Ramos-Rodríguez and Ruíz-Navarro 2004; Porter 1980) illustrates three potentially successful generic strategic approaches to attaining competitive advantage and thereby outperforming other firms in an industry: differentiation, cost-leadership and focus (Porter 1980).

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According to the resource-based view, the resources of a firm can be the source of a competitive advantage as long as resources are valuable, rare, inimitable and non-substitutable. Resource-based view is a complement to the traditional emphasis of industrial economics on industry structure and strategic positioning within that structure as a source of competitive advantage (Eisenhardt and Martin 2000; Newbert 2007; Hoskisson et al. 1999).

Agency theory was born in the 1960s and it deals with relationships that arise when one self-interested individual (the principal) delegates some decision-making authority to another individual (the agent) according to a mutually agreed contract (Eisenhardt 1989; Schulze et al. 2001; Pavlou, Huigang and Yajiong 2007).

Sociology Based Strategic Management Fields

Contingency theory suggests that there is no optimal strategy for all organizations and posits that the most desirable choice of strategy variables alters according to certain factors, termed contingency factors. The traditional view of contingency theory is based on organizational theory and postulates that a change in environment requires a change in firm structure (Zajac, Kraatz and Bresser 2000; Zott and Amit 2008).

The resource dependence theory proposes that organizational success and ultimately survival occur by maximizing power through the acquisition of scarce and valuable resources in a stable and low-cost manner (Carter and Rogers 2008; Rai and Bush 2002).

Organisational ecology theory applies evolutionary and ecological perspectives, such as populations and communities of populations, in the domain of strategy and organisation theory (Lovas and Ghoshal 2000; Baum and Shipilov 2006).

An ecosystem consists of all those companies that depend on each other in terms of their success. Most importantly, a company's performance is increasingly dependent on the performance of something where the firm does not have direct control. Therefore, ecosystem-based approach encourages close-co-operation with those firms that are clearly part of the ecosystem (Iansiti and Levien 2004).

Psychology-Based Strategic Management Fields

The most influential views of psychology-based strategic management have been the power view, which studies strategy formulation as a political process, and the concept of pattern, which sees that strategy is often consistency in behaviour in the past,

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not a pre-described plan (Ramos-Rodríguez and Ruíz-Navarro 2004; Mintzberg, Ahlstrand and Lampel 2009). When formulating strategy, managers are constrained and enabled through their internal and external allies and opponents. This kind of social struggle between different groups with different strengths shapes the actual strategic management process (Lawrence et al. 2005; Clark 2004).

The idea that strategy is more a realized pattern in the past than a set direction for the future is based on criticism towards the foundation of deliberate strategic planning – possibility of forecasting future, and empirical evidence that strategies emerge from weakly coordinated decisions of multiple organizational members (Grant 2003; Noda and Bower 1996) summarize that according to scholars who study strategic planning as a pattern, strategy is emergent from lower levels of organizations, whether through trial-and-error learning, incrementally with logical guidance from the top, or such that small changes are punctuated by a sudden big change in a relatively short period (Noda and Bower 1996).

SUPPLY CHAIN STRATEGY

Supply chain is probably most extensively defined as ‘a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer’ (Mentzer 2001). Supply Chain Council, a global non-profit organization, has developed its own process reference model for scm, so-called Supply Chain Operations Reference model (scor). The scor model consists of Supply chain business processes defined as ‘plan, source, make, deliver and return,’ the different metrics related to these aspects, and best practices outlined from the industry (Supply Chain Council 2010).

As a result and similarly to scm, there is not a jointly agreed definition of what is a supply chain strategy (Rose, Singh Mann and Rose 2012). Schnetzler, Sennheiser and Schönsleben (2007) define supply chain strategy as ‘a set of prioritized scm objectives, i. e., strategic priorities and a way to operationalize them, i. e., to determine appropriate measures, in order to build up and capitalize on so-called logistics success potentials that can potentially result in successful business performance’ (Schnetzler, Sennheiser and Schönsleben 2007). Rose, Singh Mann and Rose (2012) add that supply chain strategy can also be emergent rather than deliberate and defines the concept as a ‘deliberate and/or emergent conceptual framework by which a company involves its supply chain and supply chain

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members in its efforts to reach its own corporate strategic objective' (Rose, Singh Mann and Rose 2012).

Many scholars state that supply chain strategy must reflect the corporate strategy (Schnetzler, Sennheiser and Schönsleben 2007; Harrison and New 2002; Christopher, Peck and Towill 2006; Chopra and Meindel 2007; Waters 2009). According to the survey conducted by Harrison and New (2002), two-thirds of all respondents thought that their supply chain strategy was significant or highly significant in terms of corporate strategy. According to Rose, Singh Mann and Rose (2012) however, there still exists a major gap between corporate strategies and supply chain strategies (Rose, Singh Mann and Rose 2012).

Being loosely established, supply chain strategies can be studied from multiple different perspectives. Rose, Singh Mann and Rose (2012) isolates five different research fields: scm, marketing, operations management, organizational theory and contractual perspective (Rose, Singh Mann and Rose 2012). scm perspective of supply chain strategy discusses the different strategies in relation to the five different parts of the scOR model: plan, source, make, deliver and return. Marketing perspective highlights designing supply chain according to the requirements of the customer. Operations management weigh whether to make supply chain efficient (lean) or responsive (agile). Organizational theory concentrates on integration of the supply chain. Finally, contractual perspective emphasizes the importance of different kind of contractual agreements that can exist between the different actors in the supply chain.

Different supply chain strategies usually contain some driver based on which they think that the proper design should be determined. For example, Rose, Singh Mann and Rose (2012) illustrate three kinds of factors: product characteristics (supply and demand predictability, product life cycle), context and integrative practices, and contractual issues. Schnetzler, Sennheiser and Schönsleben (2007) adds corporate culture as one factor that determines the proper supply chain design (Schnetzler, Sennheiser and Schönsleben 2007; Rose, Singh Mann and Rose 2012).

SUPPLY CHAIN STRATEGY AS FUNCTIONAL STRATEGY

Strategy is visible at multiple layers in a firm, which can be seen in figure 1. At the highest level, strategy is described as a mission that gives the overall purpose and aims of an organisation. Corporate strategy then describes how the mission is achieved. Supply chain strategy is functional strategy. As mentioned already, according to

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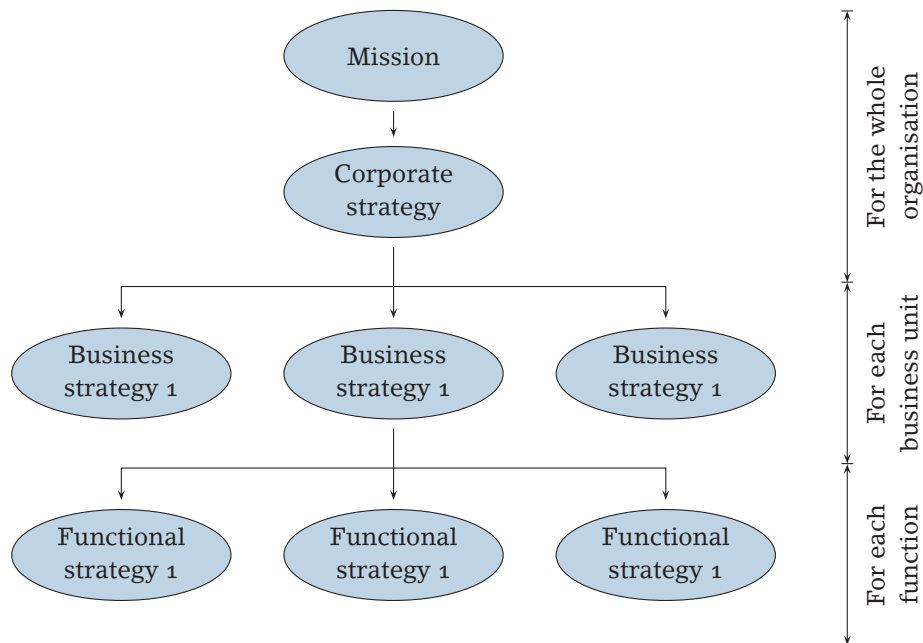


FIGURE 1 Types of Strategic Decisions (adapted from Waters 2009)

numerous scholars, it is vital that the functional strategy is in line with the business strategy (Waters 2009).

Literature review presents various holistic frameworks regarding the relation of supply chain strategy to corporate strategy and the different subfields of the supply chain strategy. One example is the holistic framework of Chopra and Meindel (2007) that can be seen in the figure 2. They state that the purpose of supply chain strategy is to strike a balance between responsiveness and efficiency (according to the premises of operations management) that fits with the corporate strategy. To reach this goal, a company must structure the right combination of the three logistical (facilities, inventory and transportation) and three cross-functional drivers (information, sourcing and pricing). It is worth mentioning that Chopra and Meindel (2007) see corporate strategy as a competitive strategy relating to the works of Porter (1980, 1985), and that is why their framework is largely divided between efficiency (cost-leadership) and responsiveness (differentiation) (Chopra and Meindel 2007; Porter 1980; Porter 1985).

Lean and Agile

The most widely established supply chain strategies in scm literature are lean and agile approaches. These concepts arise from operations management theory and study when supply chain design should be efficient (lean) or responsive (agile). The big advantage of lean and agile approaches is that they are rather comprehen-

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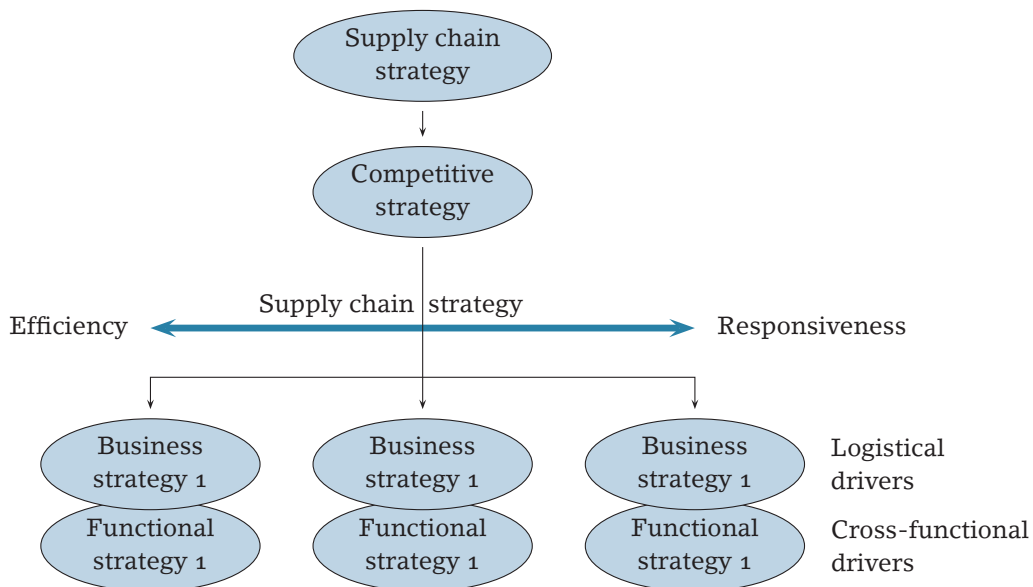


FIGURE 2 Supply Chain Decision-Making Framework (adapted from Chopra and Meindl 2007)

sive supply chain strategies and thereby they can be extended to very many supply chain objectives. The names for the different approaches are not fully established and for example Morash (2001) uses terms operational excellence (lean) and customer closeness (agile) (Morash 2001).

Lean supply chain identifies seven different types of waste (Ohno 1988): 1) defects in production, 2) overproduction, 3) inventories, 4) unnecessary processing, 5) unnecessary movement of people, 6) unnecessary transport of goods and 7) waiting by employees. Therefore, a lean supply chain aims to operate smoothly with few disturbances. It is not even designed to adapt easily to market shocks. A lean supply chain builds a separate production line for each product and avoids product exchanges. As a result, the capacity utilisation rates are usually high. Long lead-time is not that big a problem for a lean supply chain as long as it is shown to be a cost-efficient solution (Waters 2009; Vonderembse et al. 2006).

An agile supply chain focuses on responding to unpredictable market changes and capitalizing on them through fast delivery and lead-time flexibility. It utilizes information systems and technologies as well as electronic data interchange capabilities to move information faster and to make better decisions. As opposed to a lean supply chain, an agile supply chain wants to be demand- rather than forecast-driven. Therefore, an agile supply chain operates anything

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TABLE 2 How Demand/Supply Characteristics Determine Supply Chain Strategy

		Demand characteristics	
		Predictable	Unpredictable
Supply characteristics	Long lead time	<i>Lean</i> Plan and execute	<i>Leagile</i> Postponement
	Short lead time	<i>Lean</i> Continuous replenishment	<i>Agile</i> Quick response

NOTES Adapted from Christopher, Peck and Towil 2006.

but smoothly. It may periodically have a lot of capacity unused, but once it has been given an order, it will use full capacity to deliver the order as fast as possible. An agile supply chain strives for as short a lead-time as possible. An agile supply chain invests heavily in reduction of setup times and disfavours inventory (Christopher, Peck and Towil 2006; Vonderembse et al. 2006).

The generally held view among scholars is that lean concepts work well where demand is relatively stable, and hence predictable, and where variety is low. On the other hand, agile concepts are about the ability to match production with turbulence in demand (Vonderembse et al. 2006; Fisher 1997; Wang, Huang and Dismukes 2004). Christopher, Peck and Towil (2006) and Chopra and Meindl (2007) add that it is not only the demand uncertainty that determine the optimal supply chain strategy but also supply lead time (Christopher, Peck and Towil 2006) or supply uncertainty (Chopra and Meindl 2007). Table 2 illustrates how Christopher, Peck and Towil (2006) see the two drivers affecting the selection of optimal supply chain strategy. Christopher, Peck and Towil (2006) add that the demand of a product is likely to change in relation to its stage in product life cycle. New products require a more responsive supply chain whereas older products require a more efficient supply chain (Christopher, Peck and Towil 2006).

In the end of 1990s, some views arose that there can also be a hybrid supply chain strategy that uses both the characteristics of lean and agile supply chains. This kind of strategy is called leagile. In a leagile system, there is so-called decoupling or order penetration point. Upstream of the decoupling point, the supply chain will exhibit lean principles whereby production will follow a forecast schedule. Downstream of the decoupling point, the supply chain will be agile and designed to be responsive to customer demand. The idea here is that for many products, the demand becomes unpredictable only downstream, but upstream of the decoupling point,

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the demand can be highly stable. Leagile supply chain strategy can also be called as postponement strategy. In a similar manner to leagile, postponement approach delays the place of customization in the supply chain and therefore it can quickly adapt to changing market requirements. Table 3 presents the comparison of lean, agile and leagile supply chain strategies (Wang, Huang and Dismukes 2004; Mason-Jones, Naylor and Towill 2000).

Supply Chain Integration

The importance of supply chain integration aroused scholars' attention during the 1990s (Frohlich and Westbrook 2001; Cousins and Menguc 2006; Storey et al. 2006). Cousins and Menquc (2006) state that this is due to global competition that has forced firms to produce higher quality with lower price, and this can be attained via supply chain integration. According to Vickery et al (2003), an integrative supply chain strategy recognizes that integrated business processes (not individual functions or systems) create value for the firm's customers and that these processes reach beyond the boundaries of the firm by drawing suppliers and customers into the value creation process. The clear definition of supply chain integration is not that well established as some scholars only include the upstream (supplier) side of supply chain. However, it is much more general to include both upstream and downstream in the discussion of supply chain integration (Vickery et al. 2003).

Supply chain integration research has typically been viewed along two coordinated lines. The first involves the forward movement of physical goods from suppliers through manufactures and on to end-customers. Many of these views fall under the concept of Just in Time, while others highlight the importance of delivery integration in terms of implementing product postponement in the supply chain. The second involves the rearward movement of information and customer data through the chain. This enables all the actors in the supply chain to coordinate their activities, which enhances the efficiency in the supply chain. The different views are illustrated in the figure 3 (Rose, Singh Mann and Rose 2012; Frohlich and Westbrook 2001).

Vickery et al. (2003) presents two different strategies for supply chain integration according to the division between upstream and downstream operations: supplier partnering and closer customer relationships. Supplier partnering sees the supplier as a strategic collaborator. High level of trust, commitment over time, long-term contracts and joint conflict resolution are typical characteristics of the relationships. The parties also share information, risks and rewards.

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TABLE 3 Comparison of Lean, Agile and Leagile Supply Chain Strategies

Decision category	Lean supply chain	Leagile supply chain	Agile supply chain	KPIs	
				Lean	Agile
Facilities	Aim for high capacity utilization rate. Long lead times are not a major problem. Prepare to locate far from market if it decreases costs. Avoid continuous product exchanges.	High capacity utilization rate for upstream operations, significantly lower for downstream operations. Invest in speed of product exchanges and shorten lead time at the end of the supply chain.	Capacity utilization rate cannot be too high. Aim for as short lead times as possible. Locate near the markets. Invest in the capability of making fast product exchanges.	Capacity utilisation, manufacturing costs.	Capacity utilisation, Lead time, setup times.
Inventory	Generate high turns and minimize inventory throughout the chain.	Postpone product differentiation as late as possible. Minimize functional components inventory.	Make in response to customer demand. Allow for some finished goods inventory to ensure product availability.	Inventory carrying costs, inventory turnover.	Product availability, inventory level.
Transportation	Drive down costs of transportation by favoring cost-efficient transportation modes and high shipment sizes.	Apply cost-efficient transportation modes to upstream operations, and fast and flexible modes to downstream operations.	Enhance responsiveness by favoring fast transportation modes and prepare to use low shipment sizes.	Transportation costs, delivery reliability.	Delivery speed, delivery reliability.
Information	Use the latest technology to facilitate information sharing	Use the latest technology to enable the postponement	Use the latest technology to capture the changes in the mar-	Forecasting accuracy	—

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<p>in the supply chain. Use advanced forecasting techniques.</p>	<p>Desired supplier attributes involve low cost and high quality.</p>	<p>Desired supplier attributes involve low cost and high quality, along with the capability for speed and flexibility, as and when required.</p>	<p>Desired supplier attributes involve speed, flexibility and quality.</p>	<p>Supply costs, supply quality. Time of delivery, supply quality.</p>
<p>Sourcing</p>	<p>Use a static organizational structure with few levels in the hierarchy.</p>	<p>Maintain an organization similar to lean. May create temporal relationships with partners to implement innovative features.</p>	<p>Create virtual organizations by creating alliances with partners that vary with different product offerings that change frequently.</p>	<p>—</p>
<p>Quality</p>	<p>High quality and continuous improvement on it.</p>	<p>High quality both in upstream and downstream operations.</p>	<p>High quality in innovative products.</p>	<p>Defects in production, defects in deliveries.</p>
<p>Customer service</p>	<p>Low level of customer service.</p>	<p>Good level of customer service.</p>	<p>High level of customer service.</p>	<p>Customer service costs. Customer query time.</p>
<p>Product development</p>	<p>Maximize performance and minimize costs.</p>	<p>Use modular design in order to postpone product differentiation as long as possible.</p>	<p>Design products to meet individual goals.</p>	<p>Testability, repeatability, product volumes. Testability, serviceability.</p>

NOTES Adapted from Christopher, Peck and Towill 2006; Chopra and Meindl 2007; Vonderembse et al. 2006; Wang, Huang and Dismukes 2004; Bozarth and Handfield 2008.

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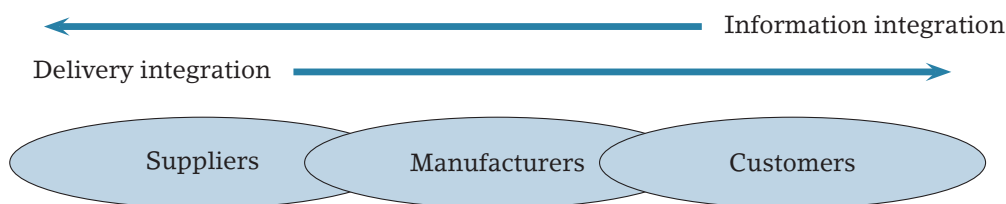


FIGURE 3 The Two Concepts in Supply Chain Integration Research (adapted from Frohlich and Westbrook 2001)

This kind of collaboration affords many of the advantages of vertical ownership without the attendant loss of strategic flexibility. Partners work together to ensure high product quality and low costs, with both companies sharing in the benefits. The partnership relationship might entail early supplier involvement in product design or acquiring access to superior supplier technological capabilities. It is vital to notice how Vickery et al. (2003) sees the underlying drivers for partnering to be long-term strategic ones rather than short-term cost-related ones (Vickery et al. 2003).

Closer customer relationships aim to enhance a firm's ability to determine its customers' requirements. Close customer relationships enable firms to proactively seek information on customer preferences, and then become more responsive. Insights gained as a result of establishing strong relationships with customers can also be used to enhance operational effectiveness and cost efficiency. Again, one should notice that the driver for stronger collaboration with customers is based first-hand on long-term strategic goals (Vickery et al. 2003).

Supply chain integration is not by any means opposed to lean and agile approaches. To build a comprehensive lean or agile supply chain, one needs to have very good relationships with both suppliers and customers. Actually, the concept of supply chain integration has arisen during the 1990s to at least some extent because of the needs presented by lean and agile approaches (Cousins and Menguc 2006).

SUPPLY CHAIN STRATEGY FRAMEWORK

According to the literature review, supply chain strategy framework could be presented in figure 4. Supply chain strategy framework is based on business environment, which could be high or low business volume. Corporate strategy main approaches are cost leadership and differentiation. Supply chain demand is based on predictable or unpredictable demand. Supply chain strategy has two approaches; efficiency or responsiveness, where efficiency is lean supply chain strat-

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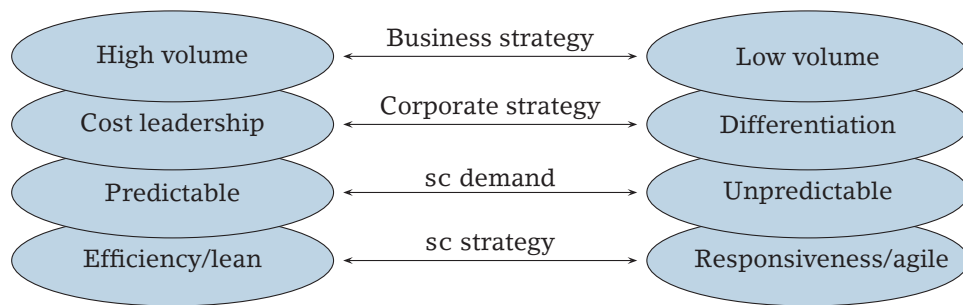


FIGURE 4 Supply Chain Strategy Framework

egy approach and responsiveness is agile supply chain strategy approach. When the business environment and volume is high, then strategy approaches for supply chain are cost leadership corporate strategy, predictable supply chain demand, efficiency, and lean supply chain strategies. If the business environment and volume is low, then strategy approaches for supply chain are differentiation corporate strategy, unpredictable supply chain demand, responsiveness, and agile supply chain strategies.

Empirical Case Study

The empirical case could be described as two independent supply chains in a global engineering business. One of the key sub-assemblies of case company's products is managed by case supply chains. Product is ready assembly subassembly, which consists of steel structure and components. The products are tailor-made and every product is customized according to the customers' needs (Sillanpää, Abdul Malek and Takala 2013).

Supply chain is organized globally so that there are three region-based supply chains: Europe, APAC and America. In every region, there are production locations, which are serving the supply chain. Production units are joint ventures, own units and also suppliers. The one important characteristic is that the cooperation is extremely deep with the production unit's in the whole supply chain (Sillanpää, Abdul Malek and Takala 2013).

The empirical case study was done together with the management of case supply chains.

Supply chain A:

- Location: Europe
- Owner: private owned
- Turnover: 15 million EUR
- Workers: 80

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Supply chain B:

- Location: Asia
- Owner: private owned
- Turnover: 20 million EUR
- Workers: 100+

Business environment in both supply chains is slightly different. In supply chain A, the business environment is more dynamic than in supply chain B. The reason behind this is because demand fluctuation is extremely high in supply chain A. If categorizing supply chains business environment into high or low volume it could be stated that volume is low compared to business environment generally. In supply chain A, the business environment is also at some stages close to high volume but that is because of the demand changes.

According to literature review and developed supply chain strategy framework, corporate strategy could be categorized as a cost leadership or differentiation. In the case study, the corporate strategy seems to be a cost leadership for both supply chains. There is huge competition in the markets all the time and that is the driver to align corporate strategy to cost leadership. Even if it seems that case supply chain corporate strategy is cost leadership, both supply chains try to differentiate. Differentiation is the target to serve customers better and try to make your supply chain unique. When your supply chain is, unique it is more challenging to change it and competition is no longer the issue. In that perspective, both supply chains corporate strategy is differentiation.

In the dynamic business environment, the supply chain demand is commonly unpredictable. In the case supply chains, the demand is extremely challenging to forecast. In European supply chain A, the forecasting process is done together with customers but in the Asian supply chain B, it is done independently. Even if supply chain A demand forecasting is working, it is extremely challenging to estimate future supply chain demand. Practically in both supply chains the demand is forecasted based on past supply chain volumes. According to case study, the conclusion of the supply chain demand is that in both supply chains the demand is more unpredictable than predictable.

According to Sillanpää, Abdul Malek and Takala (2013) there are significant differences comparing supply chain strategies in Europe and Asia. Supply chain strategy part is the conclusion of the developed supply chain strategy framework and analysis of the business

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environment, corporate strategy and supply chain demand. Supply chain strategy seems to be in both supply chains responsiveness and agile supply chain. The analyze of the supply chain strategy framework states that in both supply chains the business volume is low, corporate strategy is differentiation and supply chain demand is unpredictable (Sillanpää, Abdul Malek and Takala 2013).

Conclusion

As the concept of supply chain strategy is quite loosely established, there is quite little academic literature that explicitly relates corporate strategy to supply chain strategy. However, academic literature that relates corporate strategy to scm concepts is somewhat larger (Trkman et al. 2007).

There are many scholars who state that corporate strategies with a focus on cost-leadership require lean supply chain processes, whereas corporate strategies with a focus on differentiation require agile supply chain processes (Morash 2001; Chen and Paulraj 2004). Lean supply chain principles minimize production, inventory and transportation costs in the supply chain, which is exactly what a cost-leadership strategy requires. Agile supply chain processes support differentiation strategy by implementing high levels of value-added customer service, proactive quality and collaborative communications and interactions with customers.

The need for supply chain integration has been explained by resource-based view of the firm (Cousins and Menguc 2006). According to this view, firms have realized that some strategic resources may lie beyond the boundaries of the firm and that the competitive advantage may be explained by a network of inter-firm relationships. On the other hand, supply strategies that concern supplier selection have been relatively loosely tied to corporate strategies, and if some are used, they are most often transaction cost or agency theory (Leiblein, Reuer and Dalsace 2002). According to transaction cost theory, cooperation with suppliers is limited by the transaction costs of managing the interaction. Agency theory postulates that in a healthy relationship with suppliers, incentives of both sides are aligned.

Supply chain strategy framework merge together business environment, corporate strategy, supply chain demand and supply chain strategy. Supply chain strategy framework is based on business environment where the main approaches are high and low volume. Corporate strategy is divided into cost leadership and differentiation and supply chain demand is based on predictable or unpredictable

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demand. Supply chain strategy approaches are efficiency and lean or responsiveness and agile supply chain. Supply chain strategy framework is tested in one empirical case study where two supply chains are analysed. Empirical case study validates developed supply chain strategy framework.

Future research could be real multiple case studies in the global environment which could validate the supply chain strategy approaches and develop supply chain strategy framework for company's needs to develop supply chain strategies according company's strategy.

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Strategic Decision Making Model For Make Or Buy Decisions

Sillanpää, Ilkka

Abstract

Purpose: The aim of this study is to analyze factors that are related to make or buy decisions. Within this research a tool is created for make or buy decision-making which can be used as a help to evaluate outsourcing analytically.

Design/Methodology/approach: This research is case study research to develop a make or buy decision making tool via literature review.

Findings: The finding of the study is a model for developing make or buy decisions. The model is based on the make or buy triggers, competitive factors, McIvor's outsourcing framework, Tayles' and Drury's outsourcing decision model and balanced scorecard.

Research limitations/implications: This research is focused on making a decision making model in the manufacturing industry supply chain. In the future, more empirical study is needed.

Practical implications: The results can be utilized when developing make or buy and outsourcing decisionmaking in the supply chain.

Originality/Value: The research results bring additional value to the previous studies regarding make or buy decisionmaking models.

Keywords: balanced score card, make or buy decision, supply chain management

1. Introduction

Purchasing should be accounted for as a significant function, which needs to be considered as a part of the corporate planning process to ensure that supply conditions are reflected in it (McIvor 1997). Strategic approaches for a particular function, for example sourcing, need to be linked to other functional strategies, linked to strategies for particular business units and linked at the corporate level where there are perceived synergistic benefits. The make or

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buy -issue has been under discussion since the industrial revolution. Yet, its strategic role has not been admitted until now, at the same time as the strategic role of sourcing has started to have been appreciated.

Probably the known and the most classical theoretical approach to a make or buy decision-making is transaction cost theory made by Williamson (1985). According to transaction cost economics, a company will make the outsourcing decision on the basis of reducing production and transaction costs. Production costs refer to the direct costs involved in creating the product or service and include labor and infrastructure costs. Transaction costs include the costs of selecting suppliers, negotiating prices, writing contracts, monitoring performance, as well as the potential for opportunism from suppliers. The main factors for bringing transaction costs out at markets are: bounded rationality, opportunism, small numbers of bargain and information impactedness. (Williamson 1985, Williamson 1981, Williamson 1991)

The research goal of this study is to analyze factors that are related to make or buy decisions. This research will help to understand how outsourcing and subcontracting can affect to company's business, operations and profitability. This research creates a tool for make or buy decision-making which can be used as a help to evaluate the reasonableness of outsourcing analytically. For the meantime this kind of tool has not been created and there is no systematical way to make these decisions. The research goal of the study is to:

Create a tool for make or buy decision-making.

The research questions are:

- What are the effects of the MOB to competitive performance?
- How to make MOB decisions systematically?

2. Theoretical background

Transaction cost economics

It is not possible to restrict the basis of make or buy decisions solely to economic or cost parameters even if they can be accurately and fairly assessed. Such an analysis takes no account of the possible future behavior of the parties to the arrangement, or how the buying organization sees its role in the marketplace.

Strategic Decision Making Model For Make Or Buy Decisions

(Steele, Court 1996) Probably the known and most classical theoretical approach to make or buy decision-making is transaction theory coined by Williamson. Transaction cost economics specifies the conditions under which an organization should manage an economic exchange internally within its boundaries. According to transaction cost economics, a company will make the outsourcing decision on the basis of reducing production and transaction costs. Production costs refer to the direct costs involved in creating the product or service and include labor and infrastructure costs. Transaction costs include the costs of selecting suppliers, negotiating prices, writing contracts, monitoring performance, as well as the potential for opportunism from suppliers. (Mclvor 2000, Mclvor 2003, Mclvor 2008)

Williamson (1985) introduces a number of factors involving transaction costs. Main factors for bringing transaction costs out at markets are (Williamson 1985):

- *Bounded rationality*. People have limited memories and limited cognitive processing power. We cannot assimilate all the information at our disposal, we cannot accurately work out the consequences of the information we have.
- *Opportunism*. People will act in a self-interested way "with guile". People may not be entirely honest and truthful about their intentions, or they might attempt to take advantage of unforeseen circumstances that gives them the chance to exploit another party.
- *Small numbers bargaining*. Many bargaining situations are infrequent or involve small quantities where the cost of obtaining full information is prohibitive, i.e. as in an oligopoly.
- *Information impactedness*. The party which has more information and knowledge uses it and possible manipulates the other party. (Williamson 1985)

The central theme of transaction costs theory is that the properties of the transaction determine the governance structure. The transaction costs and the problems grow when the following variables are involved: *frequency, uncertainty and asset specificity*. These three variables will, according to the theory, determine whether the transaction cost will be lowest in a market or in a hierarchy. (Mclvor 2003)

The issue in uncertainty is how hard it is to foresee the eventualities that might occur during the course of transaction. According to

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Williamson (1985) there are two kinds of uncertainties: Uncertainty posed by environment where the company has no ability to affect and uncertainty derived from the behavior of the contracting party. (Williamson 1985)

These two shapes of uncertainty are interrelating with each other. If external, environment caused uncertainty is zero or very little, the uncertainty derived from the behavior of the contracting party is also very little. That is to say, the contracting party does not experience the situation as threatening and it does not have to act opportunistically. Uncertainty does not necessarily create transaction costs, if other variables are favorable. Closely related costs with uncertainty are for example policing and coordinating costs. (Michael 2007)

Asset specificity is perhaps the most important element in Williamson's theory. He argues that where transaction costs involve assets that are only valuable in the context of a specific transaction, transaction costs will tend to be reduced by vertical integration. Asset specificity can vary from general limitedness of the capacity to the product's individualized investment needs. If assets are highly specific the switching costs are high and suppliers often act opportunistically. Williamson (1985) recognized four, different asset specificities (Williamson 1985):

- *Dedicated assets* - specialized investments
- *Physical asset specificity* - technology advantages
- *Human asset specificity* - know-how advantages
- *Site specificity* - resource immobility

Williamson (1985) states that the above mentioned variables decide how transactions should be managed. The following table gives a summary of the relationship between asset specificity, uncertainty and governance structure. Usually using markets such as traditional buying is the most efficient way to handle standard transactions. Vertical integration is the best alternative when demanded investments are highly specific. Between these alternatives there is a state where partnership should be supported. (Williamson 1985) As a result from Williamson's model it can be argued that in so far as the company cannot reach the lowest product costs without wide-ranging investments, it should outsource the function. (McIvor 2000)

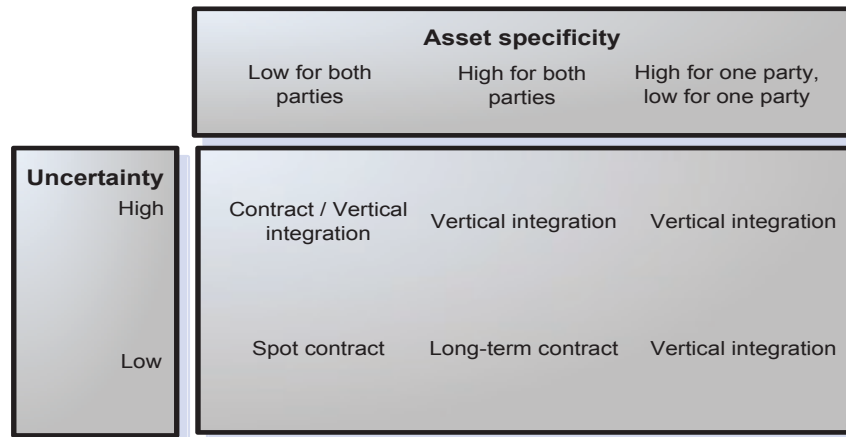
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Fig. 1. Relationship between asset specificity, uncertainty and governance structure (McIvor 2000)

Make or Buy Triggers

According to Moschuris (2007) the most important make or buy triggers are cost and quality problems. (Moschuris 2007) Typically reasons for outsourcing may be lack of capacity, lack of knowing, economical issues, organizational culture issues, life cycle of the product or for example organizational changes. The conceptual model (Fig. 2.) highlights the relationship between the importance of each trigger and variations with organizational characteristics as well as with characteristics of the item / service under make or buy investigation.

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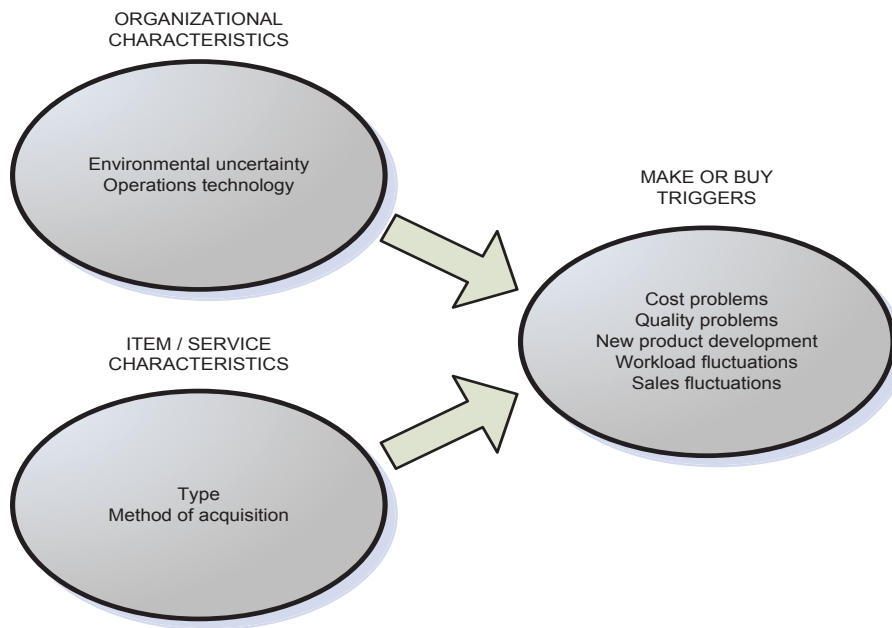


Fig. 2. Conceptual model (Moschuris 2007)

Organizational theory suggests that firms organized to deal with reliable and stable markets will not be as effective in complex, rapidly changing and unpredictable environments. There are two apparently conflicting views of the relationship between environmental uncertainty and organizational structure. According to contingency theory, firms should adopt “organic” structures that are less reliant on formal control, are decentralized and operate with fewer layers and narrower spans of control. In contrast another view is that at high levels of environment uncertainty, organizational decision-making processes are characterized by a constriction of authority. This means decisions are made at higher levels of the organization by a smaller number of organizational members. There are also controversial views about the importance of operations technology to organizational structure. Some researchers suggest that organizations should structure their activities in accordance with the demands of their transformation technologies. Conversely, others say that operations technology is not very important to organization structure. (Moschuris 2007)

Make or buy issues may be triggered due to quality problems, cost considerations, lack of capacity, unsatisfactory supplier

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performance, sales fluctuations, introduction of a new product and modification of an existing product. (Moschuris 2007) So the trend toward outsourcing activities in the value chain can be attributed to the following reasons (Mantel, Tatikonda & Liao 2006, McIvor 2003):

- *Most competent source.* Outsourcing policy is based on the best available source (internal or external) being chosen to carry out the activity or group of activities.
- *Increased flexibility.* The company believes it can be more flexible by outsourcing more activities rather than performing activities internally by being in a better position to react rapidly to market changes and be more responsive to customer change.
- *Reduced risk exposure.* Through outsourcing, the company is reducing its level of risk (converting fixed costs into variable costs). It is argued that suppliers are better able to cope with demand fluctuations through economies of scale and have more scope for alternative sources for this excess capacity.
- *Cost reduction.* In some cases the activity can be performed at a lower cost by outside suppliers.
- *Supplier management.* It is argued that it is possible to reduce the level of risk associated with high bought-in content by employing effective supplier management and partnership building approaches.

Competitive factors

A company may articulate its position in the market in a number of ways. It might compare itself with a competitor or alternatively they might associate themselves with the needs of a particular customer group. In the end companies define their market position in terms of a number of dimensions, for example range, price, quality of service etc. These dimensions on which a company wishes to compete are called competitive factors. Different dimensions and type of operation and their relative importance will change depending on how the company wishes to compete. In table 1 the competitive factors of two different operations are illustrated. (Slack, Lewis 2002, Slack 2005)

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Table 1. Competitive factors for two grouped under their generic performance objectives (Slack, Lewis 2002, Slack 2005)

Mortgage services Associated competitive factors include...	Performance objectives	Steel Plant Associated competitive factors include...
<ul style="list-style-type: none"> · Professionalism of staff · Friendliness of staff · Accuracy of information · Ability to change details in future 	Quality	<ul style="list-style-type: none"> · Percentage of products conforming to their specification · Absolute specification or products · Usefulness of technical advice
<ul style="list-style-type: none"> · Time for call centre to respond · Prompt advice response · Fast loan decisions · Fast availability of funds 	Speed	<ul style="list-style-type: none"> · Lead-time from enquiry to quotation · Lead-time from order to delivery · Lead-time for technical advice
<ul style="list-style-type: none"> · Realiability of original promise date · Customers kept informed 	Dependability	<ul style="list-style-type: none"> · Percentage of deliveries "on time, in full" · Customers kept informed of delivery dates
<ul style="list-style-type: none"> · Customisation of terms, such as duration / life of offer · Cope with changes in circumstances, such as level of demand 	Flexibility	<ul style="list-style-type: none"> · Range of sizes, gauges, coatings etc. possible · Rate of new product introduction · Ability to change quantity, composition and timing of an order
<ul style="list-style-type: none"> · Interest rate charged · Arrabgement charges · insurance charges 	Cost	<ul style="list-style-type: none"> · Price of products · Price of technical advice · Discount available · Payment terms

Different operations will see quality (or any other performance objective) in different ways, and emphasize different aspects. Each of the performance objectives represents a cluster of competitive factors grouped together for convenience. Different from other performance objectives is cost. While most competitive factors are clear manifestations of their performance objectives, the competitive factors of price are related to the cost performance objective. An improvement in cost performance does not necessarily mean a reduction in the price charged to customers. Firms who achieve lower costs may choose to take some, or all, of the improvement in higher margins rather than reduced prices. (Slack, Lewis 2002)

The idea of generic performance objectives is that they can be clearly related to some aspects of external market positioning, through their connection with competitive objectives, and can be connected to the internal decisions which are made concerning the operations resources. It is also noticeable that different product groups require different performance objectives, which means that different competitive factors have a different priority level at different product groups. (Slack, Lewis 2002)

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One way to determine the relative importance of different competitive factors is dividing the factors between order-winners and qualifiers. Different authors use different terms, so order-winners can also be called, for example, competitive edge factors, critical or primary factors, motivating factors and enhancing factors. Qualifiers also can be called, for example, hygiene factors or failure preventers. To put it simple order-winning factors are things that directly and significantly contribute to winning business. Therefore they are the most important aspects of the way a company defines its competitive stance. Qualifiers are not the major competitive determinants of success, but those are the factors where the operation's performance has to be above a particular level just to be even considered by the customer. So, even if order-winning factors would perform really well, the company will not win the business if qualifying factors are below this "qualifying" level. (Morash 2001, Slack, Lewis 2002)

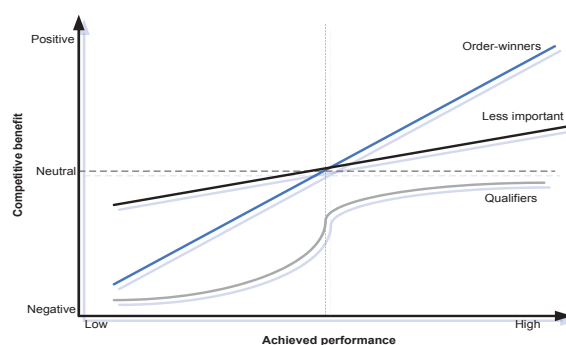


Fig. 3. Order-winners and qualifiers (Slack, Lewis 2002)

McIvor's outsourcing framework

There are only a few frameworks in the literature for the make or buy decision-making model. McIvor's (2000, 2003) outsourcing framework integrates three concepts associated with the decision-making process: value chain analysis, core competency thinking and supply base influences. The framework proposes that all non-core activities should be outsourced but that also core activities can be outsourced. It is important to notice that the framework is not a panacea for all of the problems associated with making an effective

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outsourcing decision. (McIvor, Humphreys & McAleer 1997, McIvor 2003, McIvor 2008)

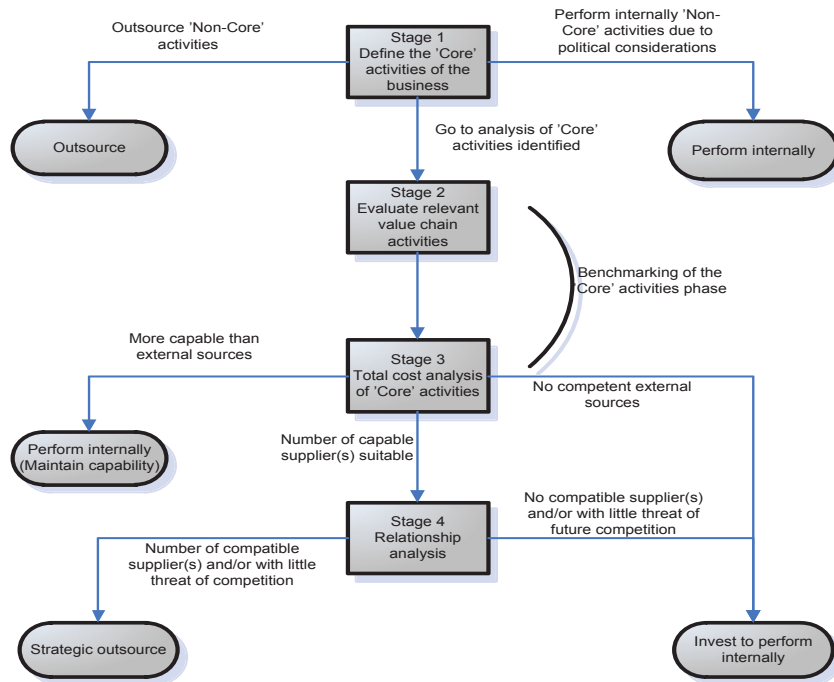


Fig. 4. Four-stage outsourcing framework (McIvor 2003)

The first stage is involved with identifying the core and non-core activities of the organization. A core activity is perceived by the customers as adding value and therefore being a major determinant of competitive advantage. Distinguishing between core activities and non-core activities is a complex task. The process of identifying the core competencies and activities should be carried out by top management along with inputs from teams from lower levels in the organization. Each team should encompass a broad section of members functionally, divisionally and hierarchically. The team has to identify the major determinants of competitive advantage in the markets, the industries, or the strategic groups in which the organization competes or might wish to compete. The framework proposed above assumes that, in general, all non-core activities will be outsourced. (McIvor 2000, McIvor 2003)

After all the core and non-core activities have been identified, the next section is concerned with analyzing the competencies of the company in these core activities in relation to potential external

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sources. So, the next stage is to evaluate the relevant value chain activities. Each selected core activity must be benchmarked against the capabilities of all potential external providers of that activity. This will enable the company to identify its relative performance for each core activity along a number of selected measures. Stage three, total cost analysis of core activities, involves attempting to measure all the actual and potential costs involved in sourcing the activity internally or externally. It encompasses all costs associated with the acquisition of the activity throughout the entire supply chain and not just the purchase price. (Mclvor, Humphreys & Huang 2000, Mclvor 2003)

The last stage, relationship analysis, is not included in the decision-making tool created in this paper but it is introduced here shortly. Several issues have to be addressed before outsourcing a core activity. The company may wish to maintain the knowledge that enables the technology of the activity to be exploited, even when it is being provided by another partner. Therefore, controlling the new product development and design process is important. The company may establish a buyer-supplier relationship ranging from partnership to competitive bidding. From this analysis of potential suppliers, the company will filter out any potential suppliers that are unsuitable. (Mclvor 2000, Mclvor 2003)

Tayles' and Drury's sourcing decision model

The Tayles and Drury (2001) model ensures that wider issues are considered in a logical manner, that the process is transparent and that strategic thinking is transformed into practice. The biggest difference between this model and the model of Mclvor's is that this model suggests that core activities or products are not outsourced in any situation. Only the non-core activities and products are nominated for outsourcing. (Tayles, Drury 2001)

Just like the decision model of Mclvor's, this one starts with identifying core competence and continues with costs to make or buy because by implication the company should have the capability or be seeking to acquire the capability. If the cost to make is cheaper than buying, the next question is about investment, whether there is a need for capital spend. If no investment is required the company should make, but if investment is required it too must be financially justified due to the economic imperative of a

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good return. Where the return from investment is good the company should invest and make. For investments that fail to achieve the desired return, the company should consider whether additional volume could enhance the returns. If not, then the next logical question is to ascertain whether or not an external supplier is available. In cases where there is no alternative supplier there is no choice but to make. If an external supplier is available the strategic positioning of the process or component needs to be reviewed due to the lack of financial justification for it on its own merits. This forces the decision-process into a feedback loop to ensure that investments really are strategic and add value to the organization as a whole. If the process or component is still deemed to be strategic on the second time round this loop the company should opt to invest and make. (Tayles, Drury 2001)

The model also goes through the decision process when the product is not about core competence. Then the next question is whether the company possesses the capability to perform the process or make the component. If it does not, then if a supplier exists that can satisfy the company's demands, the process or component specification needs in terms of quantity, quality, delivery and price, the company should buy it. If there is no capable supplier available the process or component specification needs to be reassessed and re-evaluated. If the capability exists in-house to perform the process or make the component, the next question is to ascertain the current capacity in-house. If resources are available and their use is shown to be economical the company should proceed to make. If resources are not available and the cost of buying is not less than the cost to make, the question is then whether the missing resources can be acquired. This forces the decision process into a feedback loop again to ensure that resources are deployed as optimally as possible. The acquisition of resources will only take place after the second time round the loop when the "trade-off" against other investment opportunities has been fully evaluated. (Tayles, Drury 2001)

Balanced Scorecard

The term Balanced Scorecard was born about fifteen years ago in twelve projects, the aim of which was to improve performance measuring, that were executed mainly in USA and Canada. Kaplan and Norton are seen to be the creators of the Balanced Scorecard.

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BSC is a simple and easily outlined, but at the same time extensive indicator. With the help of it, it is possible to improve competitive advantage and broaden the examination of the business from short-term to long-term planning. The objective of the Balanced Scorecard is to measure those things on which success is depending. According to Kaplan and Norton (1992) the complexity of management requires managers to observe performance in several fields of business at the same time. (Kaplan, Norton 1992, Kaplan 1993, Kaplan 1996, Kaplan, Norton 1996)

Balanced Scorecard includes economical indicators which reveal how well the organization has done. Company must compensate economical indicators with operative indicators which relate to customer satisfaction, internal processes and organization's learning. For companies operating in a market economy, economical indicators are kept the most determinant but three other perspectives are needed to give pre-signals about effects that are seen in market economy with delay. At the base of the BSC is company's vision and strategy. From those the essential perspectives, which are wanted to be followed and measured, are created (Fig. 5.). The necessity for company's operating and developing is economical success. The aim of the economical perspective is to measure those things that owners are interested in. (Kaplan, Norton 1992)

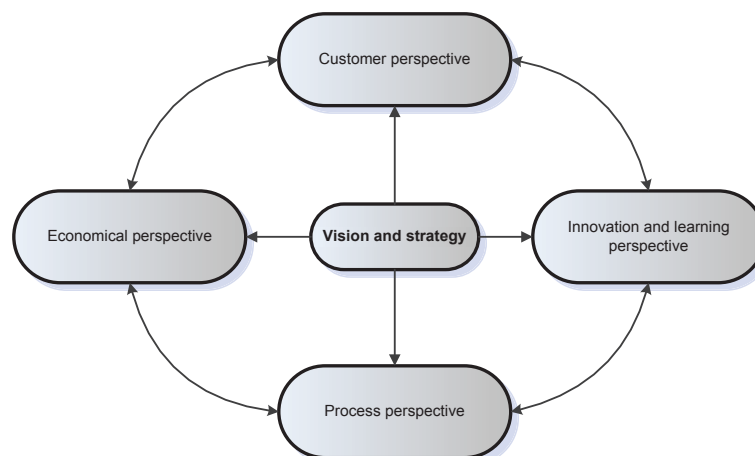


Fig 5. Perspectives of the Balanced Scorecard

Process perspective's indicators should measure those processes in which the company must perform excellently. So the processes

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are describing what should be done to identify customer needs and fulfilling them. Depending on competition strategies the measured processes may vary. Identifying all core and supporting processes is not reasonable. Strategy should define which processes are under examination and when. (Kaplan, Norton 1992)

Innovation and learning perspective's indicators should be able to answer questions: Is the organization able to improve in the future? Is the organization able to create value for its owners? This perspective should describe what kind of infrastructure the organization should aim for, so that success would be assured also in the future. To put it simply, the organization's learning consists of three factors: people, systems and the workings of the organization. In practical applications exactly this perspective is considered as the most challenging one of the BSC. (Kaplan, Norton 1992)

The indicators of the customer perspective can be divided into two groups. Another group can be called as basic-indicators because those are very similar in different organizations. Market share, customer satisfaction, customer profitableness, customer loyalty and number of new customers are very usual indicators. Those indicators reflect the company's point of view of how well it has managed in markets and in customer interface. Another group of indicators in customer perspective is called as customer promise - indicators. Those should answer, for example, the next questions: What the company should offer its customers? How is it possible to achieve the desired market share? How to tempt new customers? These factors may be the characteristic of the products or service such as quality or price. From these it should be clearly seen what it is that is going to lift the company into success in competition. (Kaplan, Norton 1992)

3. Research methodology

Eisenhardt (1989) defines case study research as a research strategy that aims at understanding the internal dynamic of an individual case. (Eisenhardt 1989) Case study research is aiming at understanding comprehensive and relevant phenomena of real life. In that case the endeavor is to study the phenomena in their genuine context. Interface between the phenomenon and context is not often clear, which complicates the work of a researcher. (Yin 2009)

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Case-study research is one of the most challenging research methods. The method is used in psychological, sociological, and political as well as in business economy researches. The use of the method is not delimited in certain research areas. Case study research is suited for following through whole study and it can be easily adapted widely and in versatile research areas. Unlike it is often thought case study research method can include not only quantitative but also qualitative searching. The aim of the case study research is to widen and generalize theories, not to specify them. (Yin 2009)

There are three case study research models: explorative, descriptive and explanatory. In explorative research it is meant to get information about phenomenon, find new ideas and possible research problems. The idea is to collect and arrange existing information. In descriptive research it is meant to give as specific a picture of the phenomenon as possible. In this kind of research the connections and explanatory factors are not straight out, but only describing the situation. The purpose of explanatory research is to straighten out the causality of the phenomena and pilot the related hypothesis. (Yin 2009)

Case study research method is the recommended research method when (Yin 2009):

- Research problem is formed with questions “How” and “Why”
- Researcher cannot dominate the case object
- It is concentrated on coexistent events real time.

Case study research starts with research planning. According to Yin it would be good to include the following five components in case study research planning: research question, statement (if possible), unit of analysis, and logic on how to connect empirical data to the statement and criteria which are the base for interpreting empirical data. This should also include a theory section to be complete research. The researcher should create a framework for research to help planning. It is worthwhile to make the effort for the theory framework because it helps the research worker to decide what information should be gathered and analyzed and how the results can be generalized. (Yin 2009)

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Data for case study research can be collected in several different ways. Six commonly used ways to collect data are: documents, archive, interviews, straight perceptions, participatory perceptions and items/devices. None of the ways for data collection are better than the others but they all have their own function in the study. The ways can be used separately but it is not desirable because of reliability and internal and structural validity. Using several sources of information makes the final result of research more plausible and exact. One of the strengths of the case study research method is that several information sources can be used in the same research. Using several sources of information gives the researcher both historical and prejudiced as well as human behavior-related information. While collecting information from various sources the aim should be that the collected information is promoting the same task or case. Using various sources of information may be expensive and challenging. (Yin 2009)

For the sake of reliability of the research, the filing of the collected data is important. To interpolate reliability the researcher should be able to constitute an evidence chain. Analyzing the collected information is one of the hardest work stages. The analyzing will succeed better if the researcher has an analytical strategy, which he uses when analyzing. There are three commonly used strategies: theoretical presentation, competitive explanations and creating description of the case. The most popular strategy is to follow theoretical statements. The second analytical theory, competitive explanations, tries to define and test competitive explanations. The third possible strategy is to create a descriptive body, over which the case and analyzing will be built. This strategy is used when the above-mentioned two strategies are not possible and the case is descriptive. The descriptive approach may help to identify different contexts thus objects for analyzing. (Yin 2009)

Case study research is regarded as a good research method when the research problem can be described with the help of questions how and why. The method is very useful when a researcher cannot control the target. There are three types of case study research: explorative (seeking to find out more about a phenomenon) research, descriptive research and explanatory research. The purpose of explorative research is to obtain information regarding a phenomenon, find new ideas and possible research problems. In explorative research, already existing information is collected and sorted. The aim of descriptive research

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is to provide as accurate an image of an individual, group, situation or phenomenon as possible. In the research the focus is not on clarifying connections between phenomena or factors interpreting behavior, but only in describing a situation. The aim of explanatory research is to explain causal relations between phenomena and testing related hypotheses. (Yin 2009)

The hermeneutic view perceives knowledge as soft, often subjective and experience-based as well as insights of a personal nature, whereas the positivist perceives knowledge as hard and real, and considers it possible to transmit knowledge in a tangible form. (Burrell, Morgan 1979) The hermeneutic view is approached in the study in the form of qualitative and quantitative research. Quantitative research refers to a study in which accurate and calculatory methods are used. Qualitative research is a method of inquiry practiced in humanities in addition to quantitative research. The aim of qualitative research is to understand the phenomenon being studied. The point of view of this study is a more qualitative one. In qualitative research, discretionary sampling is normally used. Only a small number of units is selected for the study and they are studied in depth which makes the quality of the data important. In this study, qualitative methods are used to collect information regarding the case under study. These methods include observations, interviews, questionnaires and reports. (Burrell, Morgan 1998)

Inductive reasoning, a.k.a. induction is a method of reasoning that starts from an individual group of observations and forms a generalization or a theory regarding it. Deductive reasoning a.k.a. valid reasoning is a method of reasoning in which the true premises are necessarily followed by a true conclusion. (Ghauri, Grønhaug 2005)

Research process started with the literature review of main theory base of the research problem. Most relevant theory was selected for the literature review: transaction cost economics, make or buy triggers, competitive factors, outsourcing framework, sourcing decision model and balanced scorecard. This research paradigm is hermeneutics and the research is qualitative case study research. Research methods are qualitative methods like interviews, questionnaires and observations. Strategic decision-making make or buy model was developed first according to a literature review and then tested and validated in empirical case

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study. The empirical research was done during a two year research period when the researcher did several interviews with case companies operational, tactical and strategic management and several observations of how the case companies used the decision-making model. The researcher also did two similar questionnaires with the case companies to validate that the make or buy decision-making model is working. Table 1 presents the main methodological choices for this research.

Table 1. The main methodological choices in this study.

Research discipline	Industrial engineering and management (IEM)
Theoretical base	Transaction costs economics, make or buy triggers, competitive factors, McIvor's outsourcing framework, Tayles' and Drury's sourcing decision model, Balanced Scorecard
Research paradigm	Hermeneutics
Research strategy and research approaches	Qualitative case study approach
Research methods	Qualitative methods: interviews, observations, questionnaires

4. Empirical case study to develop strategic make or buy decision-making model

The principal reasons for undertaking make or buy -decisions are for example, price competition, lack of capacity, skills shortage,

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need to increase responsiveness, need to increase quality and need to reduce time to market. The main factors considered for make or buy -decisions are for example, total acquisition costs, complexity, technologies and skills. The key characteristics of a practical decision-making tool and framework were need of easy usage and generic enough to cover a broad range of products.

The empirical case studies are small and medium sized companies located in Europe and Asia. Both of the companies are operating in manufacturing industry producing sub-assemblies for engineering solution business globally. Typically companies produce products includes part manufacturing, welding, machining, painting and assembling. The products are tailor made and every product is customized according to customers' needs. Case companies supply chain strategy is to have their own manufacturing, which is concentrating on its core competencies and other items are sourced from a wide supply chain. The supply chains are managed globally because of the need to supply products to worldwide sales channels. Case companies were selected because these businesses represent the most challenging business environment where there is a need for strategic make or buy decision-making model. According to the literature review and empirical case study it is able to develop strategic make or buy decision-making model. The developed model was empirically validated in empirical case study.

Mclvor's outsourcing framework consists of four stages. Because of the strategic role of the decision, it is essential to somehow measure the effects of the made decision. Model used as the measuring and evaluating base of this MOB decision-making tool are balanced scorecard and company's competitive factors. BSC suit make or buy decision-making not only because of its strategic role but also because it takes into account internal as well as external factors. By unifying the use of competitive factors and BSC it is possible to size up MOB decision-making more specifically and perceive the internal and external factors of the make or buy decision-making.

In innovation and learning perspective the company should define the core competencies and capabilities. In process perspective the used factors in make or buy decision-making are efficiency and value chain activities. In the economical perspective the competitive factors are cost and the total cost analysis of core activities. All of

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these perspectives should be analyzed using balanced scorecard customer perspective at the same time as analyzing other perspectives. Customer perspective is extremely important to have, because the customer is in many case extremely close involved and interested in those perspectives and factors. Competitive factors should be analyzed also from quality, service ability and delivery reliability point of view. Finally stage is relationship analysis which will be the final conclusion of the model. Every approach and perspectives in the strategic make or buy decision-making model should be used as in original theory of Mclvor, Balanced scorecard and competitive factors. Figure 6 described the connections between Mclvor's outsourcing framework, balanced scorecard and the competitive factors.

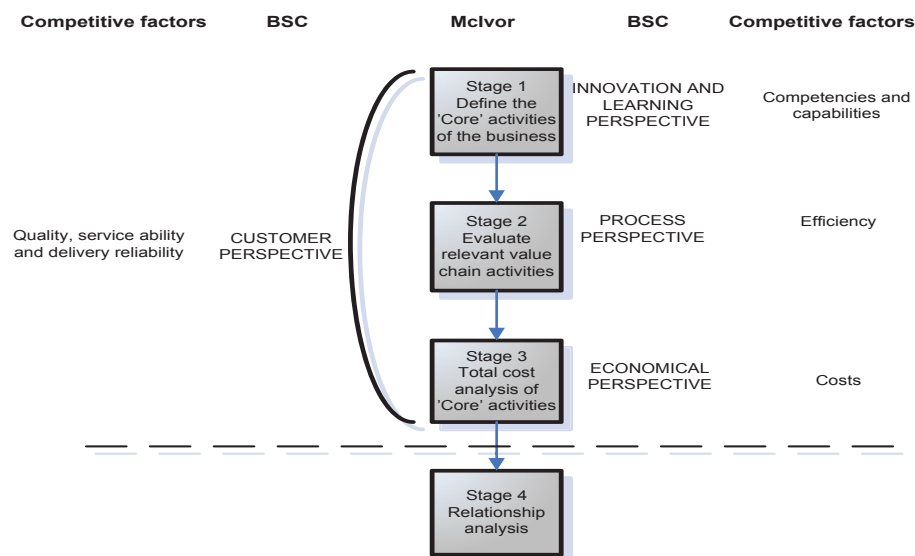


Fig. 6. Strategic make or buy decision-making model

While making any decisions it is essential to know what company's competitive factors are and how the decision contributes to those factors and to the company's competitive advantage. The competitive factors are also indicators that should be measured and predicted while making make or buy decision. It is not likely that there is a possibility to make a make or buy decision which would improve all of the competitive factors. Making the right decision is about optimizing. Some competitive factors may weaken and some will improve. The idea is to decide which of the competitive factors are critical and which the company wants to optimize. With a first-

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class management and prime suppliers it is possible also to gain the benefits of the make-alternative when outsourcing and in that way change the risks and drawbacks to become benefits. It must be emphasized that this kind of achievement requires a huge amount of work, control and collaboration, therefore it is a very challenging task.

The company's vision and strategy should be the base for balanced scorecard as well as for make or buy decisions. From the company's vision and strategy the essential perspectives, which are wanted to be followed, predicted and measured, are created. In this case the BSC is not only for measuring but also for predicting what may and will happen, if a certain decision is made. Of special interest is what happens to competitive factors. After the decision has been made and results and consequences are seen, it is possible to measure and evaluate the made decision and learn from it. The strategic decision-making model created in this research includes the same four perspectives as traditional BSC.

In the empirical case study it was stated that the company should think its make or buy decisions as a long term decision and make those decisions according to the company's business strategy:

- Should the company strive to maintain and build its capability in a particular technology or turn to the best-in-class source?
- Do the internal design and manufacturing capabilities lag behind potential suppliers?
- Will customers recognize a difference in the finished product if the company outsources some of its components?
- If there is a disparity between purchaser and supplier, how much investment is required internally to match the capabilities of the supplier?

Empirical case study contribution is that a major issue in make or buy decision making is to distinguish strategic and non-strategic parts. Generally, strategic parts are produced in-house for competitive reasons. Other strategic issues in make or buy include the cost of the updated technology required to continue manufacturing the part in-house, asset utilization, the possibility that outsourcing might reduce significantly the barriers to entry (generating more competition), or reduce the company's leverage in the supply chain, and whether it would hinder or help time-to-

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market for new products. Organizational issues include the ability to change the firm in order to reflect any adjustments in the future supply chain, and the ability to cooperate with suppliers and to properly manage outsourcing function. Empirical case study validates strategic make or buy decision-making model.

5. Conclusion

Make or buy is one way to develop a more agile supply chain. Working in collaboration with suppliers and by outsourcing and subcontracting it is possible to achieve a more flexible, more efficient and more agile supply chain. The aim of this study was to analyze factors that are related to make or buy decisions and increase understanding on how outsourcing and subcontracting can affect a company's business, operations and profitability. Within this research a tool was created for make or buy decision-making which can be used as a aid to evaluate the reasonableness of outsourcing analytically.

The first step to make outsourcing analysis is usually identifying a company's core competence. Traditionally outsourcing decisions have been bounded between core and non-core competencies while the latter can be considered for outsourcing. However, this is a really simplified point of view for there are many companies which have successfully outsourced functions which are also crucial to their core business.

There are only few frameworks in the literature for make or buy decision-making models. McIvor's outsourcing framework integrates three concepts associated with the decision-making process: value chain analysis, core competency thinking and supply base influences. The framework proposes that all non-core activities should be outsourced but that also core activities can be strategically outsourced. Another sourcing model is made by Tayles and Drury. This model does not make the actual decision, but it rather develops a decision logically. While not seeking the automatic decision, it ensures that wider issues are considered in a logical manner, that the process is transparent and that strategic thinking is transformed into practice. The biggest difference between these two models is that Tayles and Drury model suggests that core activities or products are not outsourced in any situation. Balanced scorecard is also introduced as a one framework for

Strategic Decision Making Model For Make Or Buy Decisions

make or buy decision-making. Its objective is to measure those things from which the success is depending and it includes indicators from four internal and external perspectives: customer, innovation and learning, process and economical.

Strategic decision-making model is based on balanced scorecard, McIvor's outsourcing framework and for competitive factors. The aim of the strategic model is to consider the make or buy issue via four perspectives of the balanced scorecard, so that all the factors relevant to decision are considered. Innovation and learning perspective covers core competency identifying and thinking, process perspective is about processes and resources and economical perspective covers the cost calculations and estimates. The fourth perspective, customer perspective, considers customer's interests: quality, delivery reliability and accuracy, service ability etc.

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Supplier development and buyer-supplier relationship strategies – a literature review

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Abstract: Academic and corporate interest in supplier development and buyer-supplier relationship has increased substantially in recent years. This paper provides a framework for analysing the current understanding of supplier development strategies, its impact on performance, and buyer-supplier relationship approaches. There is an increased need for buyers and suppliers to strategically collaborate to build a stronger and long-term relationship. The goal is to get extended understanding in buyer-supplier relationship and supplier development strategies. Supplier development is a process of understanding including four steps: 1) supplier assessment; 2) competitive pressure; 3) supplier incentives; 4) direct involvement. Future research can be more empirical focused including multiple case study in global environment to validate the supplier development strategy approaches and help the organisation to develop their supplier's strategies. The presented literature review offers supplier development strategies for empirical case studies and a systematic way to build buyer-supplier relationships to improve the performance.

Keywords: supplier management; supply chain integration; buyer-supplier relationship; supply chain management; supplier development; procurement management.

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1 Introduction

Supplier development was used by Leenders (1996) first to explain the determination by manufacturers to enhance the supplier's numbers and to improve their performance. After that, researchers in supply chain management started a discussion of supplier development. In the same time, organisational theorists began discussion of complex-product businesses that incline to be considered as high degree of mutual interdependence of transitional module makers and ultimate assemblers (Pfeffer and Salancik, 1978; Thompson, 1967).

One of the supplier development literature part states and explains the actions before supplier development concept takes place called 'the antecedents' (Krause, 1999). He identifies that

- 1 organisations need to manage their suppliers strategically for the competitive market
- 2 buying firms need to take a strategic viewpoint for suppliers, consider the purchasing function as a significant source for competitive advantage, and make investments in development of suppliers' performance and capabilities
- 3 to increase the supplier commitments, buying firms need to consider their suppliers as virtual extensions that helps to motivate them to improve their performance
- 4 a relationship between buyer and suppliers identifies the opportunity to invest into the supplier development programmes
- 5 communication and information sharing between buyer and suppliers is an important prerequisite to supplier development activities (Krause, 1999).

Supplier development and buyer-supplier relationship strategies

3

Moreover, supplier performances and capabilities have significant existence and play a pivotal role maintaining the manufacturing firms' competitive advantage (Humphreys et al., 2001; Krause, 1997; Watts and Hahn, 1993). Supplier development may include goal setting, supplier evaluation, performance measurement, supplier training, and other related activities (Krause et al., 2007). Supplier development approaches could be summarised into Table 1.

Table 1 Supplier development approaches

<i>Factor</i>	<i>Author</i>	<i>Explanation</i>
Communication	Krause (1997), Galt and Dale (1991), Wen-Li et al. (2003) and Wagner and Krause (2009)	Interaction between supplier and buyer
Competitive pressure among suppliers	Krause (1997), Galt and Dale (1991) and Wen-Li et al. (2003)	Use of two suppliers to create competition
Contract	Galt and Dale (1991)	Contract between the buyer and supplier
Customer base	Chakraborty and Philip (1996)	Suppliers number of customers
Demographic information	Watts and Hahn (1993) and Krause and Scannell (2002)	Information like gross annual contract sales, number of employees, etc.
Direct involvement	Krause (1997) and Krause and Scannell (2002)	Buyer firm site visits, product knowledge, training of suppliers personnel, investment to suppliers operation
Green supplier development	Blome et al. (2014), Dou et al. (2013), Igarashi et al. (2013), Fu et al. (2012), Lee and Kim (2011) and Bai and Sarkis (2010)	Green and sustainable supplier development
Interdependence	Chakraborty and Philip (1996)	The relationship with buyer and supplier
Level of involvement in supplier development programmes	Watts and Hahn (1993) and Krause and Ellram (1997a)	Management support for supplier development projects
Local versus international sourcing	Galt and Dale (1991)	Product is produced locally or sourced from abroad
Product development involvement	Chakraborty and Philip (1996), Arumugam et al. (2011) and Talluri et al. (2010)	The role that the supplier plays in product development
Supplier base	Krause (1997) and Galt and Dale (1991)	Number of suppliers in buyer firm supplier base
Supplier certification	Galt and Dale (1991) and Krause and Scannell (2002)	Buyer nominate best performing suppliers
Supplier development incentives	Krause (1997) and Krause and Scannell (2002)	Promising current benefits, promising future business, recognition achievement
Supplier development outcomes	Hartley et al. (1997)	Result-oriented, process-oriented

Table 1 Supplier development approaches (continued)

<i>Factor</i>	<i>Author</i>	<i>Explanation</i>
Supplier development programme objectives	Watts and Hahn (1993) and Arráiz et al. (2013)	To improve quality, on time deliveries, technical capability, etc.
Supplier development programme perspective	Watts and Hahn (1993), Krause and Ellram (1997a) and Arroyo-López et al. (2012)	New sources or long term cooperation.
Supplier development programme team	Watts and Hahn (1993)	Nominated teams for supplier development.
Supplier evaluation	Krause (1997), Watts and Hahn (1993), Wen-Li et al. (2003), Krause and Ellram (1997a), Hahn et al. (1990) and Humphreys et al. (2004)	Buyer personal is assigned to study the present system followed by supplier or supplier itself providing the required data about their present system to the buyer
Supplier involvement in product development and innovation	Johnsen (2009)	Supplier involved in product development and innovation which shorter time to market and improved quality.
Supplier satisfaction	Ghijzen et al. (2010)	Indirect influence strategies and promises encourage supplier satisfaction.
Supplier selection	Galt and Dale (1991), Igarashi et al. (2013), Ordoobadi (2009), Ho et al. (2010), Lee (2009), Önüt et al. (2009) and Chen and Li (2008)	Selection of suppliers according piece, quality, on time deliveries, etc.
Supplier training	Krause (1997) and Galt and Dale (1991)	Training programme with supplier organised by buyer firm
Task structure	Chakraborty and Philip (1996)	Unstructured, semi-structured, structured
Vendor selection methods	Chakraborty and Philip (1996)	Open tender, closed tender, direct selection

The term ‘suppliers’ has become a substantial party who are not only suppliers of goods these days but they have become strategic partners for the firm which represents the importance of their role in the value chain (Kwon et al., 2010). Supplier relationship management or buyer-supplier relationship in a global supply environment is the concepts of management network that involves different skills and knowledge into the field and enhance the possibility of performance (Lintukangas, 2011). Therefore, the relationship between buyer and supplier provide a pivotal prospect for firms to develop strategically global competitive advantage. These relationships have developed to the level of strategic partnership relationship rather competitive (Loppacher et al., 2011). There are some success factors which influence supplier development including:

- 1 effective communication
- 2 an attitude of partnership

- 3 mutual commitment
- 4 top management support.

These factors really define the aspect of supplier development and its success which ultimately is a resource to develop buyer-supplier relationship and continuous performance improvement through competitive advantage (Sucky and Durst, 2013).

The process of supplier development is a dimension of supplier development research. For the purpose, Hartley and Choi (1996) suggest a process model which consists of five factors. These five factors are:

- 1 supplier's team leadership
- 2 supplier's top management commitment
- 3 capable joint-development team
- 4 data driven changes
- 5 success of a model line.

Previous studies state that buying firms can communicate more efficiently with suppliers if they put efforts in supplier development including supplier evaluation, supplier training, and supplier award programmes (Krause and Ellram, 1997b). Furthermore, they perceive their suppliers as partners and place a better emphasis on some serious issues (Krause and Ellram, 1997a). Buying firm's tendency to engage in supplier development was affected by its perception of supplier obligation, its anticipation of relationship endurance and operative buyer-supplier communication (Krause, 1999). In the following, there are factors to increase supplier's performance and competences and infrastructure factors of supplier development (Humphreys et al., 2004).

Table 2 Factors to improve performance and supplier development

<i>Infrastructure factors of supplier development</i>	<i>Factors to improve supplier performance</i>
Strategic goals	Increasing supplier performance goals
Effective communication	Providing the supplier with training
Long term commitment	Equipment, technological support and investment
Top management support	Personnel exchanging
Supplier evaluation	Evaluation of supplier performance
Supplier strategic objectives	Recognising supplier progress in the form of awards
Trust	

Source: Humphreys et al. (2004)

More specifically, the determinations of the systematic review are to highlight the supplier development strategies, and buyer-supplier relationships to meet the short and long term supply needs with the help of detailed and updated literature. This will lead to examine the impact of supplier development on buyer-supplier performance and will provide a research framework to identify the step by step process of supplier development and improved buyer-supplier relationships. Moreover, this study explores the examples and literature on supplier development strategies and relationships to

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identify areas for future research to provide a platform based on the detailed literature review (Krause et al., 1998; Krause, 1997, 1999; Giunipero, 1990).

The idea of this study is significantly objective which clarifies the supplier development strategies and approaches, their impacts, and developing buyer-supplier relationships. Thus, this important study collaborates and combines the framework of supplier development approaches which lead to develop a strong relationship and provide the answers to the following research question of the study:

- What approaches support to develop suppliers' performance to improve buyer-supplier relationships?

The main question of the study can be divided into the following sub-questions:

- 1 What are the significant supplier development approaches in the literature which help buyers to improve the performance of suppliers?
- 2 How buyer-supplier relationships can be developed to highlight and to provide the important factors in the relationships for empirical examination?
- 3 Finally, how to combine supplier development strategies with buyer-supplier relationship framework to answer empirical questions?

This research identifies and addresses above mentioned questions by investigating a link between different strategies of supplier development and buyer-supplier relationships performance outcomes.

The following section reviews the research methodology used in this research paper. Based on this review and methodology, a detail literature review is presented in Section 3. Section 4 presents research framework based on the literature. Discussion/conclusions, future research perspectives/implications are discussed in Section 5 and Section 6 respectively.

2 Research methodology

A literature review is a critical summary and assessment of the range of existing materials dealing with knowledge and understanding. The purpose is to discover the research project, to customise its context or background, and to provide insights into previous work (Blaxter et al., 2010). One of the critical primary responsibilities of a researcher is to find out and analyse the existing literature concerns to a research topic (Kumar, 2011). It consists of a comprehensive research through a variety of resources such as books, journals, electronic journals, and abstracts. According to Kumar (2011), a literature review has three functions. First, it explains and emphasis the research question helping researcher to understand the subject area completely and different theoretical approaches applied previously. Secondly, it may develop the methodology. Literature review helps researcher to observe the other investigators' approach to study the chosen phenomena and validity of methodologies. Third, a literature review helps to expand the researcher's knowledge of the area and provide a better command of the chosen area and relevant issues. The greater understanding on existing research area reinforces the validity and findings (Rudestam et al., 2007).

This research paper follows the ideologies for systematic literature review proposed by Tranfield et al. (2003) to ensure the consistency and significance to the practice. In this study, a literature review was employed as the research methodologies to develop a supply chain strategy framework. The literature on supply chain strategies was composed primarily from journals in the areas of strategic management, supply chain management, operations research and operations management. The target was to focus on latest journals from last decade and that is why dissertations, textbooks, unpublished working papers, and conference papers were excluded. The literature search incorporated journals published by numerous publishers and research was done using Scopus which is one of the largest abstract and citation database of research literature. Several hundreds of journal articles were found and that is why the research has to focus the most relevant, cited and newest journals.

3 Supplier development

3.1 Supplier development strategies

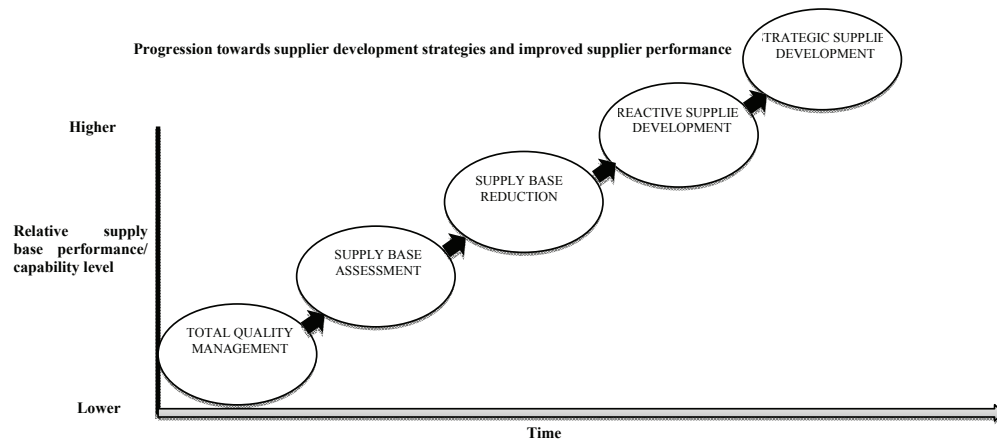
Hahn et al. (1990) proposed a theoretical model for supplier development and document industry practice. Krause et al. (2000) characterise following useful supplier development strategies:

- *Competitive pressure*: Multiple suppliers are more important to develop competitive pressure which help and motivate other suppliers to enhance quality and maintain improved performance (Tezuka, 1997).
- *Evaluation and certification systems*: Supplier evaluation and certification system ensures the suppliers' performance and organisation's expectation of performance. It motivates suppliers to improve performance consecutively (Krause et al., 2000; Carr and Pearson, 1999).
- *Incentives*: Buying firm can offer incentives to motivate suppliers to develop their performance and capabilities which include achieved cost savings sharing, increased volumes consideration, future aspects for business, and recognising them through awards (Monczka et al., 1993; Krause et al., 1998).
- *Direct involvement*: Organisations follow a pre-emptive method to develop suppliers' performance through direct involvement (Krause et al., 2000; Monczka et al., 1993). Direct involvement can be investments in operations or manufacturers can acquire supplier firm (Dyer, 1996).

According to Krause et al. (1998), buying firms follow an evolutionary path to develop suppliers' performance. In the adoption of TQM, respondents specified that they had implemented many or all of the TQM involvements, i.e., focus on customer requirements, supplier partnerships, cross-functional teams, use of scientific methods for performance measurement, and use of quality tools. Moreover, external suppliers focus helps companies to conduct a thorough supply base evaluation of acknowledgment to develop material quality, lower development costs, reduce purchase prices, and improve supplier responsiveness. After the supply base evaluation, organisations emphasis on amalgamation of purchased volumes with fewer suppliers to remove the suppliers'

incapability of meeting expectations. To further improve the performance and capabilities of their supply bases, respondent firms engaged in supplier development (Krause et al., 1998).

Figure 1 Progression towards supplier's development strategies and improved performances



Source: Krause et al. (1998)

Table 3 Overview of differences between reactive and strategic supplier development

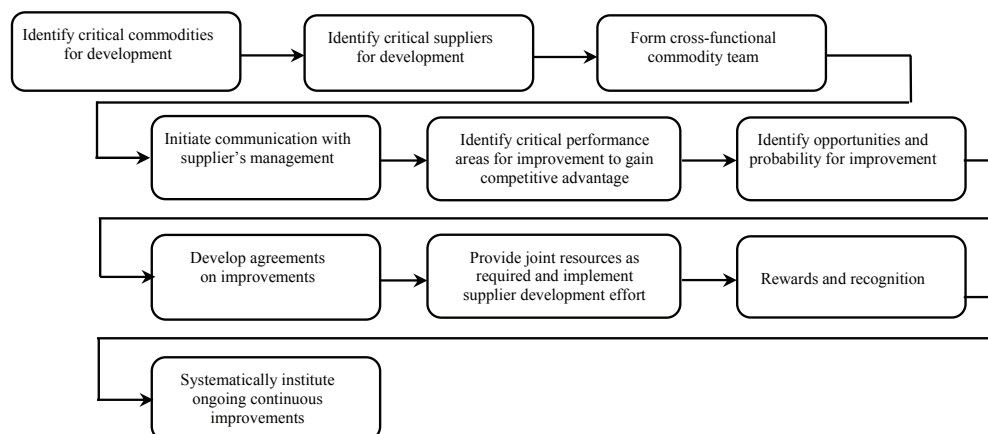
<i>Factors</i>	<i>Reactive</i>	<i>Strategic</i>
Primary question	A supplier performance problem has occurred – what is needed to correct the specific problem?	We have dedicated resources to develop the supply base – where should resources be allocated for the greatest benefit?
Primary objective	Correction of supplier deficiency	Continuous improvement of supply base
Unit of analysis	Short-term improvements Single supplier Supplier development project	Long-term competitive advantages Supply base Supplier development programme
Selection/prioritisation process	Supplier self-selects through performance or capability deficiency Problem-driven	Portfolio analysis Pareto analysis of commodity/suppliers Market-driven
Drivers (examples)	Delivery dates missed Quality defects Negative customer feedback Competitive threat for buying firm Production disruptions Change in make/buy decision	Supplier integration into the buying firm's operation Supply chain optimisation Continuous improvement Value-added collaboration Technology development Seek competitive advantage

Source: Krause et al. (1998)

Krause et al. (1998) presents reactive and strategic supplier development approaches. In the strategic supplier development, initiatives are typically carried out by an executive-level team, with an execution plan being articulated and carried out by a cross-functional commodity team. In this way, reactive firms were not efficient enough in supplier performance assessment and further they recognised as candidates for supplier development only after a problem actually occurred. Table 3 explains some of the major differences between strategic (systematic) and reactive (remedial) approaches to supplier development (Krause et al., 1998).

Krause et al. (1998) present a generic process model for supplier development including ten steps to make systematic supplier development in process-oriented way. It includes critical commodities for development, identify critical suppliers for development, form cross-functional commodity team, initiate communication with suppliers management, identify critical performance areas for improvement to gain competitive advantage, identify opportunities and probability for improvement, develop agreements on improvements, provide joint resources as required and implement supplier development effort, rewards and recognition and finally systematically institute ongoing continuous improvement (Krause et al., 1998).

Figure 2 Strategic supplier development process



Source: Krause et al. (1998)

3.2 The impact of supplier development on buyer-supplier performance and relationship

Supplier development activities can be categorised into transaction-specific and organisational structure of supplier development. The factors of supplier development infrastructure affect the performance of buyers and suppliers (Humphreys et al., 2004). In this vein, transaction-specific supplier development is the basic practice for buying organisations to develop suppliers' performance and capabilities (Krause, 1999). Moreover, supplier development includes direct investment in assets focused to buyer and supplier perspective and training with transaction-specific knowledge (Joshi and Stump, 1999). Krause (1999) explains that buyer's direct involvement to develop suppliers' performance is a key approach for the development and improved quality performance.

The clarity of long-term strategic goals determines the effectiveness of supplier development. Supplier development efforts should focus on future capabilities in technology and product development rather than on current quality and cost (Watts and Hahn, 1993). Effective communication plays a key role between buyers and suppliers to motivate them (Newman and Rhee, 1990; Giunipero, 1990); it enhances the mutual understanding of both parties and reassures the conflict resolution (Spekman, 1988). A long term commitment of buying firm assures a relationship with suppliers where suppliers willingly can make changes in their operations to fulfil the requirements of buyer (Lascelles and Dale, 1989). Supplier evaluation is another important strategy to improve buyer-supplier performance. For the purpose, buyers should select suppliers carefully and evaluate them regularly. Supplier evaluation results could provide valuable information about general areas of weakness where performance improvements were needed. When suppliers follow further developments of its performance and capability by itself to improve competence, a rational and tactical match come into exist between buyer and supplier management which increases possibilities of success in the cooperation (Stuart and McCutcheon, 1995). Trust between buyer and supplier is needed to improve the performance and capabilities of supplier and specially when they jointly investing into a business. Transaction-specific investments help to increase the buyer's reliance on the particular trading association and expose them to larger risk and uncertainty (Krause, 1999). Buyers must safeguard themselves against the hazards of opportunism of suppliers. Buyer trust in the supplier would enhance the effect of buyer assets specificity on joint action in buyer-supplier relations (Humphreys et al., 2004).

According to Humphreys et al. (2004), performance consequences are defined in various extents in the purchasing literature. Giunipero (1990) suggested that capability to handle suppliers' quality, delivery, and lead time, and also to control the acquisition cost has a significant dimension where purchasing function's efficiency can be measured. Watts and Hahn (1993) explained that supplier performance improvement indicator is most important factor to measure the result of supplier development. Moreover, Monczka et al. (1993) stated the key objectives supplier development which a buying firm initiate to increase the competitive advantage of buyer and to improve the relationship between buyer and supplier. In this vein, Humphreys et al. (2004) presented three dimensions of supplier development outcomes, i.e.,

- 1 supplier performance
- 2 buyer competitive advantage
- 3 buyer-supplier relationship improvement (Humphreys et al., 2004).

Furthermore, Hahn et al. (1990) state that upgrading existing suppliers' performance and capabilities help in supplier development to fulfil the changing competitive requirements. Improvements in supplier performance focus on perception of buyers about the quality, delivery, cost, inventory, lead time, and the rate of new product introduction aspects. Further, linking a purchasing strategy with buying firm's overall corporate competitive strategy objectively develops the long-term relations and suppliers' performance and capabilities. Competitive advantage development of a buying firm should be one indicator of efficiency in supplier development (Hahn et al., 1990). Thus, Stuart and McCutcheon (1993) suggested that competitive advantage of buying firms includes market share gains, quality, cost reduction and quick product development. On the other hand, Heide and John (1990) noted that firms efficiently make alliances when

there is some scope and possibility of joint activities. For the purpose, the performance results of buyers are mainly reliant on the performance outcomes of their suppliers. In manufacturing industries, buying firms have four key competitive priorities in their end markets, i.e., cost, quality, delivery time and reliability, flexibility, and outcome of promise (Krause et al., 2007).

Buying firms' development in the product cost is reliant partially on subcomponent suppliers' improvement that means it can be a reduction in rework, scrap, and downtimes. The benefits by reducing the supplier's cost should be partially transferred to the industrial customers in low prices form (Clark, 1989; Human and Provan, 1997; Turnbull et al., 1992). In automotive and electronics industry, the manufacturer follow a low costs of their supplied inputs, lower in final assembly and to provide a competitive price to the consumers (MacDuffie, 1995). Organisations have a key concern about the manufacturing flexibility to meet the changing needs of their customers but flexibility of assembler can be perceived to be a function of suppliers' quality, delivery time, reliability, and flexibility (Krause et al., 2007; Dyer, 1996; Liker and Wu, 2000; Meredith, 2000; Womack et al., 2007).

Performance improvements are often only possible required by buying firms when they make a long-term relationship commitment with their key suppliers (Krause et al., 2007). Previous research suggests that suppliers will be reluctant to promise or commit a relationship specific investment if buying firms are unwilling to sustain long term relationships and mutual investments to improve suppliers' performance (Krause, 1999). Moreover, suppliers consider relationship specific investments as susceptible to resourcefulness when commitments are not tangible or approaching from buying firms (Krause et al., 2000). In this way, supplier development efforts from a buying firm for a purpose to develop the performance or capabilities are more significant to analyse the influence on the its performance and competitive strategy within the buyer-supplier relationship domain (Krause et al., 2000, 1998; Wagner, 2006). For the purpose, Wagner and Krause (2009) stated that to understand the performance improvements in cost, quality and delivery and advantage from increased supplier capabilities, the buyers and suppliers need to jointly involve in relationship focused investments. They may also contribute resources for the development, i.e., information sharing and investing in physical and human assets (Hunter et al., 1996; Dyer and Nobeoka, 2000).

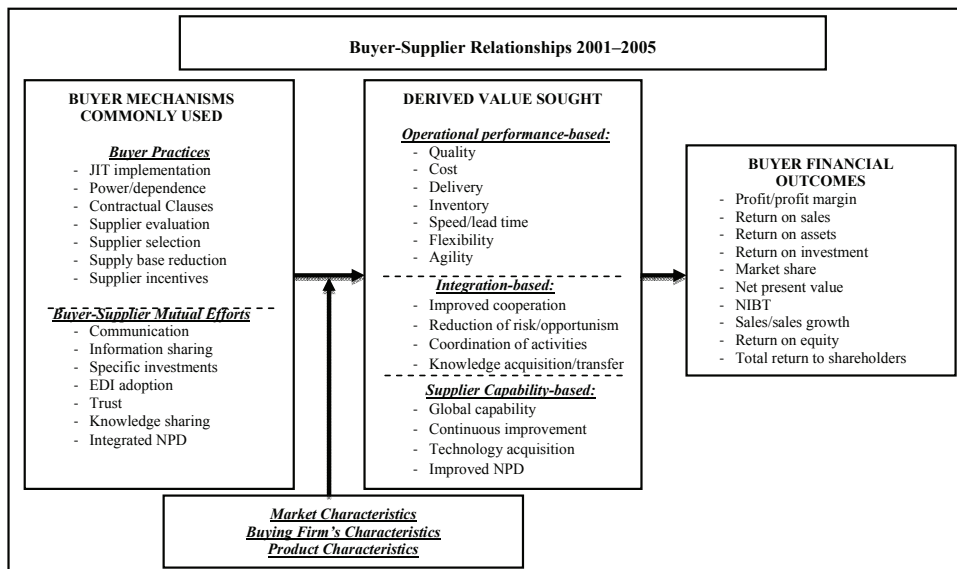
Wagner and Krause (2009) highlighted the research gap in supplier development and explained that research has been lacking because of missing distinction in between supplier development objectives and performance achievements. The relatively less research does not clarify the various goals for supplier development efforts that can be affected on the relationship between buyers and suppliers. For the purpose, Wagner and Krause (2009) presented the important study of supplier development goals. They presented a study where the difference between goals which are short-term in nature and immediate (delivery, order cycle times, and quality) and long-term goals in nature (strengthening a supplier's managerial, product development, and processes competences) are highlighted (Wagner and Krause, 2009). Further, supplier development goals will emphasise and focus on the measurable results of suppliers. On the other hand, a combined value creation needs much more efforts from buyers and suppliers; harmonised and combined capabilities, and a long-term focus on suppliers' performance and capabilities (Wagner and Krause, 2009). Supplier evaluation and feedback may be the significant activities to develop suppliers while training them, by sharing and

transferring employees from one to another, and some other related activities (Monczka et al., 1993; Wagner, 2006).

Moreover, Terpend et al. (2008) explained that empirical outcomes of studies propose the performance of a purchasing organisation which is achieved through integration of buyer/supplier firms generally and specially by integration of product development, collaborative planning, and integration of information system (Ellram and Liu, 2002; Frohlich and Westbrook, 2002; Narasimhan and Kim, 2002; Rosenzweig et al., 2003; Droge et al., 2004; Petersen et al., 2005b). Further, supplier development factors effect an organisation financially, i.e., it has effect on sales of buying company, return on equity (ROE), total return to shareholders, and net present value (NPV). Many studies explain that supplier development also has a significant impact on operational performance improvement, i.e., cost, quality, and cycle time (Rosenzweig et al., 2003; Tracey, 2004; Petersen et al., 2005a).

Park et al.'s (2001) propose that suppliers with maximum performance assessment have a strong impact on process development competences but those who emphasise conformance quality; they will not have strongest process development capability. In this vein, McGinnis and Vallopra (2001) established that a strong connection of purchasing function of buying firm assists supplier process development competencies and making sure supplier participation with high priority which is significant for the supplier development to improve performance and capabilities. Moreover, Krause and Scannell (2002) stated that product-oriented organisations are more expectedly depend upon the encouragements, drives, motivations, direct connection, and participation than service-based organisations. Further, operational factors like communication develops the performance of suppliers and play a key role in supplier development whereas collaborating and sharing information endorses reduction in cycle time and improve financial performance of buying firm and expand supplier's commitment (Rosenzweig et al., 2003; Tracey, 2004; Petersen et al., 2005a).

Figure 3 Buyer-supplier relationships



Source: Terpend et al. (2008)

Liker and Choi (2004) presents a research on supplier relationships in automotive industries Toyota and Honda. He suggested that supplier relationships are followed by six distinct steps: First, they understand how their suppliers work (supplier's business, works, capabilities and commitment). Secondly, they turn supplier rivalry into opportunity by (sourcing, compatible production and system, and setting up joint ventures). Third, they supervise their vendors by (monthly reports, constant feedback, and involving managers to solve problems). Fourth, they develop their suppliers' technical capabilities by (building up skills, a common lexicon, and innovation capabilities). Fifth, they share information intensively but selectively considering (specific time and place, rigid formats for sharing information in a structured fashion, and accurate data collection). Lastly, they conduct joint improvement activities (i.e., exchange best practices, initiate kaizen projects, and supplier study groups). Toyota and Honda have succeeded not because they use one or two of these elements but because they use all six together as a system (Liker and Choi, 2004).

Prahinski and Benton (2004) presents that buyer-supplier relationship is the supplier's perception of the buying firm's behavioural and operational relationship attributes: buying firm's commitment, cooperation and operational linkages. Moreover, he presents two buyer-supplier relationship approaches. The first approach explains the relationship which is based on transformation process, i.e., from awareness, exploration, expansion, and commitment to dissolution whereas second approach is based on the mechanism of buyer-supplier relationship at one point in time, i.e., organisational governance ranging from a transactional-based relationship to a strategic association or vertical integration (Cooper and Gardner, 1993; Webster, 1992), or the continuum between competitive and cooperative positioning (Ellram, 1995).

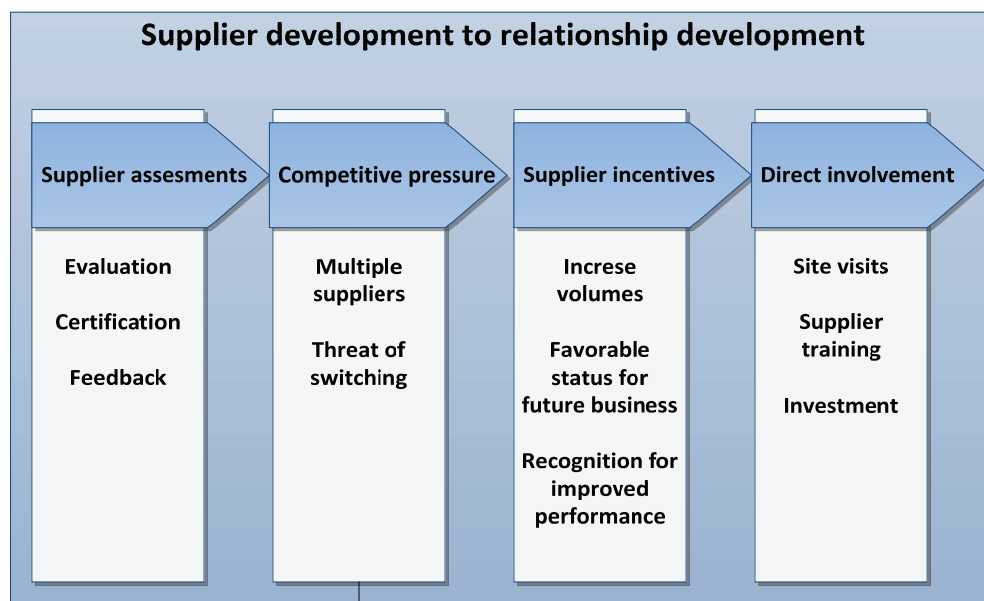
4 Research framework

Reviewing literature there are researches which examine supplier development from supplier's perspective through buyer-supplier relationship studies and highlights the important supplier perspective. Therefore, Krause (1999) highlights the importance of suppliers and emphasises that buying firms consider its suppliers as virtual extension of the firm which will in result increase the motivation of suppliers towards the buying organisation. Moreover, communication between buyer and supplier firms is significant prerequisite which creates an environment of supplier development (Wagner and Krause, 2009; Krause et al., 1998; Krause and Handfield, 1999). Some authors suggest that supplier commitment and a level of inter-firm communication are seen as antecedents to supplier development. The successful supplier development factors are focused on perception of suppliers as partners and their virtual extensions. For the purpose, higher management collaboration and commitment along with supplier acknowledgment, direct investments into the operations of suppliers, effective communications in between the buyer and supplier firms, and a secure multiple contact point are the success factors for supplier development to improve their performance and capabilities (Krause, 1997; Krause and Ellram, 1997a, 1997b). Further, critical success factors included supplier commitment, trust, and alignment of organisational cultures which are more important in supplier development strategy (Handfield et al., 2000; Hartley and Choi, 1996).

Moreover, purchasing literature emphasis the significance of supplier development favouring an organisation's operations strategy and makes sure the suppliers performance

and competences. The focus remains on supplier development drivers and it helps to explore the impact of these initiatives on performance and competences (Hahn et al., 1990; Monczka et al., 1993; Hartley and Choi, 1996). Figure 4 elaborates a detailed research framework and a structural analysis which concludes the literature review and explains different steps for the supplier development process and supplier-buyer relationship.

Figure 4 Operational breakdown of the values of buying firms' approaches to develop supplier performance (see online version for colours)



Supplier development and buyer-supplier relationship need to be in a systematic way which helps firms to organise the process and collaborate with suppliers for the improvement of product manufacturing capabilities. Supplier development carries a process including:

- 1 supplier assessment
- 2 competitive pressure
- 3 supplier incentives
- 4 direct involvement that elaborates a detail version of steps to get a competitive advantage and to develop buyer-supplier relationship.

In the same vein, research framework indicates that companies follow an evolutionary route to develop their supplier's performances and relationships. They try to focus on adoption of total quality management (TQM) followed by evaluation and culmination in supplier development strategies (Krause et al., 1998). Moreover, Modi and Mabert (2007) stated following supplier development strategies:

4.1 Competitive pressure

Companies use different supplier sources and market forces to develop competitive pressure. This strategy not only helps the organisations to analyse their suppliers' competence and performance and to build the long-term relations but motivates others develops their performance quality. Purposefully, firms use multiple suppliers to keep a competitive pressure among different suppliers. This support buying firms to get improved quality process services and they can inspire suppliers to keep the quality, delivery, or whatever supplier performance characteristics high by rewarding them with huge volume of the business over time (Tezuka, 1997). Therefore, buying firms apply this method to its suppliers when they need competitive offers from different suppliers to attain a comparatively cheaper purchase price (Krause et al., 2000). The threat of switching suppliers or losing business to other supplier creates a possibility or condition to provide suppliers a motivation to keep the competitiveness up with high quality supply at a low cost. Buyers expected to have developed relations with more than one supplier while dealing with manifold or parallel sourcing but buyers try to develop a strong relation with only one supplier dealing with sole sourcing. However, if there are certain switching costs (firm specific investment costs) involved, the buyer will hesitate to threaten supplier for a specific deviation in quality (Richardson and Roumasset, 1995).

4.2 Evaluation and certification

Evaluation and certification system supports the organisational strategies regarding current and expected performance of suppliers and ensures the suppliers about their performance and business prospects of organisation. For the purpose, evaluation and certification system is an important tool of communication between buyer-supplier and a motivational process for the suppliers to improve their performances. This evaluation and certification system comes under supplier assessment which is a key enabler in between supplier development activities and buyer-supplier relationship development. Supplier assessment is not only an important tool for buying firms to calculate the performance of suppliers in comparison of several other suppliers but it also allows buying firms to set future direction standards of suppliers' performance (Krause et al., 2000). Supplier assessment tool explains and elaborates the detailed evaluation of suppliers' managerial competencies, quality, technical competencies, cost, and delivery capabilities (Giunipero, 1990; Hahn et al., 1990). Therefore, it is very useful in providing feedback to its suppliers about their performance index and competencies. In fact, feedback is the evaluation and comparison of expectations and outcomes of suppliers' activities which integrates the competitive strength of the market to address the current performance and encourage them in improving performance (Krause et al., 2000).

4.3 Incentives

Incentives play a vital role in developing the motivation and interest of suppliers towards their capabilities and competence including; awards, cost savings, consideration for increased volumes, etc. Supplier incentives are the key motivators for suppliers to improve their performance and in building strong and long-term relationships. Moreover, if incentives are not offered and awarded, suppliers are unwilling or reluctant to keep up and build long-term relations with buying firms. Therefore, literature suggests that

supplier incentives may enhance the possibility and suppliers' will and satisfaction to follow the buyers' required demand (Ghijsen et al., 2010). However, supplier assessment and supplier incentives have indirect influence on performance of suppliers (Krause et al., 2000). Positive supplier's incentives for improved performance can be in the form of *increased business volume* and vice versa. Keeping this in view, suppliers focus more on the delivered performance to the buyer and maintain the required standard for *future business considerations* which usually has a positive impact on operational knowledge transfer activities (Modi and Mabert, 2007). These activities involved in suppliers' incentives allow buying firms to evaluate continuous improvements in suppliers' performance by increasing the performance expectations and *recognition for improved performances*. Thus, supplier's incentives activities foster the momentum of suppliers to provide continued performance to strengthen the buyer-supplier relationship (Krause et al., 1998).

4.4 *Direct involvement*

Companies use proactive method through direct involvement and make sure their existence by making capital and equipment investments, acquiring supplier firm operations partially, and by investing human and organisational resources to develop suppliers' performance and competence. Buying firms are eager to get directly involved in the supplier development programmes which include different activities and actions regarding investments in supplier development resources. In this vein, Williamson (1985, 1981) provides a holistic picture of transaction-specific investments in buyer-supplier relationship and supplier development activities and direct involvement can be a reason to reduce transaction cost and uncertainty of buying firms. On the other side, suppliers' involvement into buyer-supplier relationship also enhance the strength of relationship (Ghijsen et al., 2010). Many variables in direct involvement label the supplier development activities and enhance the performance of both buyers and suppliers (Krause and Ellram, 1997a, 1997b; Humphreys et al., 2004; Sánchez-Rodríguez and Martínez-Lorente, 2004). These supplier development activities involve *site visits, training and education programmes, technical assistance* and *investments with suppliers*. Continuous site visits allow suppliers to focus on the required quality by the buyers and enhance the process capability. These efforts are really important in supplier development actions which lead to enhance the performance (Modi and Mabert, 2007).

Firms are employing the supplier development programmes and strategies progressively to develop suppliers' performance and to build strong relationships with them to continue competitiveness in the market. According to Modi and Mbert (2007), supplier's development strategy has a strong link in developing suppliers' performance and capabilities and involving top management into the process to build purposeful relationship with suppliers. This link creates operational knowledge transfer activities and assistance to select a set of suppliers which triggers supplier development activities.

Therefore, this paper explores the possible supplier development strategies that are useful for buying firms for supplier development. Moreover, this study develops a research framework where each building block explains different ideas to develop strong relationships with suppliers. Finally, overall research framework provides the opportunities where supplier development and buyer-supplier efforts ultimately improve the performance of firms.

5 Discussion/conclusions

In this paper, a detailed literature overview of supplier development strategies and buyer-supplier relationship is presented. Many of different activities can be used to improve the performance of suppliers including low involvement actions (supplier evaluation) to more elaborative and resource demanding action (investing in production equipment and supplier's employees training) tasks (Wagner and Krause, 2009; Arroyo-López et al., 2012, Modi and Mabert, 2007). Supplier development activities can be summarised as:

- 1 introduction of competition to the supply base
- 2 supplier evaluation for further development
- 3 supplier certification
- 4 elevation of performance expectations/goals
- 5 recognition and rewards
- 6 promise of future benefits
- 7 training and education of suppliers' staff
- 8 direct investment in the supplier by the buying firms
- 9 exchange of personnel between buyer and supplier organisations
- 10 supplier plant visits
- 11 intensive information exchange with suppliers
- 12 collaboration with suppliers to improve the material and development of new materials
- 13 involvement of suppliers in new product development process (Krause, 1997; Krause and Ellram, 1997a, 1997b).

One objective for supplier development is to transfer competences from the customer to the supplier. These capabilities gradually develop the basic skills to guarantee the performance index towards continuity of development and innovation. For the purpose, this transmission of competencies may be accomplished through different actions and the execution of organisational procedures facilitating an association and interactions, sharing the information, and integration of best practices to strengthen or enhance the quality of knowledge to be transferred (Hartley et al., 1997; Krause et al., 2000; Sako, 2004; Dyer and Hatch, 2004). Moreover, there are some critical elements in supplier development that play an important role to improve supplier performance. These elements include the involvement of buyer building a perception as partners. Moreover, two-way multifunctional communication, top management interest, and building cross functional teams are most significant factors making supplier development strategies (Krause and Ellram, 1997a).

Furthermore, supplier development has an effect on financial performance indicators such as sales, ROE, total return to stakeholders, and NPV (Rosenzweig et al., 2003; Tracey, 2004; Petersen et al., 2005a). For the purpose, it is examined that supplier development has a vital impact on operational performance improvement, i.e., cost,

quality, and cycle time. Supplier development is a key factor and positively effects on buyer's performance specially in product development integration, collaborative planning and information system integration (Frohlich and Westbrook, 2002; Narasimhan and Kim, 2002; Rosenzweig et al., 2003; Droge et al., 2004; Petersen et al., 2005b; Ellram et al., 2002). Suppliers with high performance rating have strong process improvement capabilities with involvement of purchasing function and considering it with top priority (Frohlich and Westbrook, 2002; Narasimhan and Kim, 2002; Rosenzweig et al., 2003; Droge et al., 2004; Petersen et al., 2005b; Ellram et al., 2002). In the same vein, information sharing is a significant factor which foresees the competitive existence of a buyer and helps to measure the process of supplier assortment (Kannan and Tan, 2002).

Most of the firms prioritise their supplier development goals according to the delivery, order, cycle times, quality, product development, and operational capabilities (Wagner and Krause, 2009). For the purpose, companies follow an evolutionary path to increase supply base performance. They consider TQM interventions, i.e., supplier collaboration, customer requirements, cross-functional teams, measuring performance through scientific methods, and quality tools usage. Therefore, external suppliers are also much more important to be focused to conduct a supply base evaluation on the acknowledgment to develop the material quality, lower development costs, reduction in purchasing prices, and to improve the responsiveness of suppliers. Once supply base performance is assessed, companies focus on the consolidation of purchased volumes with fewer suppliers in order to eliminate suppliers incapable of meeting expectations (Krause et al., 1998).

6 Future implications

Most of the organisations hold a relationship and develop a key strategy for constant competitive achievement. In the supplier development process, buyers and suppliers need to consider the amount of investment and aligning processes and cultures to improve the supplier performance and capabilities. After the formation of buyer-supplier relationship, buyers need to realise the structure to maintain a reasonable relation with better suppliers how to develop them for long-term relations. On the other hand, suppliers need to be proactive and focused with the mutual interest and development processes of buyers.

This study elaborates the theoretical point of view for the supplier development and buyer-supplier relationship and gives only a theoretical proof. Future research should consider a comprehensive case study with the given theoretical research framework adding empirically analysis of transaction cost economics and social exchange concept. Buyer-supplier relationship analysis with variables of transaction cost and social exchange theory will help organisations to get a detailed view of supplier development and sustainability of buyer-supplier relationship. Moreover, future empirical research will help organisation to form cross-functional teams, involving top management role, checking alternative rewards and recognitions, determining the criteria to identify better suppliers and efforts towards sustaining the long-term relationship with suppliers. For the purpose, the structural factors of transaction cost economics (i.e., bilateral investments in specific assets to reduce the transaction cost and enhance the transaction value) and social factors (i.e., trustworthiness, information sharing) will be beneficial for the academia to understand the concepts of supplier development process. In fact, knowing the social factors and structural arrangements of buyer-supplier relationships that lead to reduction

of transaction costs and enhancement of transaction value will help the managers to effectively manage their buyer-supplier relationships and development.

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CRITICAL ATTRIBUTES ON SUPPLY CHAIN STRATEGY IMPLEMENTATION: CASE STUDY IN EUROPE AND ASIA

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ABSTRACT

Purpose: This case study research aims to compare the performance of the implementation of supply chain management (SCM) strategies within Asian and European Companies.

Design/methodology/approach: The case study measures company's opinions of supply chain strategy implementation through utilization of Sense and Response methodology. Critical Factor Index (CFI), Balanced Critical Factor Index (BCFI) and Scaled Critical Factor Index (SCFI) are used in this study to represent the result of comparison between European and Asian companies.

Findings: From the analysis of comparison of all Sense and Response models, it can be concluded that there are differences and similarities of critical attributes that affecting supply chain strategy implementation in Asian and European companies. There are two attributes that have consistent trend for both regions; innovation and organization structure.

Research limitations: In this research the analysis of supply chain strategy implementation was made for the needs of manufacturing industry. Suggestions for future research are multiple case studies in different industry areas in global business environment.

Practical implications: The results provide a guideline to the company to measure the right attributes for making the right decision in a dynamic environment. It also provides good knowledge for companies to implement supply chain strategies, the main approaches to implement it and the main challenges in supply chain strategy implementation.

Originality: Supply chain strategy implementation was analyzed in the European and Asian companies. This research shows that there are several developing areas for companies when implementing supply chain strategies.

KEYWORDS

Supply chain management, Sense and Respond, Strategy implementation

Introduction

Research problem

Supply chain management (SCM) is a management concept of the 2000's. It includes divisions from the management concepts of the previous decades. Many definitions for SCM have been presented. SCM has been and is still regarded as a synonym for logistics, supply and SC control. Today the broader definition determined by the

Global Supply Chain Forum is generally accepted as a norm [1, 2]:

“Supply Chain Management (SCM) is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders”

To develop supply chain and to run and operate supply chain smoothly it is extremely important to integrate supply chain strategy to the whole supply chain. Supply chain strategy is the key element of planning operational daily work. According to

preliminary research it seems that this research area is unique.

The research goal can be captured as following:

The goal is to deepen knowledge in supply chain strategy implementation in the manufacturing industry.

The research problem is presented as a question:

How to implement supply chain strategy in the manufacturing industry?

Sub question:

Is there any difference between the performance of the implementation of supply chain management in Asia and Europe?

Research paradigms

Eisenhardt (1989) defines case study research as a research strategy that aims at understanding the internal dynamic of an individual case. [3] Case study research is aiming at understanding comprehensive and relevant phenomena of real life. In that case the endeavour is to study the phenomena in their genuine context. Interface between the phenomenon and context is not often clear, which complicates the work of a researcher. [4]

Case study research is regarded as a good research method when the research problem can be described with the help of questions how and why. The method is very useful when a researcher cannot control the target. Furthermore, it is useful when the focus is on concurrent events in a real time manner especially when the border between the event and context is not clear. There are three types of case study research: explorative (seeking to find out more about a phenomenon) research, descriptive research and explanatory research. The purpose of explorative research is to obtain information regarding a phenomenon, find new ideas and possible research problems. In explorative research, already existing information is collected and sorted. The aim of descriptive research is to provide as accurate image of an individual, group, situation or phenomenon as possible. In the research the focus is not in clarifying connections between phenomena or factors interpreting behaviour, but only in describing a situation. The aim of explanatory research is to explain causal relations between phenomena and testing related hypotheses. [4]

Supply chain management

Supply Chain Operations Reference model (SCOR) which was defined in the Supply Chain Council (2005), defined a SC as follows [5]:

“The supply chain encompasses every effort involved in producing and delivering a final product, from the supplier’s supplier to the customer’s customer. Five basic processes– plan, source, make, deliver and return – broadly define these efforts, which include managing supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, and delivery to the customer.”

Supply Chain Council (2005) defined that there are four basic processes in the SC: plan, source, delivery and return. Plan refers to processes that balance aggregate demand and delivery requirements. Sources are processes that transform product to a finished state to meet planned or actual demand. Delivery is a process in which the finished goods are delivered to a customer.. Return is defined as processes associated with returning or receiving returned products. [5, 6]

SCM encompasses co-operation of various functions between suppliers and customers. Most essential divisions of SCM are those of managing business relations and managing customers. Actual competition takes place along the whole SC when companies involved in the SC have the prerequisites for competitive operations. From the point of view of the SC, moving the orders upstream or downstream does not make the aggregate more competitive. Costs are divided – with respect to the whole SC – by the price requested from the client. Logistics cannot be replaced with help of SCM, but both of the philosophies – logistics and SCM – need to be discussed in tandem with each other. [7]

According to Treville (2004), supply integration includes JIT delivery, reduction of the supplier base, evaluating suppliers based on quality and delivery performance, establishing long-term contracts with suppliers, and eliminating paperwork. Demand integration includes increased access to demand information throughout the SC to permit rapid and efficient delivery, coordinated planning, and improved logistics communication. Supply integration is integration that supports the efficient manufacture and delivery of goods. Demand integration stands for integration that supports market mediation with the primary role of demand integration being transfer of demand information to facilitate greater responsiveness to changing customer needs. [8][1]

Stevens (1989) identifies four stages of SC integration [9]:

–Baseline. Fragmented operations within an individual company. Planning very short term, almost reactive.

–Functional integration. Limited integration between adjacent functions. Focusing on the inward flow of goods. Poor visibility of real customer demand.

–Internal integration. Involves integrating the aspects of the SC that are directly under the control of the company.

–External integration. The scope of integration is extended outside the company to embrace suppliers and customers.

The definition of SC integration best acknowledged by its researchers is the following [1, 7]: Supply chain integration is process integration upstream and downstream in the supply chain

Lee (2000) divides SC integration into three dimensions: information integration, coordination as well as resource sharing and organisational relationship linkage. Thus, three main aspects in integration seem to be information integration, organisational or relationship integration and process integration.[10]

Case description

The case could be described as a one specific supply chain in a global engineering business. One of the key sub assemblies of case company's products are managed by case supply chain. Product is ready assembly subassembly which consists of steel structure and components. The products are tailor-made and every product is customized according customers' needs.

Supply chain is organized globally so that there are three region based supply chains: Europe, APAC and America. In every region there are production locations which are serving supply chain. Production units are joint ventures, own units and also suppliers. The one important characteristic is that the cooperation is extremely deep with the production unit's in whole supply chain. Every production units are managed like own operations, because of before this operations was part of case company own operations.

The interview was done together with the case company's management of the supply chain and with supplier's management. Interviews were done with the supplier's managers to evaluate the case suppliers and with the case suppliers' management's.

Data Collection Method and Data Analysis

This study aims to compare the performance of the implementation of supply chain management within two groups of company namely Asian companies and European Companies. There were five respondents represent each group. The interest is to seek for possible similarities of critical attributes to be focus on for improvement. The study also attempted to see possible trend in the implementation of supply chain management (SCM) among both group.

This part presents results of a comparative study that measures organization's opinions regarding business performance from a supply chain management's point of view through utilization of Sense and Response methodology. There are three models used; CFI, BCFI and SCFI to portray the result of comparison between the two groups. Each attribute in the questionnaires is evaluated on how well each attribute have been carried out in their companies, how they see themselves compared to their competitors, and how they see each attribute developing compared to the situation 1 to 2 years before.

Questionnaire

Data collection instrument used for data collection is questionnaire. The questionnaire contains 36 attributes which divided into three main categories: SCM strategy themes/approaches, SCM strategy implementation and challenges in SCM strategy implementation. The following table shows the list of all attributes measured in each category.

Table 1. List of Attributes in Each Category

SCM strategy themes / approaches	
1	Deeper cooperation with selected suppliers
2	Outsourcing own manufacturing to suppliers
3	Innovations
4	Early involvement in development, (with suppliers)
5	Low number of suppliers
6	Cost efficiency supply chain
7	Managing supply chain information
8	Quality development in whole supply chain
9	Supplier development in the supply chain
10	Production flexibility
11	Lean
12	Agile
13	Punctuality

SCM strategy implementation factors	
14	Competency of Organizational Members
15	Implementation Plan
16	Organization Structure
17	Organizational Culture
18	Implementation Leadership
19	Strategy Communication
20	Monitoring, Control & Evaluation
21	Strategy Commitment
22	Strategy
23	Achieving Visible Results
24	Training & Education
25	External Consultants
26	Rewarding Implementation Performance
Challenges in SCM strategy implementation	
27	Strategy formulation
28	Environmental uncertainty
29	Organizational structure
30	Organizational culture
31	Communication
32	Resources allocation
33	Leadership power
34	Awareness of strategy
35	Commitment to strategy
36	Monitoring and development of implementation

There are a total of 9 indices needed for all three models which can be obtained from the data collected. In order to calculate all indices, each attribute evaluated through five approaches. The first approach is expectation. In a scale of 1 to 10 which represent lowest to highest expectation; each respondent has to assess the way the attribute expected to perform in the next one to two years. Second approach is experience. As the first approach, experience is measured in a scale of 1 to 10 from lowest level to highest level as according to their experience on performance in the past one to two years.

Third and fourth approaches are direction of development for future and past. Direction of development for future refers to the prediction of development trend for each attribute in the next three years. The prediction is based from company's performance in the past two years. On the other hand, direction of development for past is refers to evaluation of current performance of each attribute as according to their one to two years performance. Each respondent has to determine whether the direction of development for both future and past is worst, same or better.

Next approach is to compare the situation of each attribute towards their competitor. Same as the third and fourth approaches, each respondent also has to determine whether the current performance of each attribute is worst, same or better as compared to their competitor.

Table 2. The design of questionnaire

Attribute	Scale: 1=low, 10 = high		Direction of development, expectations (future)			Direction of development, experiences (past)			Competitor			
	Expectations (1-10)	Experience (1-10)	Worse	Same	Better	Worse	Same	Better	Worse	Same	Better	
Attribute 1												

Figures Balanced Score Cards (Average of Expectation)

Firstly, the analysis of similarities of attribute to be improved in the future was conducted. As mentioned before, expectation and experience of each attribute was measured in a scale of 1 to 10. The average value for expectation and experience was calculated and presented in a form of bar chart for each group.

According to the analysis, each attribute has more average of expectation value rather than average of experience. The attributes to be improved is determine through the biggest gap value between average of expectation and average of experience. The result demonstrates that both group felt they should improve the performance of “*cost efficiency of supply chain*” and “*lean*”. From the calculation, the gap value is found bigger in Asian group with a value of 2.8 and 2.4 compared to European group with a value of 1.8 and 1.6 respectively for each attribute. It implies the need for improvement is higher in Asian group than European group.

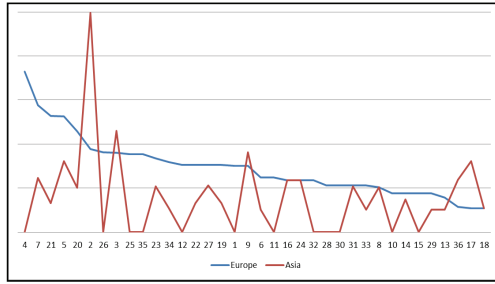


Fig. 1. Variation of expectation for both regions.

Figure 1 shows variation of expectation from Europe and Asia companies. The attributes were sorted from the highest to smallest value of Europe companies. The number in the graph can be refer in Table 1. The top three attributes that has the biggest gap between Asian and European companies are “Rewarding Implementation Performance”, “Strategy Commitment” and “Early involvement in development, (with suppliers)”.

Takala and Ranta (2007) have introduced critical factor index (CFI) into the operative management system to steer sense and respond (S&R) theory. Critical attribute that may support business decision making process could be identify, interpret and evaluate.[11] The following model, BCFI, was developed by Nadler and Takala (2010) by taking the principle of CFI theory into consideration.[12] Later, Liu, et al., (2011) developed the SCFI model that accurately models the S&R theory.[13]

The following equations are used in the calculations of CFI, BCFI and SCFI models (1)-(9).

$$Importance\ index = \frac{Average\ of\ expectation}{10} \tag{1}$$

$$Gap\ index = \frac{Average\ of\ expectation - Average\ of\ experience}{10} - 1 \tag{2}$$

$$Development\ index = |(better - worse) * 0.9 - 1| \tag{3}$$

$$Performance\ index = \frac{Average\ of\ experience}{10} \tag{4}$$

The equations of CFI, BCFI and SCFI models are listed as follows:

$$CFI = \frac{std\{experience\} * std\{expectation\}}{Importance\ index * Gap\ index * Development\ index} - 1 \tag{5}$$

$$SD\ expectation\ index = \frac{std\{expectation\}}{10} + 1 \tag{6}$$

$$SD\ experience\ index = \frac{std\{experience\}}{10} + 1 \tag{7}$$

$$BCFI = \frac{SD\ expectation\ index * SD\ experience\ index * Performance\ index}{Importance\ index * Gap\ index * Development\ index} - 1 \tag{8}$$

$$SCFI = \frac{\sqrt{\frac{1}{n} \sum_{i=1}^n (experience(i) - 1)^2} * \sqrt{\frac{1}{n} \sum_{i=1}^n (expectation(i) - 10)^2} * Performance\ index}{Importance\ index * Gap\ index * Development\ index} \tag{9}$$

Critical Factor Index (CFI)

According to Takala and Ranta (2007), CFI is a measurement tool to determine the level of criticalness of an attribute towards business performance based from employees, customers and business partners’ evaluation.[11] The level of criticalness can be grouped into three categories; most critical, soon to be critical or non-critical.

There are upper and lower limits that determine whether an attribute is in a range of critical, soon to be critical or non-critical. Initially, the average level has to be calculated. If an attribute falls within the range of 1/3 (lower limit) and 2/3 (upper limit) of the average level, it indicates that the attribute is non-critical. However, if the attribute falls lower than 1/3 of the average level, it is considered critical. Whilst, if the attribute falls upper than 2/3 it means that the attribute is soon to be critical [13]. The following table shows the value of each indicator for this study.

Table 3. Calculated Indicator for the Models

Item	Formula
Average level	$\frac{100\%}{36\ attributes} = 2.78\%$
Lower limit	$2.78\% + 0.92\% = 3.7\%$
Upper limit	$2.78\% - 0.92\% = 1.9\%$

The researchers have calculated the data results of CFI for both groups; Asian and European. The results are presented by future, past and evaluation towards competitor data. Results of the survey are indicated by “Traffic light bars”. Red, yellow and green bars indicate the status of each attribute. Most critical attribute will be indicated by red color. This is follows with yellow which indicate the attribute that may become critical in the nearest future. The

best one is green that are considered non-critical at the moment.

However, the results of the study are going to be presented in a table form as follows.

Table 4. Summary of Calculated CFI for both Future, Past and Competitor Data

Period	Critical Attributes	Soon to be Critical Attributes
Future	Competency of organizational members Monitoring, control and evaluation Communication Leadership power	Innovations Organization structure
Past	Innovations Quality development in whole supply chain Supplier development in the supply chain Punctuality Competency of Organizational Members Implementation leadership Monitoring, control and evaluation Implementation leadership Monitoring, control and evaluation Strategy formulation Communication Leadership power	-
Competitor	Quality development in whole supply chain Punctuality Competency of Organizational Members Implementation Leadership Monitoring, Control & Evaluation Training & Education Organizational structure Leadership power	-

Table 4 summarizes the result of CFI for both future, past and competitor data. For future data, there are four critical attributes and two potentially critical attributes matched between both groups. However, the number of critical attributes increased with eight additional attributes for past data. Past data does not have any potentially critical attributes. The four attribute that matched between both future and past data are “Competency of organizational members”, “Monitoring, control and evaluation”, “Communication” and “Leadership power”. According to the CFI calculation, these attributes are considered critical to be improved at the moment by both groups.

On the other hand, there are eight matches of critical attributes to be focus on towards their competitor. Three out of four attributes matched with

the internal critical attribute which are “Competency of organizational members”, “Monitoring, control and evaluation” and “Leadership power”

As previous studies done by Liu and Takala (2012) and Hassan Nikookar et. al (2012), there are a number of attributes resulted “0” index values which does not indicate anything from the real situation. This is the main disadvantage of CFI model due to the “0” standard deviation that commonly occur during data collection.[14,15] Nevertheless, Nadler and Takala (2010) has developed Balanced Critical Factor Index (BCFI) model which solved the problem encountered by CFI model.[12] The developer of BCFI has manually added “1” to the standard deviation of expectation and experience which has forced the minimal standard deviation becoming “1” to avoid “0” standard deviation.

Balanced Critical Factor Index (BCFI)

According to Toshev, R. et. al (2012), BCFI detects the most critical factors affecting the overall company’s performance much more properly and reliably.[16] BCFI is using the same judgment concept as CFI. The calculated indicator in CFI is also used BCFI model to determine the status of criticalness of each attribute. The following figures represent the calculated data results of BCFI for both groups; Asian and European and towards their competitor.

Table 5 summarizes the calculated result of BCFI for both future and past data of Asian and European groups.

Table 5. Summary of Calculated BCFI for Future, Past and Competitor Data

Period	Critical Attributes (Red)	Potentially Critical Attributes (Yellow)
Future	Early involvement in development (with suppliers) Cost efficiency supply chain Production flexibility Implementation plan Strategy communication External consultants Strategy formulation Environmental uncertainty Communication Leadership power	Outsourcing own manufacturing to suppliers Organization structure Achieving visible results Training and education Commitment to strategy
Past	Deeper cooperation with selected suppliers Innovations Low number of suppliers Cost efficiency supply chain Quality development in	-

	whole supply chain Supplier Development in the supply chain Agile Punctuality Competency of Organizational Members Implementation leadership Strategy communication Monitoring, control and evaluation Strategy commitment Achieving visible results External consultants Environmental uncertainty Organizational culture Communication Resources allocation Leadership power Awareness of strategy Commitment to strategy	-
Compe titor	Innovations Early involvement in development, (with suppliers) Low number of suppliers Cost efficiency supply chain Quality development in whole supply chain Production flexibility Lean Agile Punctuality Competency of Organizational Members Implementation plan Implementation leadership Strategy commitment External consultants Organizational structure	-

According to the table, there are 10 critical attributes matched between both groups. This exceeds the amount of critical attributes generated by CFI model. In CFI model, the same attributes generated as well from future to past data. However, in BCFI model there are a few attributes which appear in future data but does not appear in the list of critical attributes in past data. Only two critical attribute matched between future and past data, “*cost efficiency supply chain*” and “*external consultants*” which are also matched for comparison towards competitor.

Scaled Critical Factor Index (SCFI)

The third model derived from BCFI is SCFI. SCFI which was developed by Takala, et. al, (2011) adds trend research to the study. According to Liu, Y. and Takala, J. (2012), SCFI is more sensitive to dynamic environment changes compared to

BCFI.[14] Therefore, SCFI generates more accurate result than BCFI in small sample size case study.

From all SCFI graphs, it can be seen that there are no critical attribute generated by the SCFI model. Almost all attribute considered as potentially to become critical in the nearest future except for a few attributes which are non-critical for the time being.

Comparison for All Models

Each attribute have to be analyzed individually to see the consistency of result from all S&R models. The result for each attribute of past and future values for both Asia and Europe companies are compared to see the trend of changes; either better or worse. Afterward, the trends are compared between all three models to see the consistency of the changes.

The following table demonstrates the way to evaluate the changes of each attribute’s value from past to future.

Table 6. The assessment of attribute changes from past to future (Liu et al, 2011)

Past Value	Future Value	Assessment
Good	Good	No change / "-"
Good	Other	Worse
Other	Good	Better
Potentially Critical	Potentially Critical	Better
Critical	Critical	Worse
Potentially Critical	Lower	Better
Critical	Higher	Better
Potentially Critical	Higher	Worse
Under resourced	Lower	Worse

Table in appendixes depicts the comparison results between past and future values for both Asia and Europe companies by using S&R models. The results with consistent trend are marked normally while the inconsistent results are marked with darker shading.

Table 7 lists the attribute that shares similar result which is ‘better’ in all S&R models; CFI, BCFI and SCFI accordingly to Asia and Europe companies. From the list it can be seen that ‘innovation’ and ‘organization structure’ have a consistent result for both region.

Table 7. List of attribute that share similar trend for all model

Asia	Europe
Outsourcing own manufacturing to suppliers	Innovations
Innovations	Organization structure
Managing supply chain information	Strategy
Quality development in whole supply chain	Achieving visible results
Supplier development in the supply chain	Organizational structure
Punctuality	Organizational culture
Organization structure	
Organizational culture	
Implementation leadership	

Conclusions

This paper aims to compare the performance of the implementation of supply chain management within two groups of company namely Asian companies and European companies. The interest is to gain insight for possible similarities and differences of critical attributes to help decision makers to make adaptive adjustments on operations strategy in dynamic business environment of Asia and Europe. Each model generates different critical attributes. However, as supported by past research, results which are yielded by SCFI model are more accurate than others. According to SCFI model, there are no critical attribute at the moment for both Asian and European companies. The trend indicates positive changes from expectation to experience values. However, almost 95 percentages of all attributes are potentially to be critical in the future. From the analysis of comparison of all S&R models, it can be concluded that there are differences and similarities of critical attributes that affecting supply chain strategy implementation in Asian and European companies. This is understandable as different environments have different point of view. There are two attributes that have consistent trend for both regions; innovation and organization structure.

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Appendixes

The comparison results between past and future values for both Asia and Europe companies by using S&R models

Attributes	Past CFI Asia			Future CFI Asia			Past CFI Europe			Future CFI Europe			Past BCFI Asia			Future BCFI Asia			Past BCFI Europe			Future BCFI Europe			Past SCFI Asia			Future SCFI Asia			Past SCFI Europe			Future SCFI Europe			Trend
	Trend	Value	Value	Trend	Value	Value	Trend	Value	Value	Trend	Value	Value	Trend	Value	Value	Trend	Value	Value	Trend	Value	Value	Trend	Value	Value	Trend	Value	Value	Trend	Value	Value	Trend	Value	Value				
Deeper cooperation with selected suppliers	-																																				
Outsourcing own manufacturing to suppliers	PC																																				
Innovations (early involvement in development, with suppliers)	C																																				
Low number of suppliers	C																																				
Cost efficiency supply chain	-																																				
Managing supply chain information	C																																				
Quality development in whole supply chain	C																																				
Supplier development in the supply chain	C																																				
Production flexibility	-																																				
Lean	-																																				
Agile	-																																				
Punctuality	C																																				
Competency of Organizational Members	C																																				
Implementation Plan	-																																				
Organization Structure	C																																				
Organizational Culture	C																																				
Implementation Leadership	C																																				
Strategy Communication	C																																				
Monitoring, Control & Evaluation	C																																				
Strategy Commitment	C																																				
Achieving Visible Results	-																																				
Training & Education	C																																				
External Consultants	-																																				
Rewarding Implementation Performance	-																																				
Strategy formulation	C																																				

Management and Production Engineering Review

Environmental uncertainty	-	-	-	-	C	-	Worse	C	C	Worse	C	Worse	C	Worse	PC	Better	PC	Better	PC	Better
Organizational structure	C	C	Worse	PC	PC	PC	Better	C	C	Worse	PC	Better	PC	PC	PC	Better	PC	PC	PC	Better
Organizational culture	-	-	-	C	PC	PC	Better	C	C	Worse	C	Better	PC	PC	PC	Better	PC	PC	PC	Better
Communication	C	C	Worse	C	C	C	Worse	C	C	Worse	C	Worse	C	PC	PC	Better	PC	Good	PC	Better
Resources allocation	-	-	-	C	C	C	Worse	C	PC	Better	C	Worse	PC	PC	PC	Better	PC	PC	PC	Better
Leadership power	C	C	Worse	C	C	C	Worse	C	C	Worse	C	Worse	C	PC	PC	Better	PC	PC	PC	Better
Awareness of strategy	-	-	-	Good	Good	Good	-	C	PC	Better	C	Worse	PC	PC	PC	Better	PC	PC	PC	Better
Commitment to strategy	-	-	-	Good	Good	PC	Worse	C	PC	Better	C	Worse	PC	PC	PC	Better	PC	PC	PC	Better
Monitoring and development of implementation	Good	C	Worse	C	PC	PC	Worse	PC	C	Worse	C	Better	PC	PC	PC	Better	PC	PC	PC	Better

Indicator: PC=Potentially Critical (yellow), C=Critical (red), '-'=No change

Developing the Elements of Information Integration in the Real Estate and User Services

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Purpose: The service supply chain is managed with information and therefore the functionality of the flow of information is an essential part of service business. The aim of this study is to address this issue by looking into the meaning and development of the elements of information integration in real estate and user services. The purpose of the study is to formulate a model for the information integration development.

Design/Methodology/approach: This paper is a qualitative research into elements of information integration and developing them in real estate and user services. Collecting the data for the study consisted of three stages: a workshop and two rounds of interviews.

Findings: The finding of the study is a model for developing information integration in a real estate and user services. The model presents the meanings of the six elements which integration consists of and which need to be developed in order to increase information integration

Limitations: In services, the supply chain is typically shorter than in production. This study is limited to analyse the supply chain between a customer and a service provider since these are the most significant and often the only parties in the supply chain of real estate and user services.

Practical implications: The results can be utilized when developing information integration in the service supply chain and developing service providers operations.

Originality/Value: The research results bring additional value to the previous studies regarding elements of information integration by developing a model for the sequence of development of these elements.

1 Introduction

Integrating a supply chain is an essential part of improving the performance of a supply chain (SC). Information integration lays a foundation on an extensive integration of a SC and is an essential part of a service SC. (Krause 1999, Sriram, Stump 2004) Information integration is the sharing of essential data or information between the parties involved in production (Lee, Whang 2000). Information integration is the foundation of integration, and it becomes emphasized in the service sector (Lee 2000). With the help of information integration the parties get easier access to the information required, are better able to understand the needs of customers and are able to reduce lead times more than their competitors do (Sezen 2008).

All decision-making is based on information. Information flow is critical e.g. in identifying demand, distributing information and receiving feedback (Krause 1999, Sriram, Stump 2004). With the help of information integration the parties get easier access to the information required, are better able to understand the needs of customers and are able to reduce lead times more than their competitors do

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(Sezen 2008). Therefore information has to be available to the parties from the first stages of planning until the very end of the life cycle. Sharing information among the parties of a SC has a positive effect on the product or services provided to a customer. (Krause 1999, Sriram, Stump 2004)

The previous studies on integrating a SC have had their emphasis on production. In the service sector, on the other hand, SC centres on flows of information as well as the relationship between a service provider and a customer. The special characteristic of service sector SC is that the SC is bidirectional. In other words, a customer, apart from being a customer, is also one of the parties of the SC as well as a provider of input to the service process. (Sampson 2000)

This research focus on Real Estate and User services. Real Estate services are services focused on maintenance of properties. They can be further divided into real estate management services and repairs and replacements services. Real estate management is regular action having to do with maintenance – action with the help of which the conditions of a property are retained at a desired level. Repairs and replacements is action relating to maintenance of a property. It is retaining properties of a given building or facility by replacing or repairing faulty and worn out components without substantially altering the relative quality standard of the building or facility. User services are defined as services aimed at the users of a property, its facilities and their facilities. (Rakli 2012)

Real Estate and User services are mainly produced in the customer's premises and therefore the interface between a customer and a service provider is extensive (Nikander et al. 2007). Real Estates and customers' needs are different and therefore Real Estate and User services have to be planned in a property-specific manner. This increases the importance of long-term customer relationships. (Sillanpää, Junnonen 2012)

Information integration increases possibilities to react to sudden changes in the unstable demand environment (Lee, Whang 2000). Information integration between the parties improves productivity, customer service and comprehensive performance in the market as well as coordination (Frohlich, Westbrook 2001, Frohlich, Westbrook 2002, Sengupta, Heiser & Cook 2006). Furthermore, it reduces storage costs and makes the chain more effective (Lee 2000). Information integration has also a great deal of significance when carrying out coordination between organizations and establishing co-operation relationships (Lee 2000, Zeng, Pathak 2003, Ganesh, Raghunathan & Rajendran 2008).

Information has a major role in service management in Real Estate and User Services and therefore the functionality of information integration plays a key role in the success of a service process as well as in producing services which meet customers' (Sillanpää, Junnonen 2012). Sharing information among various parties has a significant positive effect on operative performance (rate, production and quality). In the service sector, a supplier's ability to adapt services or products according to the customer's wishes – and to do this better than competitors – has greater impact on performance than in industry (Sengupta, Heiser & Cook 2006).

This study aims to address the problems of information integration development by looking into the elements of information integration and the sequence of development of these elements with Real Estate and User services as a case. Previous researches of information integration have mainly focused on the elements of information integration (Uusipaavaliemi 2009), performance of information integration (Sriram, Stump 2004, Carr, Kaynak 2007, Fabbe-Costes, Jahre 2007, Paulraj, Chen & Flynn 2006, Sanders 2007) and the value of information integration (Lee 2000, Ganesh, Raghunathan & Rajendran 2008). This

study provides a new viewpoint of the information integration and develops the previous research forward by looking the sequences of the element of information integration.

2 The elements of information integration

2.1 Elements of information integration

Information integration is about sharing information and knowledge between the parties involved in SC. Furthermore, it encompasses planning, prediction and improving functions in co-operation. Information integration comprises exchanging both information and knowledge between the parties. The parties share information related to demand, stock status, plans regarding capacity, production schedules, promotion plans, and predicting demand and transport schedules, thus improving the functionality of the entire chain. (Lee 2000, Berente, Vandenbosch & Aubert 2009, van der Vaart, van Donk 2008)

There are six aspects that are to be taken into consideration when developing information integration in the SC: processes and activities, information technology, information attributes, information sharing practices, collaborative foundation and time-related aspects of integration (Table 1) (Uusipaavaliemi 2009).

Table 1. Elements of information integration (Uusipaavaliemi 2009).

Element	Definition	Contents/Operationalisation
Processes and activities	The extent of process integration and the scope of information sharing in the processes.	Process coverage of information sharing Degree of process integration
Information technology use	The extent of information technology use and technology integration in the supply chain information sharing.	Information systems coverage Information systems integration
Information attributes	The characteristics of information to be shared in a supply chain.	Information form Information quality Information availability
Information sharing practises	The extent (volume) of information sharing and frequency of activities undertaken to advance information sharing in a supply chain.	The coverage (extent) of information sharing practices The frequency of communication / interaction
Collaborative foundation	Status of the relationship issues and practices underpinning the collaborations and thus integration in a supply chain.	Shared goals Shared resources Trust Commitment Performance measurement
Time-related issues	The speed and timelessness in information integration	Timing of information sharing Information lead-time

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Pinning down the factors that have to do with information integration facilitates identifying information integration-related obstacles and improves the flow of information. Furthermore, understanding these factors facilitates sharing of high-quality information between the parties. These elements related to information integration are covered in more detail in the following.

Processes and activities

The processes and activities implies integration of inter-party processes as well as information sharing between processes (Uusipaavalniemi 2009). Process point of view focuses on inter-organizational processes rather than functional units and departments of organizations (Trkman et al. 2007). Process integration studies functions of all parties and thus enables the organizations to function as an ensemble in order to achieve a shared goal. Process integration enables improving co-operation, coordination and communication between organizations. Thus it helps in incorporating the functions related to information, resources, applications and people, thereby facilitating the flow of material, information as well as controlling in the entire business environment. (Tang 2004)

In integrating business processes, promoting timeliness, usability, granularity and transparency is essential. Usability implies the easy accessibility of information for functions whereas timeliness implies information being available when it is needed. Transparency secures intelligibility of information and granularity shows that information is at the correct level of detail. (Berente, Vandenbosch & Aubert 2009, Trkman et al. 2007)

Information technology use

Information technology use stands for scope of both information technology used in SC information integration and technology integration and it encompasses data systems and their integration (Uusipaavalniemi 2009). Data system integration aims at providing continuous information support throughout an organization so that the organization is able to overcome the variable challenges of market (Bhatt 2000). Internal information sharing has to be in order before starting to share information externally among the parties of the SC. Data system integration can be understood as a multidimensional phenomenon which consists of two interrelated dimensions: data integration and integration of communication networks. (Narasimhan, Kim 2001)

It is impossible to establish an efficient SC without information technology. Information technology reduces uncertainty because it helps in sharing information with dispatch among the parties of the entire SC and thus upgrades availability and accuracy of information. Developing a web-based platform enables a higher level of communication between organizations. Therefore, improving information flow and creating seamless integration in the totality of the SC is important. (Sanders 2007, Gunasekaran, Ngai 2004, Devaraj, Krajewski & Wei 2007, Thun 2010)

Information systems have been divided into four different levels (Cardellino, Finch 2006):

1. Operational-level systems support operational management by following up an organization's basic functions and costs. The function of these systems is to answer day-to-day questions and follow the organization's transaction flow. This information has to be easily accessible, up-to-date and correct.

2. Information-level systems support knowledge workers. The purpose of these systems is to assist business by finding, organizing and integrating new information into business as well as to help the organization deal with any amount of paper documents.
3. Management-level systems are designed to service mid-level management. The facilities of these systems are related to monitoring, controlling, decision making and administrative functions.
4. Strategic-level systems help senior management to tackle and concentrate on strategic issues and long-term trends both inside the organization and its external environment. The most important function of these systems is to match the existing capacity of the organization to changes in the external environment.

The emergence of IT in customer relationships changes not merely the physical communication devices but also the amount and depth of the information exchanged outcome and thus involving IT affects the climate of the entire customer relationship (Leek, Turnbull & Naude 2003). Studies show that when moving from face-to-face communication to IT, the communication between parties becomes psychologically distant, impersonal, more task-oriented and less spontaneous (Rutter, Rutter 1984).

Information attributes

Information attributes encompass the characteristics of the information shared in a SC, such as information form, quality and availability (Uusipaavalniemi 2009). Information form describes the mode and medium of shared or conveyed or what is the medium with which information is made available (Freiden et al. 1998). Therefore, information form describes how information is spread and how it is accessed. Information form can be divided into four categories (Uusipaavalniemi 2009, Minkus, Nobs 2006):

- data and information in a database, information stored in data systems and local databases.
- documents shared in electronic form; locally stored information or information which is shared on network drives or by e-mail.
- paper-based documents; information exchanged by handing it out personally or by fax and e-mail.
- information distributed in an informal manner; information shared through informal contacts such as through telephone, meetings, e-mail or conversations.

Quality of information includes the following points of view: accuracy, timeliness, suitability and credibility (Monczka et al. 1998a, Monczka et al. 1998b). Sharing information among the parties of an SC improves performance of the chain and therefore it has to be considered which information is shared as well as when, how and to whom it is shared (Holmberg 2000).

Information sharing practices

The information sharing practices has to do with the functions which have to be put into operation in order for information sharing in an SC to be efficient. Information sharing practices encompass extend of information sharing practices as well as the frequency of interaction. (Uusipaavalniemi 2009)

The communication channels an organization uses to interact with its customers can be divided into two main categories: traditional and advanced means of communication. The traditional communication channels are telephone, fax, e-mail, written documents and face-to-face contacts. Advanced means of

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communication are related to inter-computer connections, EDI connections and ERP connections. (Carr, Kaynak 2007) Advanced means of communication do not replace face-to-face conversations, but offer more possibilities for sharing information (Wognum, Fisscher & Weenink 2002). Furthermore, advanced technologies have an effect on the frequency of information (Sriram, Stump 2004).

A great deal of varied technical, commercial and organizational information is exchanged between companies. The nature of exchanged information defines the channel of communication used. Independent channel is used when exchanging technical or commercial information. Individual communication channel is used for softer information such as information regarding use of the product, status of contracts, basic details of the parties, etc. The way an organization communicates affects customer relationships. (Leek, Turnbull & Naude 2003)

Collaborative foundation

Collaborative foundation encompasses issues related to the status of co-operation relationship as well as present practices with which to feed co-operation and thus increase SC integration. It includes common goals, shared resources, confidence and commitment as well as performance measurement. Collaborative foundation is related to the scope in which the parties commit to the planning of co-operation and setting of goals. (Uusipaavaliemi 2009)

Co-operation has been defined in several studies as a key issue of SC integration and often investing in management of information flow is considered to be unsuccessful should there not be a fundamental co-operation relationship among the parties of the SC. (Sanders 2007, Ritchie, Brindley 2007, Stank, Keller & Daugherty 2001, Pagell 2004)

The choice of a channel of communication affects the quality of co-operation relationship. Building up confidence is a social process which has been based on face-to-face interaction between personnel of organizations. It is possible that the emergence of new technology has decreased the amount of face-to-face interaction, led to task-orientated job descriptions, done away with compromises and personal interaction and thus diminished trust. (Leek, Turnbull & Naude 2003) Even though more developed means of communication are useful as well, previous studies show that traditional means of communication are more profitable in sharing information between organizations (Carr, Kaynak 2007, Carr, Kaynak 2007, Leek, Turnbull & Naude 2003).

Time-related issues

Time-related issues imply speed and timeliness in information sharing. This encompasses timing of information sharing and information lead time. Time is a key quantity in measuring SC performance and it has to be taken into account also in information integration. (Uusipaavaliemi 2009)

3 Research method

3.1 The nature of the study

This study is a qualitative research regarding the elements of information integration and their meaning and sequence of development in an SC of Real Estate and user services. This study defines the meaning of these elements in Real Estate and User services and a sequence of development for these elements. The research problem can be stated in the form of the following questions:

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- What are the elements of information integration in a service SC? How these elements are shown in Real Estate and User Services?
- In which order are these elements to be developed when integrating information in Real Estate and User Services?

The study was conducted as a case study research, which has been widely used in industrial economics. Case study research is a research strategy that aims at understanding the internal dynamics of an individual case. Case study research method was deemed suitable for this research problem, since with the help of case study research method it is possible to explain complex social events, such as organizational processes and problems of an industry. In addition, case study research aims at understanding comprehensive and relevant phenomena of real life. (Eisenhardt 1989, Yin 2009)

Case study research is regarded as a valid research method when the research problem can be described with the help of questions how and why. The method is very useful when a researcher cannot control the target. Furthermore, it is useful when the focus is on concurrent events in a real time manner especially when the border between the event and context is not clear. (Eisenhardt 1989, Yin 2009)

3.2 Data collecting and data analysis

In case study research, the data can be collected using various means. The six most used and most important means to obtain data for case studies are the following: documents, archives, interviews, direct observations, participatory observations and items / devices. In case study research, the researcher has an opportunity to change or even add data collection methods during the study.

Collecting data for the study consisted of three stages: a workshop and two rounds of interviews. The themes of data collection encompassed surveying the needs for information and the current practices of flow of information as well as of significance and development of information integration related elements in the SC of facilities services and user services.

The workshop had its emphasis on recognizing the information needs of customers. Participants of the workshop were people who specialized in various tasks in service organizations: service managers, controllers, salespersons and IT managers. This ensured a wide perspective of the information needs of customers. In the workshop, the information needs of customers per a given service were reflected upon in small groups.

The first round of interviews concentrated on analysing the information needs which came up in the workshop as well as prioritizing these information needs and understanding the present situation of information flow. Both service providers and customers were interviewed to get a mutual view. The aim of the first round of interviews was to recognize the customers' needs relating to facilities services and user services as well as understanding the present situation of information flow between service provider and customer in facilities services and user services.

The aim of the second round of interviews was to test elements of information integration in facilities services and user services as well as to decide the sequence of development of these elements. The elements were tested in four customer relationships by interviewing both the service provider and the customer. The interviews were divided into three themes: information related to facilities services and user services, information distribution channels and developing flow of information.

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All interviews were recorded and transcribed to make analysis easier. The analysis of the interviews was divided into three levels. The first level included the identification of the board themes and used the words of the interviewed person. The second level developed further the broad themes and the text was reformulated towards a more theoretical direction. The third level constructed a model by looking at similarities between different interviews.

3.3 Case description

The Case of this study is Real Estate and user services in Finland. Real Estate and user services are the integration and alignment of the non-core services, including those relating to premises, required to operate and maintain a business to fully support the core objectives of the organisation. (Tucker, Pitt 2009) Real Estate and user services are applicable to all organisations since it relates to the uses of space in a workplace and it plays a supporting or in enhancing the performance of a firm. (Noor, Pitt 2009)

The central parties in real estate and user services are user, owner of real estate and service provider. It is, however, difficult to define both the exact roles of the parties and their interrelationship, since they differ from one situation to another. The owner of a real estate is the person or company with title to the property or to part of the property. Owners can be divided into two types: owner-users and owner/investors. Owner users use the property for their core business, whereas owner/investors have invested in the property and want profit from this investment. Thus the owners can be both customers and suppliers for the real estate and user services.

A user is a person, an organization or a commonwealth which acts in the premises either as a tenant or an owner. Furthermore, the customers who use premises of an organization or a commonwealth are users as well. Users have two roles, especially in user services: they are users of the services and they participate in producing the services. The role of users in facilities services, however, is secondary, because facilities services focus primarily on maintaining the technical condition of a property.

Service providers are organizations which deliver various services that meet the needs of users, customers and owners of real estates. Customer's wishes and the value creation process are of great significance when a service provider is creating an organization's strategic perspective. A service provider has to recognize the long-term needs and wishes of the customers. Furthermore, a service provider has to be able to offer its customers a comprehensive supply of services instead of mere value included in the technical settlement of a product or service. Comprehensive supply of services may include, amongst other things, delivery, installation, repair, maintenance, tuning and information regarding the best methods of usage. In order to obtain a comprehensive supply of services, a service provider often has to co-operate with organizations producing various services.

4 Findings

4.1 Elements of information integration in Real Estate and User Services

Processes and activities

Real estate and user services are services that mostly support customer's core business and in that way affect customer's business processes. Real estate and user services are produced mostly in customer's space and that is why customer's and service provider's business processes connect in a concrete way. Real

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estate and user services increase capital value, enhance marketing and sales, increase innovations, employee's satisfaction, productive of the work, flexible and help cost controlling. (Lindholm 2008)

Customer's business area and strategy affect how remarkable real estate and user services are for customers. The information received from real estate and user services give added value for core business and support corporate to get their strategy goals. The SC of real estate and user services are usually short, because service providers use their own organizations and resources to produce services.

Information Technology use

Customers and service providers use lots of different and separated information systems. There is paid little attention to the information needs of different business level in the information systems, they are created more universal systems. The information systems of customers are typically maintenance system, space controlling system, finance controlling systems, enterprise resource planning and energy consumption system. The information systems of service provider are typically related to service production, like help desk and customer controlling systems, but they also have different business controlling systems.

The maintenance system is the most development and widespread system. Some customer's maintenance systems are integrated into the service provider's systems, like help desk, but the integrations between service provider's and customer's systems are not common, although it is seen important. The maintenance book is legal to every building in Finland and that have helped its development.

The use of information systems has customer's market in real estate and user sector. Customers choose the systems they use and service providers should be content with that. Customers want to manage their real estate and user services. To own these systems makes customer independent of service provider and makes possible to change service provider if necessary. In addition, customers can use same systems for long time.

The development and scope of information systems are related to customers' organizations information technology culture. The more positively they concern to information systems the wider is the information system use. In addition, the more important role of real estate are for core business the more the customer are willing to invest in the information systems of real estate and user services.

Information attributes

There are huge amount of information and data transferring in facilities and user services. The correct information is needed, but the knowledge how to utilize the information is lacking. Therefore there is a need to invest the quality of information instead of the quantity of the information, information sharing and that the relevant information is offered. Service provider and customer have partly different information needs. Service provider easily thinks that if customer don't need some information, it will be unnecessary also for the service provider.

The quantity of the information is not the most important thing, but the relevant information should be collected from the information flow. When sending information it should be investigated what is the relevant and usefulness information for the receiver. Service provider should be able to create data from provided service, which serve the information needs of customer in a strategic, tactic and operational organization level. In the operational level information is related to day to day issues, tactical level the information is more consolidated but there is also a need to go deeper into the information sources. For

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the strategic level the relevant information should be consolidated and the information should be visualized and presented as overview. That is why the information for strategic levels is presented as a summary or an overview which is supporting the strategic decision making.

In technical services information needs are focused into quality measures, to secure quality, financial measures and statistic related to service produced. In user services the focus of the information is related to quality and cooperation. The customer relationship and user satisfaction are not so relevant in technical services, because in technical rooms there are no customers as users. Real estate's users are also one interface for the service provider and customer. Real estate's users are interested how their working environment is sensible and amused related information which are for example cleanliness and safety.

Real estate and user service information flow is related to day to day service operations and its success. Service related information needs and workable service related information is important, for example quality, customer satisfaction, claims, reaction time and feedback. Service related measured information is needed but it is challenging to define measures of the services. Measures related to quality and costs seem to be extremely important.

One of the service provider important information needs is the information related to future. Service providers would like to get information related to customer's future needs and what is the customer expectation from the service providers so that service providers are able to respond these needs in real time. Real estate and user services are take a place in customers real estates and that's why it is critical for service operations to know every changes or modifications related to these real estates, because those has the straight impact to service process. The earlier there is information related to changes, that better it is possible to react to the needed changes for the service process.

The accuracy of information related to the service calls is important in technical services. Service calls should be enough detailed and as accurate as possible, so that the service provider are able to start operations targeting into the right things. Especially a lead time and an urgency level are critical information for the technical services. Clear scope of technical service increases service level, quality and efficiency.

There are flexible and stabile information related to real estate and user services. The flexible information is usually measured which is changing during time and stabile information are more stabile in longer time. Informing has huge part of these services. Informing is related among other things to the changes of facilities, organizations and personnel.

Information sharing practices

There are lots of information between different parties in real estate and user services, but usually it is not organized in a systematic way. The principles of information flow are agreed with customer and service provider in each customers, because the information flow practices varies depending of customers. Every customer has their own needs coming from strategy and business processes, and the information

The four information channels were observed in real estate and user services: face-to-face communication (planned and unplanned meetings), phone, emails and information systems (systems, programs, web-browser, common folders). The priority of information affects to the used channels: phone is used when the information has to go quickly forward and emails or information systems when the priority is not so

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high. In addition, it is important to think what the message is and which the best channel is. There are no one channel that fits all: every information channel has advantages and disadvantages.

Phone and email are the most used information channels and usually available to every party in real estate and user services. The phone is used when the issue needs quick react. The email is used to transfer reports and information that do not need quick reaction.

There are lots of different information systems in real estate and user services, but the information systems have low integration level because of the disadvantages related to them. Customers usually own the information systems, because they own the properties and businesses and the service providers use customers systems. That is the way to ensure that the systems do not change even though the service provider change.

The low integration level is one reason why the information reports related to real estate and user services are usually undeveloped. In addition, it is usually difficult to get usable information to the core business when the different information systems, for example service desk and business controlling systems, do not communicate to each other.

There is a common way to act when the information systems are used and lots of different variation when the other information channels are used. Customers usually have many different service providers in their real estate and wish similar report from different service provider to compare the reports.

Collaborative foundation

Services are managed by information and there for the information flow is an essential thing for the function of services and customer relations. The related customs for the information flow and reporting in the real estate and user services are undeveloped. The demands of customers for even better reports and the information flow in the organisation helps developing the information flow in the customer relations.

The customer is the part of the service process and hence in a very significant position producing and developing services. The real estate and user services are produced in the facilities of customers, which emphasises already the presence of customer. The information flow is in a key position functioning in the collaboration between the service producer and customer. When the information is moving from a party to party, the common goals are clear.

It is important for the information flow that same things are discussed and that the service provider and customer share a common language. The relationship between the service provider and customer has to be sustained maintaining the confidence. All actions should not be automated, because the confidence is build up at great part for the face-to-face contacts. Targeting the automating to the specific functions, it will bring time to the face-to-face collaborations.

The open relationship will help at the exchange of information and the needs of different levels should be recognized. All action is starting from bilateral confidence. The common practices are substantial: for example if all the service calls are not taken to the system, the confidential measures and data are not achieved. The systems are not allowing not to be used and that is why the people are considered for one of the main risks in the system chain.

Time related issues

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There are a huge amount of stable and flexible information transferring in real estate and user services. Stable information are more stable for longer times and flexible information is changing during time and consist of measures and measured things. In both categories it is important that information is relevant.

In real estate and user services the information should be accurate, because non-accurate information is not usable and not relevant for any parties. Real estate and user services related service calls should be reacted quickest. Information flow and reaction time seem to be critical in these services mentioned above. This has an effect which information channel is suitable to use: a telephone is used when urgent issues should be done right away and a customer has to get a response that issues are going to be solved.

Real estate and user services are in use days and nights depending when users are using facilities, for example security systems. In real estate and user services there are wide SC's and that is why there is a possibility that the information is not up to date before it reaches the end of a SC.

4.2 Developing the elements of information integration

Based on the empirical data, in developing information integration it is essential to develop its elements in the right order. Of these elements, collaboration as well as processes and activities are the basis of nearly all areas having to do with developing of customer relationship. Thus they also form the basis for information integration in a service SC. Collaboration among the parties lays the foundation for continuity of the customer relationship as well as for trust. Reconciliation of processes and functions among the parties, then, enables improving of co-operation, communication and coordination between organizations. Co-operation and the element of processes and activities affect each other. The functioning and depth of co-operation have an effect on the degree of integration of the processes and activities between the parties. The degree of integration of the processes and activities, then, affects the depth of co-operation.

After these two elements are in order, it is possible to start focusing on other elements of information integration. In the analysis of the data it was noted that defining the information attributes is the first and the most important stage in developing information integration in a service SC. Defining the information attributes helps to pin down the information needs of an organization by defining the form, quality and availability of information. Defining information attributes helps in finding out, amongst other things, in which form the information must be, how it should be available and how timeless it should be in order for it to create additional value for the organization.

Pinning down the information attributes is a significant element since only the necessary information is important for an organization, and a large number of organizations suffer from information overload. Defining the information attributes is the basis of pinning down the practices of information sharing. Figure 5 illustrates the development sequence of the elements.

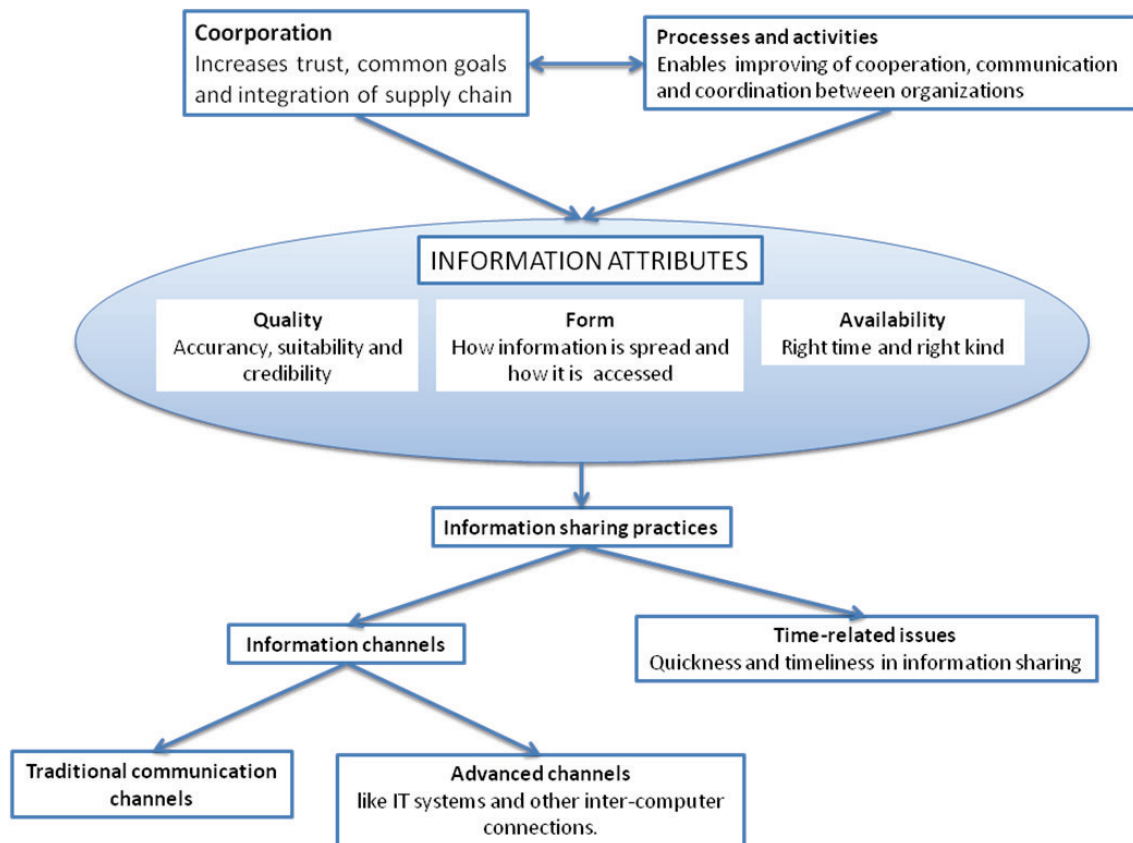


Figure 1 Developing information integration.

When the information attributes have been pinned down it is possible to define the element of information sharing practices, that is, the channels through which it is cost-effective, functionally reasonable and necessary to both disseminate and receive information. The channels through which information is shared can be divided into traditional and advanced channels of communication. The traditional communication channels include, for example, telephone, fax, e-mail, written documents and face-to-face contacts. The advanced channels are more technical than the tradition channels, and include, for example, IT systems and other inter-computer connections.

The most essential of the information sharing channels are the IT-related channels, because it is impossible to achieve an effective SC without IT. Adapting IT to information needs is a significant part of information development because it enables automation of communication, storing, processing and refining of information and facilitates information sharing. Yet there are a large number of challenges in IT development between two organizations. The traditional channels should not, however, be forgotten since especially with the facilities services and user services concerned, these traditional channels are often indispensable, or at least through them the parties immediately make sure that the message has reached the recipient.

The element of information sharing practices includes time-related issues, though these are defined in the elements of information attributes. Regardless of this, channels of information sharing define largely how often it is possible to send information and how long it takes to deliver this information.

5 Conclusion

The bigger the organization is the more the function of information flow and the needs of information are emphasized. That is the way to get the real-time information and the right decisions. If the information flow does not work it will affect negative way both to the customer and to the service provider. That is why both parties are interested to develop the information flow and information integration.

In this study, the flow of information was analysed with the help of elements of information integration. In the study it was noted that defining information attributes appeared as a prerequisite for developing information integration, since defining information attributes – that is form, quality and availability – helps defining the information needs of a customer. Furthermore, defining information attributes forms the basis for defining channels of information distribution.

The most important theoretical contribution of this study is the conceptual framework for the sequence of development of the elements of information integration. It addresses the sequences and the relationships of the elements of information integration and makes the complex phenomenon of the development of information integration simpler. Information has a major role in service management and therefore advancing communication, including information integration, plays a key role in functionality and development of services.

In addition, this study has a number of practical implications. Customers demand a more and more sophisticated information flow and reporting practices. In particular, complications in information flow have been regarded as one of the obstacles for progress in the field. The current practices in the information flow related to real estate and user services are immature even though sharing information has become more and more important to customers as well as to service providers. The findings helps service provider and customer to develop the information flow between service provider and customer by determining the relationships between the elements of information integration and identifying the right order how to develop the information integration. Many service companies have mostly similar main characteristics, which makes the generalization of the study easier.

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Empirical study of measuring supply chain performance

Sillanpää, Ilkka

ABSTRACT

Purpose Supply chain performance measurement - the process of qualifying the efficiency and effectiveness of the supply chain. The aim of this study is to create a supply chain measurement framework for manufacturing industry, define which data should be measured and verify the measurement framework in the case company's supply chain.

Design/Methodology/Approach There is a review of the current understanding of supply chain management and literature related to supply chain performance measurement and the study creates a framework for supply chain measurement. This research is qualitative case study research.

Findings This study presents the main theoretical framework of supply chain performance measurement. The key elements for the measurement framework were defined as time, profitability, order book analysis and managerial analysis. The measurement framework is tested by measuring case supply chain performance.

Research limitations/implications In the study, a performance measurement framework was created for the needs of manufacturing industry. Suggestions for future research are multiple case study in different manufacturing industry areas and positivistic based supply chain performance research.

Practical implications The measurement framework in this study offers guidelines for measuring the supply chain in manufacturing industry but the measurement framework could be used in different areas of industry as well.

Originality/Value The supply chain performance measurement framework is tested and a valid framework for supply chain performance measurement in manufacturing industry.

Keywords: supply chain performance measurement, supply chain management, manufacturing industry

INTRODUCTION

In particular, measuring the supply chain (SC) has been recognized as a problem. The problem occurs when developing a SC in practice. The pressures in rationalizing set by management create a significantly large challenge for supply chain management (SCM). The SC has to be made more streamlined, lead-times have to be decreased, excess processes need

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to be eliminated and developed as a whole in such a manner that new, more efficient processes can be established. The basis for development work is a survey of the present state and measuring efficacy of the current SC. Tools for this have been scarce. This study provides a resolution to problems in measuring the SC.

Sampson (2000) represents SC as bidirectional in service business since the customer does not merely receive the output but also brings input to the service process. Bidirectionality can be single-level or two-level. On both levels, the customer is involved in the SC in a bidirectional manner: in addition to the customer providing input, customer's input gets additional value from the service process and hereby the customer is able to consume the output. In a single-level bidirectional SC, the service provider's subcontractors are involved in the SC in a unidirectional manner, e.g. as providers of material or facilities. In a two-level bidirectional SC, on the other hand, subcontractors are involved also in the service process. (Sampson 2000)

An SC is usually regarded as unidirectional in production industry and bidirectional in service industry. In production industry, with regard to production-related inputs and outputs the SC of a product is indeed unidirectional: the flow of products passes from suppliers to customers. Likewise, the flow of payments and feedback passes from customers to suppliers. However, an integrated supply chain in production industry also encompasses two-way co-operation and information sharing among the parties in the SC. (Sampson 2000)

In SC performance measurement the main purpose is to get information for top management's needs, but also several kinds of SC measures are needed at every management and operational level. SC should be measured because of management interest in measuring how efficient SC is. Usually there are several kinds of interest and several management levels are interested in knowing about SC performance. Measuring is also needed when SCM is going to be developed. Van Hoek identifies the problem of measuring SCM in the research paper titled as "Measuring the Unmeasurable - Measuring and Improving Performance in the Supply Chain Management" (Hoek 1998).

Gunasekaran et al. (2004) introduce six metrics for measuring SCM capability and performance. Metrics are based on the following SCM processes: plan, source, make/assemble and delivery/customer. (Gunasekaran, Patel & McGaughey 2004) Shepherd and Günter (2006) categorize SC performance measures into five SC processes: plan, source, make, deliver and return or customer satisfaction, whether they measure cost, time, quality, flexibility and innovativeness and whether they are quantitative or qualitative measures.

Measures can be categorized according to business processes or into strategic, operational and tactical management levels. (Shepherd, Gunter 2006)

Theeranuphattana (2008) states that the SCOR model is based on five core processes: plan, source, make, deliver, and return. The SCOR model advocates hundreds of performance metrics used in conjunction with five performance attributes: reliability, responsiveness, flexibility, cost, and asset metrics. (Theeranuphattana, Tang 2008)

Chan (2003) presents SCM performance measurement approach which consists of qualitative and quantitative measures. Quantitative measures are cost and resource utilization and qualitative measures are quality, flexibility, visibility, trust and innovativeness. Chan (2003) and Bhagwat (2009) introduce Analytic Hierarchy Process (AHP) for measuring SCM qualitative and quantitative approaches. AHP is a common tool for solving multi-criteria decision-making problems. (Chan 2003, Bhagwat, Sharma 2009, Bhagwat, Sharma 2007).

Typically SC performance measurement research has been carried out via questionnaires and they have not had an action oriented point. Measuring the SC is the basis for developing it. It is possible to evaluate the SC when it can be measured. Likewise, it is possible to evaluate efficiency by following indicators of SC. The research goal can be captured as following:

The goal is to deepen knowledge in supply chain performance measurement in manufacturing industry.

The research problem is presented as a question:

How to measure supply chain performance in manufacturing industry?

RESEARCH METHODOLOGY

Eisenhardt (1989) defines case study research as a research strategy that aims at understanding the internal dynamic of an individual case. (Eisenhardt 1989) Case study research is aiming at understanding comprehensive and relevant phenomena of real life. In that case the endeavour is to study the phenomena in their genuine context. Interface between the phenomenon and context is not often clear, which complicates the work of a researcher. (Yin 2009)

Case study research is regarded as a good research method when the research problem can be described with the help of questions how and why. The method is very useful when a researcher cannot control the target. Furthermore, it is useful when the focus is on concurrent events in a real time manner especially when the border between the event and context is not clear. There are three types of case study research: explorative (seeking to find out more about a phenomenon) research, descriptive research and explanatory research. The purpose of

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explorative research is to obtain information regarding a phenomenon, find new ideas and possible research problems. In explorative research, already existing information is collected and sorted. The aim of descriptive research is to provide as accurate image of an individual, group, situation or phenomenon as possible. In the research the focus is not in clarifying connections between phenomena or factors interpreting behaviour, but only in describing a situation. The aim of explanatory research is to explain causal relations between phenomena and testing related hypotheses. (Yin 2009)

This study is conducted in a challenging environment by studying the measuring of the SC in manufacturing industry. SC is an extremely challenging research subject and the study creates new information by measuring performance of the case SC. The hermeneutic view perceives knowledge as soft, often subjective and experience-based as well as insights of a personal nature, whereas the positivist perceives knowledge as hard and real, and considers it possible to transmit knowledge in a tangible form (Burrell, Morgan 1979). The hermeneutic view is approached in the study in the form of qualitative and quantitative research. Quantitative research refers to a study in which accurate and calculatory (in humanities often statistical) methods are used. Qualitative research is a method of inquiry practised in humanities in addition to quantitative research. The aim of qualitative research is to understand the phenomenon being studied. The point of view of this study is a more qualitative one. In qualitative research, discretionary sampling is normally used. Only a small number of units is selected for the study and they are studied in depth which makes quality of the data important. In this study, qualitative methods are used to collect information regarding the case under study. These methods include observations, interviews, questionnaires and reports. (Burrell, Morgan 1998)

Inductive reasoning, a.k.a. induction is a method of reasoning that starts from an individual group of observations and forms a generalization or a theory regarding it. Deductive reasoning a.k.a. valid reasoning is a method of reasoning in which the true premises are necessarily followed by a true conclusion. (Ghauri, Grønhaug 2005)

Arbner (1997) presents three main methodological approaches: analytical approach, system approach, and action approach. The analytical approach represents clearly explanatory knowledge with the assumption that reality is objective. The action approach represents understanding knowledge with the assumption that reality is socially constructed. The system approach is positioned between positivism and hermeneutics in the assumption that reality is objectively accessible. (Arbner, Bjerke 1997)

The constructive approach means problem solving in a real-life organizational setting through the construction of a management system. (Kasanen, Lukka & Siitonen 1993, Lukka 2000, Labro, Tuomela 2003) According to Kasanen (1993), a constructive method is a solution-oriented normative method where target-oriented and innovative step-by-step developments of a solution are combined, and in which empirical testing of the solution is done and utility areas are analysed. (Kasanen, Lukka & Siitonen 1993)

A hermeneutic view is approached in the study in the form of qualitative and quantitative research. In this study, qualitative methods are used to collect information regarding the case under study. A system approach is a good research method for this study. Furthermore, a constructive approach can be regarded as an important method with regards to the study, since in the study, on the basis of this theory a model with which the SC is measured, is created. These methods include observations, interviews, questionnaires and reports.

This study complies more with the deductive than inductive logic of reasoning. In the study, leading theoretical methods of measurement that represent SC are defined. On basis of these, a theoretic frame of reference is created for measuring the case SC. The indicators and the theory developed are studied, after which the results are interpreted. The study includes both inductive and deductive reasoning.

Table 1. The main methodological choices in this study.

Research discipline	Industrial engineering and management (IEM)
Theoretical base	Supply chain management, Performance measurement in Supply chain
Research paradigm	Hermeneutics
Research strategy and research approaches	Qualitative constructive case study approach
Research methods	Qualitative methods: interviews, data form ERP systems, measurements, observations, questionnaires, documents

SUPPLY CHAIN PERFORMANCE MEASUREMENT

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This chapter presents primary approaches for SC performance measurement. First, the emergence of SCM concept is reviewed. After this, SCM is defined according to the views of various academics. It is possible to measure SC performance in several ways and performance measurement in the SC context has been studied in many perspectives.

Supply chain management

Supply chain management (SCM) is a management concept of the 2000's. It includes divisions from the management concepts of previous decades. Many definitions for SCM have been presented. SCM has been and is still regarded as a synonym for logistics, supply and SC control. Today the broader definition determined by the Global Supply Chain Forum is generally accepted as a norm (Lambert, Cooper & Pagh 1998, Cooper, Lambert & Pagh 1997):

“Supply Chain Management (SCM) is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders”

Supply Chain Operations Reference model (SCOR) which was defined in the Supply Chain Council (2005), defined a SC as follows (Supply Chain Council 2005):

“The supply chain encompasses every effort involved in producing and delivering a final product, from the supplier's supplier to the customer's customer. Five basic processes— plan, source, make, deliver and return – broadly define these efforts, which include managing supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, and delivery to the customer.”

Performance measurement in supply chain context

“When you can measure what you are speaking about, and express it in numbers, you know something about it...” Lord Kelvin, 1824-1907

“You cannot manage what you cannot measure”, (Sink, Tuttle 1989)

There is a set of contributions in the area of SC performance measurement. Chan and Qi (2003) proposed a process-based PMS for mapping and analyzing complex SC networks (Chan 2003); van Hoek (2001) emphasizes the importance of performance measurement from the point of view of the third-party logistics alliances in SC (Van Hoek 2001); Gunasekaran et al. (2001) develop performance measures and metrics in a SC environment from a managerial point of view (Gunasekaran, Patel & Tirtiroglu 2001). Morgan (2004) offers nine

preconditions necessary for effective and dynamic performance measurement within SC's. These preconditions are cheap and reliable identification of units in transition, standard protocols, communication systems that are capable of handling the volume of data, hardware and software, multi-layered control systems, system handshake protocols, routing and re-routing protocols that allow SC cost control, speed and flexibility of delivery response, high velocity electronic cash transfers instigated automatically; and robust systems with inbuilt automatic recovery abilities (Morgan 2004). Thakkar et al. (2007) proposed a balanced scorecard (BSC) framework for a case organization using an integrated approach of interpretive structural modelling and analytic network process (Thakkar et al. 2007, Thakkar, Kanda & Deshmukh 2009). More supply chain performance approaches are presented in appendix 1.

According to the research, SC capability can be measured by using different kinds of approaches:

- A Performance measurement matrix (Keegan, Eiler & Jones 1989)
- Balanced scorecard approaches (Bhagwat, Sharma 2007, Thakkar et al. 2007, Bigliardi, Bottani 2010, Chia, Goh & Hum 2009, Dror 2008, Xu, Li 2008, Lawrie, Cobbold 2004, Brewer, Speh 2001, Kaplan, Norton 2001)
- Cost and non-cost (Gunasekaran, Patel & Tirtiroglu 2001, De Toni, Tonchia 2001)
- Financial and/or non-financial metrics (Lawrie, Cobbold 2004, Gosselin 2005, Ittner, Larcker & Randall 2003, Ittner, Larcker 2003, Lambert, Pohlen 2001, Neely 1999, Olsen et al. 2007, Tangen 2004, Tapinos, Dyson & Meadows 2005)
- Green supply chain measurements (Hervani, Helms & Sarkis 2005, Shaw, Grant & Mangan 2010)
- Input, output and composite measures (Chan 2003)
- Measuring SC in multiple levels (Shepherd, Gunter 2006, Lin, Li 2010)
- Objective measures and subjective measures (Chan, Chan 2004)
- Performance measurement questionnaire (Dixon 1990)
- Performance prism (Neely et al. 2000)
- Quality, cost, delivery and flexibility (Shepherd, Gunter 2006)
- Resources, outputs and flexibility (Beamon 1999)
- SC collaboration efficiency (Ramanathan, Gunasekaran & Subramanian 2011); coordination efficiency and configuration (Shepherd, Gunter 2006)
- SC process based measuring approach (Shepherd, Gunter 2006, Chan 2003)

- Six-sigma approaches (Lin, Li 2010, Ramaa, Rangaswamy & Subramanya 2009, Xu 2008, Wang, Du & Li 2004, Dasgupta 2003)
- Strategic, operational or tactical management approach (Gunasekaran, Patel & Tirtiroglu 2001)
- Van Hoek's matrix model (Hoek 1998)
- Visibility SC collaboration (Caridi et al. 2010)

Supply chain performance measurement in the case company

As it emerged from the theoretical study, managing the SC has to be measured at various different levels using various approaches. For measuring SC, the barometers have to be tailored case-specifically for each SC. Manufacturing of pre-fabricated products has developed a great deal during the last few decades. Production processes have been automated, SC's have been made more streamlined and production methods have been developed. This, however, is not yet enough – one must be able to improve cost efficiency from before. Especially in the production plants of the case company one has to be able to respond to the challenges caused by globalization.

Prefabricated products of the case company compete with cost-efficient SC, top-rated technology and good quality. To be able to develop the SC, one has to be able to measure its efficacy. The SC of the case company can be measured with the following indicators, taking into consideration the special characteristics of the SC: order book analysis, profitability, time, managerial analysis. This measurement framework was conducted according to the literature review and interviews of this case study.

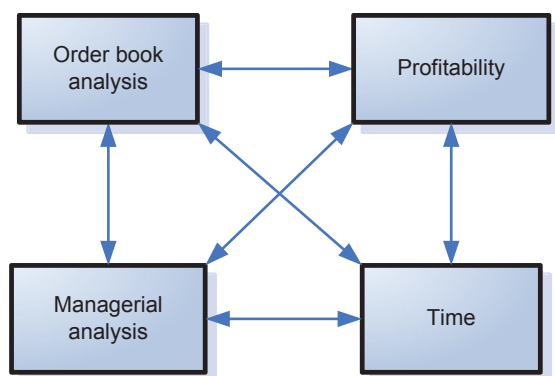


Figure 1: Supply chain performance measurement indicators.

Order book analysis

Measuring the SC of a production plant has its foundation in order book analysis. According to the survey to literature, order book analysis can be categorized to non-financial metrics (Gosselin 2005, Kaplan & Norton 1992, Lambert & Pohlen 2001, Lawrie & Cobbold 2004, Neely 1999, Olsen et al. 2007, Tangen 2004, Tapinos et al. 2005, Thakkar et al. 2007), qualitative approach (Beamon 1999, Chan 2003a), and non-cost (Gunasekaran et al. 2001, Toni & Tonchia 2001). The aim is to gain information regarding the present state of the order book of the production plant. Percentage of delivery to customers of total sales as well as percentage of various deliveries for internal sales from total sales can be regarded as the most central indicators.

Weekly manufacturing amounts suggest the average load of production. With the help of manufacturing figures it is possible to verify seasonal variation and possibly the effect of manufacturing amounts to on-time delivery. Delivery amounts should be reviewed as tons. One should analyze weekly and monthly variation of delivery amounts to internal and external customers. Amounts produced are, from the point of view of running the production plant, an essential measurable quantity. In the light of previous amounts produced – together with the sales forecast obtained from sales – it is possible to plan future capacity and future production.

Profitability

It is important for a company manufacturing prefinished products in an engineering works to measure efficacy of the SC from the point of view of cost-efficiency. The profit directed at the order describes cost-efficiency best. On the basis of theoretical review, this indicator is numbered among cost and economic viewpoint indicators (Gosselin 2005, Gunasekaran et al. 2001, Kaplan & Norton 1992, Lambert & Pohlen 2001, Lawrie & Cobbold 2004, Neely 1999, Olsen et al. 2007, Tangen 2004, Tapinos et al. 2005, Thakkar et al. 2007, Toni & Tonchia 2001). The indicator can be generalized as a fundamental indicator for all production companies. The indicator is especially important by the fact that the price of steel varies according to markets and therefore updating the prices for products and continuous follow-up on sale prices for these to meet the actual expenses is extremely important. In the steel service business the sales usually occur on the basis of spot transactions, but additionally the company operating in the field of pre-fabricated plate product business has committed to

deliver products to its customers according to long-term contracts. Therefore, re-counting of the products according to changes in production schedules is extremely important.

Time

Lead-time is in many studies considered to be one of the central indicators in manufacturing industry. De Toni et al. present time-based indicators as non-cost indicators, where time can be measured as internal or external time (Toni, Tonchia 2001). Gunasekaran et al (2004) present a great deal of time-based measures. (Gunasekaran, Patel & McGaughey 2004) Time is also identified as the next source of competitive advantage (Kessler, Chakrabarti 1996, Vesey 1992, Stalk 1988, Balsmeier, Voisin 1996, Mehrjerdi 2009). Also in measuring the SC several scholars recognize lead-time to be a very descriptive indicator. In the case company, lead-time is one of the most important elements that the customer is interested in. Quick times of delivery in the steel service business make the business hectic and therefore lead-time has to be measured in order to be able to decrease it.

Managerial analysis

In measuring the SC one has to review the SC as a whole. Partial optimization has to be avoided because improving one sector is not enough to improve the whole SC. Gunasekaran et al. state that several kinds of measures should be used in performance metrics: balanced approach, strategic, tactical and operational levels and financial and non-financial measures. SCM could be measured at a different management or operation level. (Gunasekaran et al. 2001, Gunasekaran et al. 2004). It is useful to gather managerial analysis from analyses of people involved in the SC as well as analyses of outsiders.

Managerial analysis can be performed on the basis of measured information obtained from the systems, making visual perceptions in production and interviewing professionals involved in the production process. The purpose of managerial analysis is to follow-up the whole SC and obtains information regarding immeasurable issues related to SC. The purpose of observation is also to obtain information regarding efficacy of the SC so that evaluation will not be based merely on measured quantities.

EMPIRICAL SUPPLY CHAIN PERFORMANCE MEASUREMENTS

In this chapter the SC is measured with previously established indicators. The indicators consist of four different parts: order book analysis, profitability, time and managerial analysis.

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In order book analysis, the production plant's completed output and reliability of delivery in different years are reviewed. SC can be also measured from the point of view of profitability. Also the costs of the SC are observed. Time-based measuring of the SC is conducted by measuring the delivery cycle, on time delivery, production time and its subdivision into operational times. It is extremely important to make managerial analyzes where analyses are made on operational, tactical and strategic levels.

Case description

The metal industry has built up around the steel industry. Most typically, Finnish metal industry consists of small and medium sized engineering works as well as of some larger, global companies. The production of large companies in the metal industry in Finland consists of highly refined solutions that aim to produce special additional value to the customer. Products manufactured have to be of especially high quality and efficiency of production has to be at its best. Compared to countries with lower cost levels, the costs of Finnish steel and metal industry are enormous. This fact has forced the companies in the steel and metal industries to invest in efficiency, quality and producing additional value to end customers. When focusing on core business, the production process in metal industry was altered and outsourcing of functions was started from the beginning of the production process. At the beginning of the production process there are usually plate processing functions which include cutting, bending and finishing of standard products manufactured at a steel factory. Instead of supplying a standard product, steelworks can supply steel parts that are manufactured according to diagrams. Customers can implement these parts directly to production process as raw materials.

The most typical manufacturing processes in the metal industry are related to handling and machining steel that is used as raw material. Steelworks manufacture the products according to standard measurements. Engineering works in the metal industry use plenty of steel plate as raw material due to the fact that the parts needed for the product to be manufactured are cut from it.

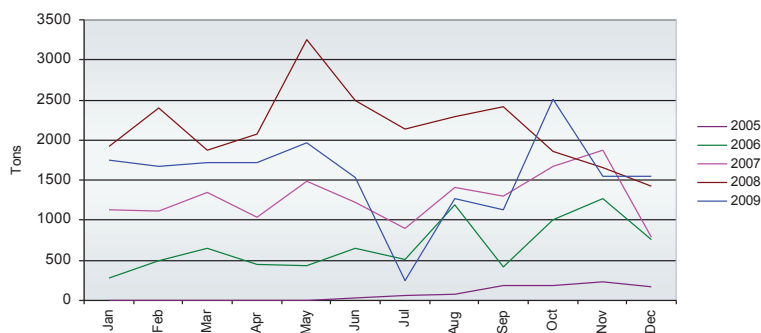
The case company in the study manufactures steel products and refines steel into solutions. One of the solutions is steel parts tailored to a customer's needs. Steel parts (in other words pre-fabricated products) are manufactured at various units and steel service centers of the case company. Steel service centers are specialized in manufacturing blocks from various steel products for end customers. The case production plant is one of the production units of the case company. It manufactures pre-fabricated products from steel plates. The products are cut

plate parts that may have been edged, bevelled, sandblasted and finished. The products are manufactured according to diagrams provided by the client. The production process of pre-fabricated plate parts is extremely hectic and delivery times are usually just a few days.

The case production plant can be described as the steel factory's refinement unit which serves customers by refining steel in a customer-tailored manner. The supply chain of the case production plant being studied is restricted to the production plant's material flows in such a way that the case SC begins from the material stock of the case production plant. The supply chain ends when the blocks have been delivered to the end customer or to various production plants of the case company, to internal customers. Internal customers supply the products to end customers after the manufacturing process.

Order book analysis

In 2005, 955 tons was manufactured and In 2006, increasing production as well as rationalization of the production facilities began. Furthermore, in 2006 a new operation control system was implemented in the production plant. In 2006, 8118 tons of steel parts were manufactured, which means a growth of almost nine times over the previous year. The following year, in 2007, production capacity of the production plant was mobilized more efficiently and benefits of the production control system could be utilized. The amount produced in 2007 was 15508 tons, which was nearly double 2006 production. In 2008 the amount produced increased to 24 147 tons, which was 1,5 times that of year 2007. The period from 2005 to the end of 2008 was a time of rapid economic growth which was also seen in the growth of sales volumes. In 2009 sales faded as did the order books of customers. Regardless



of this the production plant was able to manufacture 27 070 tons of steel parts.

Figure 3: Output of the case production plant in 2005-2009.

Delivery reliability of the orders

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In 2005 delivery reliability averaged out 37.5 percent. In 2006 delivery reliability averaged out at 47.33 percent. There was a very significant improvement in delivery reliability in 2007 when it averaged out at 96.8 percent. After growth in production settled in 2008 and 2009, it has been possible to maintain delivery reliability at a good level. In 2008 delivery reliability was 96.5 percent and in 2009 almost 100 percent. Management of capacity has been made more efficient and co-operation of sales and production has been improved. All the challenges related to launching of production plant have been overcome as growth is steady and the operations are stabilizing.

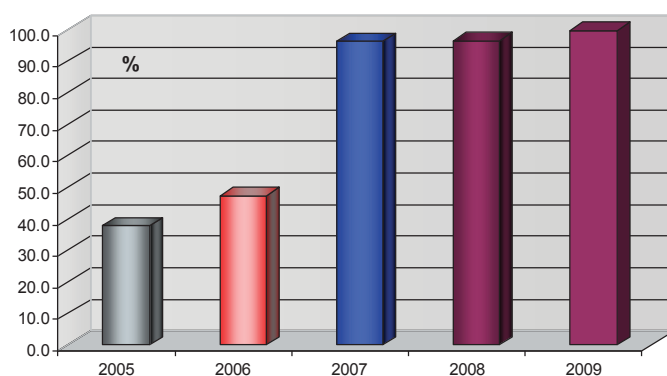


Figure 4: Delivery reliability per year in 2005-2009

Lead-time and profitable analysis in the first measurement

Product A profitability

Profit margin of the order was - 45.9 % and hence the order was unprofitable. Process time of the order was 134.1 hours. Total lead-time was 23 days and proportion of process time was determined to be 24.3 percent.

Table 2: Cost efficiency of Product A of Customer A.

Results	Product order	/ Profit margin of the order	Total lead-time (days)	Process time (hrs) / order	Proportion of process time %
Total	8	-45.9	23	134.08	24.3

Lead-time for product A

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Concerning products for Customer A, the problem has been long lead-times. 19 similar orders were manufactured during the period of time. Dispersion in period for the fulfilment for the orders was from nine to 43 days. Average for product lead-times was 27.7 days.

On time delivery for orders of Customer A's Product A varied a great deal. At the beginning of the year all orders were overdue by as much as eight days. On time delivery for the latest orders was 100 percent. Five of the orders were delivered 1-6 days earlier than the given time of delivery.

Production time a.k.a. process time of the order was 134.8 hours, which makes almost six days. Process time of one stage was 16.85 hours, and to produce the whole order, process time was spent from the period for the fulfilment of the order was 24.3 percent. Lead-time of the SC was 23 days.

Product B profitability

The profit margin of Customer B's order reviewed was 7.76 percent. Process time of the order was 180.12 hours. Total lead-time was 28 days and proportion of process time in the total lead-time was 26.80 percent.

Table 3: Cost efficiency of Product B of Customer B

Products / order	Profit of the order %	Total (days)	lead-time / order	Process time (hrs)	Proportion of process time %
8	7.76	28.00	180.12	26.80	

Product B lead-times

During the period of time in question, the number of orders manufactured was 13. There was great deal of dispersion (from ten to 83 days) in time for fulfilment of an order. Average of periods for fulfilment of an order for Product B was 44.7 days. Proportion of process time in the whole period for fulfilment of an order was very small and there was a great deal of waiting time.

There are clearly challenges with regards to on-time delivery of products for Customer B. At the beginning of the year shipments were delivered as much as 25 days before the agreed date of delivery. None of the orders was 100 percent delivered on time. Towards the end of the period under review shipments were delivered as much as 35 days late.

The order from Customer B included parts for eight products. The production time a.k.a. process time of the order was 166.62 hours, which is approximately 26.80 percent of the

period for fulfilment of an order. The period for fulfilment of an order for the order was 28 days. There were large buffer stocks between the stages of work. Production is controlled in a manner in which after one stage of work is completed, the material is transferred to the next stage of work. Due to this the proportion of process time in the period for fulfilment of an order is small.

Lead-time and profitability analysis in the second measurement

Product A profitability

Second measurements were done only for product A, because of product B production was finished during measurement period. The profit margin of the order was 19 percent, which is – unlike previous year – clearly profitable. Total lead-time was 34 days. Compared to the previous measurement, it increased 11 days. Process time was 115.3 hours per order, which shows clear improvement compared to the previous measurement. This is due to the fact that in the previous measurement there were 8 completed products for the order instead of the 10 products measured in this measurement. The proportion of process time was 14.1 percent. It decreased almost 13 percentage units due to the total lead-time increasing compared to the previous measurement.

Table 4: Customer A, cost-efficiency of Product A

pieces / Set	Profit marginal of the order	Total lead-time (days)	Process time (hours) / order	Proportion of process time %
10	19.0	34.0	115.3	14.1

Lead-time of product A

Compared to the previous measurement, the number of measurement samples has increased by one order. In periods for the fulfilment of an order, dispersion had increased clearly from 12 days to 78 days, whereas it previously was from 9 days to 43 days. The average of periods for the fulfilment of an order for Product A was 46 days, which is nearly 19 days more than in the previous measurement.

On time delivery was studied for the same orders. Dispersion of on time delivery is especially large, from zero days to as much as 24 days late. None of the orders was delivered before the requisite date of delivery. There has been a great improvement in on time delivery compared

to the previous measurement. In the latter measurement, there were as many as five orders delivered on time and few orders that were only one day late. During the previous measurement, orders were delivered well beforehand or late. In the latter measurements it was perceived that dispersion of on time delivery has increased.

Process time, Product A

The order under review included ten pieces of Product A. Process time of the order was 115.29 hours. It took nearly 20 hours less time to manufacture the order than during the previous measurement. Furthermore, it is worth noting that the results of the first measurement covered productions of ten pieces and the latter productions of eight pieces. In completing the whole order, the proportion of process time in the whole period for the fulfilment of an order was 14.1 percent. Lead-time of the SC was 34 days.

Managerial analysis of supply chain measurements

SCM was measured at the case production plant during two different periods of time. The aim of two different measurement stages was to obtain information regarding usability of the selected indicators. It proved to be very challenging to carry out the measurements due to the operational environment being highly dynamic. Production volume, changes in the products manufactured as well as updates of the data system created challenges in performing the measurements. Corresponding measurements had not been carried out before, so the methods of measurement as well as the information obtained from the measurements had to be created from scratch. Use of the data systems could not be made in a most efficient manner because no corresponding reports have been created in the systems. The data obtained from the data systems had to be gathered from various sectors.

The results of the measurements reflect the efficiency of the SC of the case production plant very well. The most astonishing result is obtained from comparing the lead-time of the whole SC to production time a.k.a. process time. The proportion of process time in the whole period for the fulfilment of an order is approximately between 10-25 percent. The proportion of work stages in production time had also changed between the two different measurements. The proportion of manual work stages in production time had decreased and the proportion of automated work stages had remained more or less the same.

Comparison information regarding Product A in 2006 and 2007 is presented in the table. In 2006, one order included parts for the 8 products manufactured by the customer and in 2007 the order contained parts for 10 manufactured products. Profitability of the order has turned

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from loss to profit. Total lead-time has increased from 23 days to 34 days. Process time of order has decreased from 134 hours to 115 hours and hence the process time of plate parts for one product manufactured by the customer has decreased by approximately 30 percent. The proportion of process time has decreased from 24 percent to 14.1 percent, because the total lead-time of the orders under review has increased from 23 days to 34 days.

Table 5: Comparisons of Product A in 2006 and 2007

Year	pieces Set	/ Profit margin of the (%)	Total order time (days)	lead- Process time (hrs) / order	Process time (hrs) 1 set	Proportion of process time (%)
2006	8	-45.9	23	134.08	16.76	24.3
2007	10	19.0	34	115.289	11.53	14.1

In the case production plant's SC process, typical problems presented in literature can be perceived. Load of production has been varying a great deal at the case production plant. Monthly variation is very large. This is due to a short order book and weak practices in customers' forecasting. There is also a great deal of variation in the loading of work stages. To enable stabilizing variations of capacity in production, employees should be more multi-skilled. If there is no work at a given stage of work, an employee could be moved to a post where resources are needed. Loading could be steadied if the bottlenecks of bevelling and finishing would have enough machines and devices. One should pay close attention to these stages of work when loading production. Each hour lost in the backed up stages of work is directly comparable to profit of the company, because the amount of products completed depends on the amount of the products that have gone through the bottlenecks. Bottlenecks could be reduced by increasing machinery to the backed up stages of work and at times moving employees to deal with the backlogs in the bottlenecks.

CONCLUSIONS

The indicators consist of four different parts: order book analysis, outcome, time and managerial analysis. The SC was measured with the help of order book analysis. The volume of orders was analyzed and two customer cases were selected. Through these customer cases, cost-efficiency of the SC was measured. With the help of order book analysis it is possible to obtain an overview of the volume of orders, production volumes and on time delivery of the case production plant. It is easy to generalize as an indicator in various SCs. The indicator can

be utilized regardless of the branch of industry or production plant in analyzing the SC of manufacturing production.

In measuring the SC, cost-efficiency is defined as the costs of the products to be manufactured on the basis of measured production times as well as machine hour rates. A cost-efficiency indicator was used to measure the costs allocated to the order of the whole SC of the largest customer of the case production plant during two different periods of time. The results obtained when measuring cost-efficiency were reliable and they could be utilized very well.

The SC was measured from the point of view of time during two different periods of time by measuring lead-times and production times of orders as well as the ratio of production times and lead-times. Also on time delivery measurements are related to time. Furthermore, on time delivery was reviewed from two different periods of time. Time lays a foundation also for measuring cost-efficiency, because the basis is measuring costs according to machine hour rates and time spent in different stages of work. According to recognized academic Goldratt (1992), the most essential indicator of the SC is lead-time (Goldratt, Cox 1992).

Managerial analysis is an analysis by persons involved in the SC or people monitoring the effectiveness of SCM from outside. In managerial analysis measurement the aim is to draw conclusions regarding the entire SC and avoid partial optimization. The analysis concentrated also on rationalizing capacity management of the production plant.

Framework as a tool for practical supply chain measurements

In the study, a performance measurement framework was created for the needs of manufacturing industry. This series of indicators is a tool for managers whose work is related to SC development. There has been a demand for indicators for the SC. The foundation of development is recognizing the present state. According to it, goals to required development must be set. The usability of the tool was tested in the measurements in practice. The indicators proved to be very usable for measuring the case SC and the framework could be used for measuring various SCs in manufacturing industry. The tool can be applied to various SCs but it has to be tailored by considering any special features of a chain.

Indicators for SC performance measurement were tested in practice at a typical company that manufactures prefabricated products. This very much narrows the chasm between theory and practice. The measurements in practice were conducted by the researcher and managers involved in the SC. The set of indicators established on the basis of theoretical frame of reference was transformed to a practical tool. According to interviews as well as the feedback

received, the indicators serve managers at the practical level extremely well when they are managing and developing the SC.

Reliability and validity of the study

Reliability is about demonstrating that the operations of a study – such as the data collection procedures – can be repeated, with the same results, by another researcher, and it thus aims at minimizing errors and bias during the research process (Yin 2009). Using case study method the same result can be found by another researcher. It is more common to get a more holistic approach for research case by using case study method.

Construct validity could be measured as the use of multiple sources of evidence and was measured in this study by interviewing the specialists at various organizational levels who are involved in the SC. In this study, various data collection methods were used. The methods include interviews, documents, questionnaire, observations and measuring time. Use of multiple investigators was carried out by making specialists participate in conducting measurements and analyzing the data. One of the research quality measures is to establish a chain of evidence between research questions, evidence and conclusion, and respondent review of draft case description. In the study, a theoretical framework of reference for SCM and performance measurement was determined. Furthermore, a series of indicators was established in the case SC. Also practical knowledge of the topic affected establishing indicators. Research follows a research protocol and scientific reasoning.

Appendix 1 (Chan 2003, Chan 2003, Gunasekaran, Patel & Tirtiroglu 2001, De Toni, Tonchia 2001, Tangen 2004, Beamon 1999, Ramaa, Rangaswamy & Subramanya 2009, Holmberg 2000, Suwignjo, Bititci & Carrie 2000, Gunasekaran, Williams & McGaughey 2005, Gunasekaran, Kobu 2007, Stephens 2001, Hieber 2002, Lockamy III, McCormack 2004, Li et al. 2005, Fynes, Voss & De Búrca 2005, Li, Xu & Kumar 2007, Ren 2008, Chan, Qi 2003b, Chan, Qi 2003a)

Performance measurement approaches.

Author	Framework / Performance measures / Performance Measurement System (Quality (Q) Cost (C) Delivery(D) Flexibility (F) Agility (A) Responsiveness(R) Non-financial (NF) Qualitative (QL) Quantitative (QN))	Category of Measure
Beamon(1999)	Resources, output and flexibility	QN
Holmberg,S. (2000)	Performance model with system perspective, cost, speed and customer service level, agility	C, A, Q
Suwignjo, U.S Bititci, and AS Came, (2000)	Quantitative model	QN
Gunasekaran,A, Patel C and Tittiroglu E (2001)	Strategic, operational and tactical focus	QN, QL
Stephens, (2001)	Measures based on process	C,R, QN
De Toni and Tonchia (2001)	Cost and non cost	C, NF
Hieber(2002)	Supply chain collaboration efficiency; coordination efficiency and configuration	Q, QN
Chan(2003)	Cost, quality, resource utilization, flexibility, visibility, trust and innovativeness	C, Q, QN, F, A
Chan and Qi (2003)	Input, output and composite measures, processes of supply chain	QN, QL
Chunhua Tian, Yeuting Chai, Yi Liu, Shouju Ren (2003)	Quality, cost, delivery and flexibility perspective performance measures at department, enterprise and supply chain level	C, Q, QN, F, A
Felix T S Chan, et al. (2003)	Innovative Performance Measurement Method	Q, QN, QL
Stefan Tangen, (2003)	Financial, time based measures, non cost	C, T, NF
Changrui Ren, Yueting Chai, Yi Liu, (2004)	Active performance management system	QN, QL
Archie Lockamy III, Kevin McCormack	SCOR model	QN
David J. Parsons, Robin J. Clark, Kevin L. Payette, (2004)	Relationship between productions run lengths and overall supply chain performance	QN, Q

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Schonsleben(2004)	Quality, cost, delivery and flexibility	Q, C, D, F
Gunasekaran A, et al. (2005)	Framework for measuring costs and performance	C, NF
Li, S., Rao, et al. (2005)	Strategic supplier partnership, CRM, information sharing, quality, internal lean practices and postponement	QL, QN, Q, C
Liwen Wu, Yutao Song (2005)	Finance, business processes, customer, environment, core enterprise ability	C, QN
Fynes, B., Voss, C., Búrca, S. D., (2005)	Quality, framework incorporating dimensions of SC relationships and quality performance	Q, QN
Abhijeet K. Digalwar, Bhimaraya A. Metri (2005)	Theoretical framework for the performance measures of World Class Manufacturing	QN, Q, C
MAO Zhaofang et al. (2006)	Supporting evaluation level (HITS-Human, Institution, Technology, Surroundings) and operational evaluation level (TQFS – Time, quality, Finance and service)	QL, T, Q, C
Z., Li, X. Xu, & Arun kumar (2007)	Supply chain performance measurement approach which evaluates a supply chain from both structural and operational levels	QN, C, Q
Tong Ren, (2008)	Supply Chain Performance Measurement Based on SCOR Model	QN

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