



TAMPEREEN TEKNILLINEN YLIOPISTO
TAMPERE UNIVERSITY OF TECHNOLOGY
Julkaisu 555 • Publication 555

Anne Kleemola

Group Benchmarking as a Model for Knowledge Creation in Supply Management Context



Tampereen teknillinen yliopisto. Julkaisu 555
Tampere University of Technology. Publication 555

Anne Kleemola

Group Benchmarking as a Model for Knowledge Creation in Supply Management Context

Thesis for the degree of Doctor of Technology to be presented with due permission
for public examination and criticism in Auditorium 240, at Tampere University of
Technology - Pori, on the 18th of November 2005, at 12 noon.

Tampereen teknillinen yliopisto - Tampere University of Technology
Tampere 2005

ISBN 952-15-1461-2 (printed)
ISBN 952-15-1504-X (PDF)
ISSN 1459-2045

ABSTRACT

The increasing fastness of change in business environment is forcing companies to look for more efficient methods to maintain and improve their competitive position on the market. The methods are searched among cooperation and networking operations between companies and, especially on the supply field, between supply chains. Enterprises with limited resources are facing this challenge even harder. Efficient methods to learn from other organizations and other's experiences are essential on those efforts.

This study explores the possibilities of benchmarking as a learning method in the context of supply. Benchmarking is a well-known method, but its effective applicability to organizations with limited resources as well as company networks is not examined enough. Also the process of benchmarking as an efficient learning method is not proved according to knowledge creation theories. Therefore, the theoretical findings of this study are gathered into a new model, Group Benchmarking. The model considers the shortages of existing benchmarking types as well as the needs of means for developing supply chains toward networking. The constructive approach has been used in developing the model on the basis of supply chain management and benchmarking theories. When proving the process of learning in the construction, the knowledge management theories form a conceptual background.

The construction has been proved to be feasible in two case studies. The case studies show, firstly, that the constructed model is functional and can be accomplished successfully. Secondly, it offers well focused knowledge for participating companies to develop their own supplier networks. Thirdly, the model increases organizations' knowledge about their weaknesses and strengths on the business environment as well as gives a path to achieve their future targets by learning from other organizations. Fourthly, it attends as a cooperative, resource-saving forum for companies with limited resources, which are not forced to "invent a wheel again".

Keywords: Benchmarking, Knowledge, Management, Model, Network, Supply Chain

ACKNOWLEDGEMENTS

This dissertation process revealed how important the support and encouragement of people close to the researcher are. My process took five years and it would not have been finished without the people to whom I want to give my specific thanks.

First of all, I wish to thank my supervisors Docent *Kaj U.Koskinen*, Professor *Hannu Jaakkola*, Dr. *Jari Palomäki* and Dr. *Rainer Breite* from Tampere University of Technology for their advice and experience that I was able to utilize. The comments of Professor *Hannu Vanharanta* were important in guiding me to the right direction. I am also very grateful of all the practical arrangements during the work taken care of Ms. *Ulla Nevanranta*.

To my reviewers, Professor *Pekka Kess* and Professor *Antti Paasio* I wish to give my thanks for their fair and valuable comments that they have given me during the evaluation process of this dissertation.

The companies that participated the empirical case studies of this dissertation deserve my warm thanks. Especially I want to mention Ms. *Kati Ollila* who believed in my ideas during the whole process and was continually interested in the progress of the process.

There have been some financial supporters whose contribution for this work has been critical: HAMK foundation, the Finnish Cultural Foundation, the High Technology Foundation of Satakunta and Kemira foundation.

Finally I owe the greatest gratitude to my family for their understanding and support. Especially I am grateful for my dear daughters, *Heidi and Henriikka* – who patiently waited for their share of my time when I was working with my thesis.

Pori, November 2005

Anne Kleemola

TABLE OF CONTENTS

ABSTRACT	i
ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii
LIST OF FIGURES	vi
LIST OF TABLES	vii
LIST OF ABBREVIATIONS AND DEFINITIONS	viii
1 INTRODUCTION	1
1.1 Background	1
1.2 Research context	2
1.3 Problem formulation	3
1.4 Objectives of the Study	5
1.5 Philosophical Background and the Research Approach	6
1.6 Structure of the Thesis	10
2 SUPPLY CHAIN MANAGEMENT	12
2.1 A Historical Perspective on the Supply Chain Management	13
2.2 The Supply Chain	14
2.2.1 Defining Supply Chain and Related Concepts	15
2.2.2 The Philosophy of Supply Chain Management	18
2.2.3 Features of Buyer/supplier Relationships	20
2.3 The Network	28
2.3.1 Network Concept in General	28
2.3.2 The Supply Network Concept	29
2.4 Developing Buyer/supplier Relationships	32
2.5 Summary of the Chapter “Supply Chain Management”	42
3 CONCEPT OF KNOWLEDGE MANAGEMENT	44
3.1 Epistemological View	44
3.2 A Definition of Knowledge	47
3.3 Knowledge Types	48
3.4 Creating knowledge	52
3.4.1 Knowledge Spirals	52
3.4.2 From Individual Learning to Organizational Learning	58

3.5	Knowledge Enablers	60
3.6	Summary of the Chapter “Concept of Knowledge Management”	66
4	CONVENTIONAL BENCHMARKING MODEL	67
4.1	A Definition of Benchmarking	67
4.2	History of Benchmarking	69
4.3	Benchmarking as a Tool	72
	4.3.1 Different Benchmarking Types	74
	4.3.2 Benchmarking Practice Models	79
5	BENCHMARKING PROCESS	82
5.1	Generic Benchmarking Process	82
5.2	Practices vs. Metrics	86
5.3	Tools and Techniques for Benchmarking	90
	5.3.1 Choosing the Benchmarking Subject	90
	5.3.2 Analyzing the Gap between Performances	92
	5.3.3 Concluding the Tools and Techniques	94
5.4	How to Find the Best Practices?	95
5.5	Some aspects of Benchmarking Supply Chains	100
5.6	Summary of the Chapters “Conventional Benchmarking Model” and “Benchmarking Process”	102
6	A NEW GROUP BENCHMARKING MODEL	106
6.1	ABC-classification Method	110
6.2	Supplier’s Portfolio Classification Method	110
6.3	A Form as a Boundary Object	112
6.4	Strategic Supply Chain Positioning Matrix Method	114
6.5	Group Benchmarking	118
	6.5.1 Bilateral Benchmarking	119
	6.5.2 Cooperative Benchmarking	120
	6.5.3 Collaborative Group Partnership Benchmarking	120
	6.5.4 Collaborative One-to-one Partnership Benchmarking	120
6.6	Summary of the Chapter “A New Group Benchmarking Model”	121
7	THE ROLE OF GROUP BENCHMARKING MODEL IN THE EXISTING KNOWLEDGE MANAGEMENT THEORIES	123
7.1	The Knowledge Spiral in Group Benchmarking	123
	7.1.1 Socialization	123

7.1.2	Externalization	124
7.1.3	Combination	124
7.1.4	Internalization	125
7.1.5	The Process of Knowledge Creation and Transfer in the Group Benchmarking Model	125
7.2	Enablers in Group Benchmarking	127
7.3	Five-Phase Model of the Organizational Knowledge Creation Process in Group Benchmarking	128
7.4	Summary of the Chapter “The Role of Group Benchmarking Model in the Existing Knowledge Management Theories”	133
8	TESTING THE FEASIBILITY OF THE GROUP BENCHMARKING MODEL	134
8.1	CASE 1: Developing Networks Through Benchmarking in the Joinery Industry	134
8.1.1	The Case Company – Harjavalta Oy, Puustelli-keittiöt Oy	134
8.1.2	The Order-delivery –process	135
8.1.3	Analyzing the Supplier Network	136
8.1.4	The Results in the Case Study	137
8.1.5	Conclusions of the Case 1	141
8.2	CASE 2: Group Benchmarking – a Model Toward Effective Supply Networking	142
8.2.1	The Companies in the Case Study	143
8.2.2	Analyzing the Suppliers in the Companies	144
8.2.3	Positioning Suppliers in the Strategic Supply Chain Matrix	145
8.2.4	Performing Group Benchmarking	145
8.2.5	The Longitudinal Study	151
8.2.6	Conclusions of the Case 2	154
9	DISCUSSION AND CONCLUSIONS	155
9.1	Theoretical Contributions	155
9.2	Practical Contributions	156
9.3	Discussion of the Results	157
9.3.1	The Main Objectives	157
9.3.2	The Minor Objectives	158
9.4	Evaluations of the Methodology	159
9.4.1	Validity of the Research	160
9.4.2	Reliability of the Research	160
9.5	Future research	161

Appendix 1	The Group Benchmarking Model
Appendix 2	The Supplier Positioning Matrix Form

LIST OF FIGURES

Fig. 1.1	The position of the constructive research approach as a model	8
Fig. 1.2	The structure of the thesis	11
Fig. 2.1	Type of competitive relationships	20
Fig. 2.2	Continuum of possible sourcing options	22
Fig. 2.3	The networks of the focal firm	31
Fig. 2.4	The key transition from open-market negotiations to collaboration	34
Fig. 3.1	Four modes of knowledge conversion	53
Fig. 3.2	Knowledge Spiral	55
Fig. 3.3	Learning levels influencing formation and management of cooperations	59
Fig. 4.1	Development in the art of benchmarking	71
Fig. 4.2	Classification of benchmarking	77
Fig. 4.3	Typology of externally focused benchmarking activities	78
Fig. 4.4	Nature of benchmarking activities	78
Fig. 5.1	Generic benchmarking process	84
Fig. 5.2	Benchmarking for best practices	88
Fig. 5.3	A supply chain network	102
Fig. 6.1	The new model consisting four separate methods	108
Fig. 6.2	Purchasing product portfolio and supplier portfolio	111
Fig. 6.3	The process from the positioning matrix Form to graphical format	115
Fig. 6.4	An example of illustrating the situation of present and future performance of a company as well as comparing them to the present performance of another company	116
Fig. 6.5	Examples of different comparison alternatives obtained from positioning matrix material	117
Fig. 6.6	The Group Benchmarking model	119
Fig. 6.7	Group Benchmarking as a continuous process	122
Fig. 7.1	Creating and transferring knowledge through the Group Benchmarking	126

Fig. 7.2 Model for developing and managing supplier networks	127
Fig. 7.3 Five-phase model of the organizational knowledge-creation process	129
Fig. 8.1 Process map of Puustelli-keittiöt Oy main processes	135
Fig. 8.2 The supplier's portfolio classification in the case company	138
Fig. 8.5 The present network situation in all participating companies on Stages 2 and 3	148
Fig. 8.6 Examples of using positioning matrixes for collaborative one-to-one partnership benchmarking.	150
Fig. 8.7 Examples of comparison between the first and second studies	153

LIST OF TABLES

Table 2.1 Classifications of networks within the literature	29
Table 2.2 Types of supplier relationship	35
Table 2.3 The levels of subcontracting as a function of trust	36
Table 2.4 General features of the Strategic Competitive Positioning Model	38
Table 2.5 Incremental benefits achieved at each stage of the Strategic Competitive Positioning Model	39
Table 2.6 The Supply Chain Positioning Matrix	40
Table 3.1 The autopoietic vs. the traditional view of knowledge	46
Table 3.2 Two types of knowledge	49
Table 3.3 Three epistemologies	50
Table 3.4 Twelve types of knowledge in organizations	51
Table 3.5 Instruments for the management of explicit knowledge	56
Table 3.6 Instruments for the management of tacit knowledge	57
Table 5.1 Tools and techniques for the analysis gap and integration of the benchmarking process	93
Table 5.2 What to benchmark?	98
Table 5.3 The typical problems, advantages and the critical success factors of general benchmarking process	105
Table 8.1 The supplier's portfolio classification in the companies. The Figures are numbers of suppliers in each class	144

LIST OF ABBREVIATIONS AND DEFINITIONS

Abbreviations

ACR	= Arms-length Contractual Relationship
AHP	= Analytical Hierarchy Process
APICS	= The Association for Operations Management
CAD	= Computer Aided Design
CFA	= Common Factor Analysis
EDI	= Electronic Data Interchange
ISO	= International Organization for Standardization
JIT	= Just in Time
MRP1	= Material Requirements Planning
MRP2	= Manufacturing Resource Planning
OCR	= Obligational Contractual Relationship
PCA	= Principal Component Analysis
PDCA	= Plan, Do, Check, Act
QFD	= Quality Function Deployment
SCM	= Supply Chain Management
SCOR	= The Supply Chain Operations Reference -model
SECI	= Socialization, Externalization, Combination, Internalization
TQM	= Total Quality Management

Definitions

Method: A way of doing something, especially in accordance with a definite plan (Webster's Encyclopedic Unabridged Dictionary of the English Language).

Methodology: A set or system of methods, principles, and rules for regulating a given discipline, as in the arts or sciences. The study of the principles underlying the organization of the various sciences and the conduct of scientific inquiry. A branch of pedagogies dealing with analysis and evaluation of subjects to be taught and the methods of teaching them. (Webster's Encyclopedic Unabridged Dictionary of the English Language)

Model: Mean someone or something set before one for guidance or imitation.

1 INTRODUCTION

1.1 Background

During past years several various definitions have been offered for supply chain after the concept started to gain popularity. The definition of supply chain has been widening from material flow between the raw material suppliers and end users to the concept including also the information flow, achievement of competitive advantage and added value in the whole chain. Nowadays the evolution of network-like operations within and between firms is common focusing on the partnership kind of relationship and cooperation among wide variety of activities. In the literature (e.g. Camp, 1995) there are articles and empirical descriptions about success of big and multinational companies e.g. in automotive industry, operating in networked organizations and especially about network sourcing among their suppliers and subcontractors. One reason for the tendency might be that they are supply chains and networks, not firms, competing. In addition to big organizations, also enterprises with limited resources, i.e. the enterprises with less than 750 employees, are forced to adjust their operations because they often act as roles of subcontractor for big companies so being a part of the wide supply chain or a network. However, they probably find difficulties in trying to apply the similar practices into their circumstances due to a lack of human, financial and time resources and especially because the literature of supply chain practices is more academic than practical in nature.

Benchmarking is defined to be a method to learn success (Reider, 2000, p.xii) i.e. it is a learning method, which is accomplished by transferring knowledge from one company to another. The importance of knowledge is widely acknowledged. Already in 1993 Drucker (1993) argued that in the new economy, knowledge is not just another resource alongside the traditional factors of production – labor, capital, and land – but the only meaningful resource. However, there is not much literature about examination of benchmarking as a method although its usage in development processes is wide. Also the usage of benchmarking seems not to be very efficient because of its trivial nature in practice.

This research was accomplished in order to decrease both deficiencies; a lack of methodologies for supply chain development and a need for research of benchmarking method, by constructing one new model. Additionally, this study aims at making a conceptual examination about knowledge management in benchmarking context in order to strengthen the existing theories. This research has been tested also empirically during the years 2000 and 2002

and is presented in two separate case studies in this dissertation in order to test and validate the created construction.

1.2 Research context

Nowadays supply chain is seen as a remarkable source of competitive advantage in the value creation process of companies. How well the supply chain as whole works to fulfill the customer demands is the decisive factor in company's success on the market. Cooperation with the companies of the supply chain is necessary, because the strongest competitors are those who can manage the fully integrated supply chain including external customer as well as prime suppliers, their suppliers, and their supplier's suppliers.

As the concept of supply chain management (SCM) has gained acceptance in the business community, the strategies required to be successful in this environment should be identified. As Hamel (2000) notes, business concepts or business models are becoming obsolete at an accelerating pace. Part of identifying a supply chain strategy is facing today's issues on customer demand. Also recent trends such as outsourcing and mass customization are forcing companies to find flexible ways to meet customer demand. The focus is optimization core activities to maximize the speed of response to changes in customer expectations. (cf. Chase et al., 2000) Supplier partnerships can be the key in enhancing the performance of manufacturing companies when optimizing core activities. In this point of view also the importance of small and medium sized enterprises is growing as loops of the supply chains.

Successful supply chain management requires the effective and efficient management of a portfolio of relationships. Firstly, firms must match the optimal type of relationship to the various product, market, and supplier conditions. Secondly, they must adopt the appropriate management approach for each type of relationship. (cf. Duclos et al., 2003) There is strong recognition in the practitioner literature of the importance of supplier relationships and the need to establish "partnerships" has been widely espoused (Forsyth, 2001; Fretty, 2001; Kerns, 2000). Rackham (2001) states that successful partnerships mean radical redesigning of business relationships. He adds that partnership creates new value that could not be achieved within the existing vendor/customer roles. Surprisingly, the concept of partnership is poorly understood. Many authors (e.g. Cox, 1996; Saunders, 1997) have identified the advantages that it can bring but far less has been published on the attributes of partnership itself. What is known is that partnerships are "close" relationships and thus, the level of closeness of relationship is an appropriate viewpoint for exploring supplier partnerships. It can be assumed that developing partnerships and network kind of activities in supply chain management improves companies'

competitive position. Yet, it appears that it is one thing to talk about supply chain management and quite another to implement a program for developing supplier partnerships. Especially the managers of companies with limited resources could find it useful to combine their forces and utilize the resources and each other's competences in a common supply chain but also in separate supply chains as horizontal cooperation.

It can also be assumed that the pace of change is so rapid nowadays that no single organization or a supply chain can ever control or dominate all effective operating practices and good ideas. To be a marketplace leader, one must look outward of the organization – as well as inward – for constant improvement and new ideas. Customers everywhere are sending the same message to their suppliers: “faster, cheaper, better”. Benchmarking might offer a method for a quick learning from other organizations.

Current literature does not present in any types of benchmarking an association of knowledge management with benchmarking learning process. Nor does it clearly evaluate the applicability of the benchmarking types to different organizations, industries, companies or knowledge types. However, benchmarking is considered as an effective method for improving and developing performances of companies with transferring information and knowledge between companies as well as creating new knowledge during the process. Therefore, it seems to be very natural idea to take into consideration the knowledge creation point of view when planning a new benchmarking process.

1.3 Problem formulation

The trend of competing against supply chains instead of traditional companies demands a better understanding of the supply chain management. Supply chain management is a subject, which is much written and examined causing a variety of conceptions on the field (cf. Cox et al., 1995; Lummus et al., 1997; Quinn, 1997; Womack et al., 1990; Christopher, 1998; Saunders, 1997; van Weele, 2002). The development has led to wider conceptions of supply chain, which also cause wider integrities of companies to manage and control. Companies together with their suppliers and supplier's suppliers form a broad network of different relationships and operations. In order to react and respond quickly enough to fluctuations in demand, companies are to manage the relationships between their suppliers as well as their customers. It can be assumed that close partnerships and network sourcing are developed for that need (Hines, 1994, 1996; Cox, 1996).

The need for developing supply chains toward close relationships and network sourcing, demands a better understanding of the characteristics of different relationships between

companies, especially between buyers and suppliers. Suppliers can be classified and the relationships divided into classes according to different features like trust and suppliers role in design of products (cf. Ansari et al., 1997; McHugh et al., 1995; Kuitunen et al., 1999). The knowledge about the class of each supplier is a necessary beginning. It gives a clue about the importance of the relationship. Also the characters of the relationships can be determined according to each class as well as all the levels on network operations (Hines, 1994; Lamming, 1993; Ansari et al., 1997). It can be assumed that methods for classifying suppliers exist and are helpful in order to develop the relationships toward network operations. It can also be assumed that the characteristics of relationships are well described in literature. However, new evaluation and analysis methods for network operations and development are needed (Lehtinen, 2001, p.109) as well as theories, which take into account a company's abilities to manage its supply chains (Breite, 2003, p.195). Companies are in need of ways to develop relationships in addition to the knowledge about what kind of relationships they need in order to succeed in networking operations.

The problem of not having evaluation and analysis methods for developing network operations is analyzed to be caused by three reasons. The first is that there is a lack of literature suggesting that such work should be undertaken. Second, there is a scarcity of especially western exemplars to be followed. The third reason is that, with a very few exceptions, there is an absence of knowledge about how to realize such developments and in particular the strategies and techniques to be used. (Hines, 1996)

Academics as well as practitioners are familiar with methods of learning practices. The fastness of change causes limitations for alternatives of methods. It can be assumed that benchmarking is one of the best methods because of its nature of learning something that is proved to be a best practice by another company or organization. Another reason to utilize benchmarking process is that it enables an organization to learn something that is in intangible format; knowledge and within knowledge, even in tacit form. Benchmarking is widely used by practitioners and also literature presents a variety of benchmarking types (Bendell et al., 1993; Hannus, 1994; Camp, 1989; Karlöf, 1995; Tuominen, 1997; Reider, 2000; Boxwell, 1994; Jackson et al., 2000a). It can be assumed that the process of benchmarking is well defined and there are multiple alternatives to choose the type of benchmarking. However, companies often find the process too trivial to give answers to specific problems. Also the guides for selecting the benchmarking subject and the best practice target are experienced difficult for especially small and medium sized companies. Literature is written about the world-class companies with good opportunities to choose freely the best practice target (cf. Reider, 2000). Situation is

probably different when a company performing the learning process is smaller and has no access to the possible best practice targets. Even more complicated is to find enough resources; human and financial to perform that kind of process. Increased usage of research partnerships is getting necessary (cf. Ralston et al., 2001). It can be assumed that networking could be the idea also in common development projects among the enterprises with limited resources. For common purposes they need the applicable methodology for cooperative learning by benchmarking and especially for supply chain field.

It can be assumed that benchmarking is a profitable learning method. It is also known that learning is, among other things, transferring knowledge from one person to another or from an organization to another (cf. Nonaka et al., 1995; Senge, 1990; Goh, 2002; Lindsay et al., 1977). There are different attitudes about the definition of knowledge, possibilities to transfer knowledge and the types of knowledge. However, creating knowledge forms the basis for a competitive advantage (cf. Nonaka et al., 1995) and the fastness of learning the best practices determines the position in the competition. How the knowledge transferring i.e. organizational learning happens in the benchmarking process is the field that is not examined. How the process of knowledge creation can be utilized in the cooperative benchmarking is also an interesting question that is discussed in this research.

As presented above, the research aim of this thesis is three-dimensional. First, the researcher constructs a model to help enterprises with limited resources to build a road map toward successful supply network operations. Second, in that effort the researcher uses benchmarking process, which needs to be developed in order to make it applicable to cooperative development project. Third, the researcher justifies the theories of knowledge management with the help of the first and second dimensions. These dimensions are fulfilled in the new construction. The problem formulation is presented in Figure 1.2 together with the structure of the thesis.

1.4 Objectives of the Study

The objectives of this study are as follows:

1. To show that a new model for developing supply network with the help of benchmarking method can be constructed and it is feasible.
2. To explore the connection between knowledge creation and benchmarking concept as a learning environment.
3. To explore network context related to supply chain management and the methods for developing buyer/supplier relationships in the context.

The objectives 2 and 3 are bases for the objective 1 because they determine the separate methods to be chosen in the new construction.

The purpose of the study is to construct a model which will improve the operations of organizations. This will appear in the theoretical background as pointing out the deficiencies of existing methods and developing them in the new model. In choosing the organizations for case-studies this is taken into consideration by selecting the companies which are focusing on the operations concerned i.e. supply chain development. The processing of the empirical material is executed in a way that will improve the analysis and utilization of the material and at the same time develop the methods concerned. In the evaluation of the results in this study the purpose is considered as analyzing the benefits of the new model in the improvement point of view.

1.5 Philosophical Background and the Research Approach

This study is conducted according to the steps of constructive research originally developed by Pertti Järvinen and published of Lukka (2000). The study is a typical constructive business field study; it applies both hermeneutics and positivism, uses both qualitative and quantitative methods and contains a strong conceptual analysis, which builds a basis for theoretical framework and for the new construction. It also offers an ideal result of a constructive research project which is a real-world managerial problem solved by an implementation of a new construction. In this construction the transformation of qualitative data to quantitative form in data gathering decreases the typical problem in qualitative analysis when the preunderstanding and interpretation of data are affected by the researcher. In qualitative research the personality of the researcher is a key research instrument (Gummesson, 2000) and a human being is suspected not to be rational and objective (Pihlanto, 2002).

According to Olkkonen (1994), there are two traditions of science; positivism and hermeneutics. Hermeneutics consists of research of meaning of the matters and the mind. The purpose of hermeneutics is to help in interpreting accurately the more or less unclear parts of the studied phenomena. It is often called as interpretative method. Interpretation means that the researcher examines his/her observations through the theoretical presumptions. Hermeneutics emphasizes the relation between the facts and values, on the contrary to positivism, which excludes values from the scientific thinking. The typical types of hermeneutic research are case-study and action-oriented. Positivism emphasizes that the purpose of science is to study the reoccurring and uniform features that happen under the laws of nature. According to the positivistic approach, the researcher proposes claims that then must be tested and proved either right or wrong. The results are reported in a mathematical form. Positivism emphasizes

especially the cause-and-effect relations, and describes the explanation model related to them by using the statistical methods. The approach has a connection to empirism and it has to be possible to form the data in the way that it can be measured. The method of positivistic science is explanatory; the types of research are theoretical and/or inductive-empirical.

Although the constructive research approach has been explicitly developed in the field of business administration (Kasanen et al., 1991; Lukka et al., 1998), its potential application field is broad. The constructive approach can be understood as a methodological approach paralleling the four approaches defined by Neilimo et al. (1980). In this regard, the other methodological options include the conceptual, nomothetical, action-oriented and decision-oriented research approaches. The nomothetical approach is closely linked to the modernist (positivist) research tradition. The underlying explanatory model is causal and attempts are made to state the findings in the form of general laws. The decision-oriented approach focuses on analytical modelling research and is usually grounded on assumptions similar to the nomothetical one. However, there is a fundamental difference between the two in the nature of research: in contrast to what applies to nomothetical studies, the results of the decision-oriented studies are normative attempts and their results are meant, for instance, to help management in running their firms. The action-oriented approach provides a kind of alternative to the nomothetical approach as it brings the human being into the focus of analysis. The explanatory model is often teleological and the historical background of the phenomena studies is carefully examined and considered. The emphasis is usually put on gaining a thorough understanding of the studied subjects, but the purpose can include and active participate in change processes. The conceptual approach again is distinguished by its priori basic nature: it produces new knowledge primarily through the “method of reasoning”. Its aim is to create a concept system, which aids in describing different phenomena and creates instructions for present and future actions. To these four options known for a longer time, the constructive approach adds one, which is normative and empirical by its very nature. The Figure 1.1 illustrates the position of the constructive research approach in these terms.

Conceptual approach	Nomothetical approach
Decision-oriented approach	Action-oriented approach
	Constructive approach

Fig. 1.1 The position of the constructive research approach as a model (Kasanen et al., 1993, p.317)

The constructive research approach has certain common aspects with the decision-oriented one. In both cases a theoretical analysis, thinking etc. plays an important role leading to the creation of a new entity. However, the decision-oriented approach typically uses the method of deduction, while heuristic innovations are characteristic of the constructive research approach. The main difference between the two lies in the fact that the constructive approach entails always an attempt to explicitly test the practical usability of the constructed solution, which is typically lacking in the decision-oriented studies. (Lukka, 2003)

Another approach of Neilimo and Näsi's (1980) classification, which reminds the constructive approach, is the action-oriented one. In both cases the direct and pragmatic empirical connections, and the application of case study method, play a major role. However, the major difference between the action-oriented and the constructive studies in general lies in the fact that the former studies typically aim at careful description and thorough understanding of empirical phenomena without a problem-solving type of normative purposes, which is characteristic to the constructive studies. Also, the action-oriented research does not seem to aim at creating explicit managerial constructions. (Lukka, 2003)

The constructive research approach can be considered as a form of case research. Common to both approaches is the researcher's operation directly in the field, small sample sizes, and the application of ethnographic methods (observation, interviews and analysis of archives) as the basis of data gathering in the empirical part of the study. It is also typical to rely mostly on qualitative research methods, even though the application of quantitative methods is possible, too.

The core features of the constructive approach include that it:

- focuses on real-world problems felt relevant to be solved in practice,
- produces an innovative construction meant to solve the initial managerial problem,

- includes an implementation attempt of the developed construction and thereby a test of its practical applicability,
- implies a very close involvement and cooperation between the researcher and practitioners in a team-like manner, in which experiential learning is expected to take place,
- is explicitly linked to prior theoretical knowledge,
- pays particular attention to reflecting the empirical findings back to theory; the nature of the theoretical linkage varies, and – due to the partly heuristic nature of the constructive research process – cannot be predicted beforehand (Lukka, 2000).

As a basic meaning for the constructive approach could be considered a solution to a real-world managerial problem, implemented and having both great practical and theoretical contribution (Lukka, 2000). The process of constructive approach is described as follows:

1. To find a practical relevant problem, which also has potential for theoretical contribution.
2. To examine the potential for long-term research cooperation with the target organizations.
3. To obtain deep understanding of the topic area both practically and theoretically.
4. To innovate a solution idea and develop a problem solving construction, which also has potential for theoretical contribution.
5. To implement the solution and test how it works.
6. To ponder the scope of the applicability of the solution.
7. To reflect the findings to prior literature.

Another important research approach in this study is a conceptual approach. This approach is helpful when examining the concepts of supply chain, supply chain management, knowledge management and benchmarking. In this study a special challenge of conceptual variety is faced because of the multi scientific nature of the research field. Also some features of action-oriented approach can be found in this study. The role of researcher is actively involved during the whole process and the goals are negotiated with the companies. So, these three concepts form a basis for the new construction.

1.6 Structure of the Thesis

The structure of the thesis is presented in Figure 1.2. The study consists of four parts. *The first part* of the thesis, Introduction, introduces the research area, describes the objectives of the study and presents the research strategy.

The second part presents the theoretical background and the framework for the new construction. The part consists of four chapters:

Chapter 2: Supply Chain Management presents the basic definitions of the field, its history and the features essential for buyer/supplier relationships in the supply chain and especially supply network. The chapter explores methods for developing supplier networks choosing one as a basis for the new construction.

Chapter 3: Concept of Knowledge Management explores knowledge as a definition, different knowledge types and the ideas of creating and transferring knowledge between individuals and organizations.

Chapter 4: Conventional Benchmarking Model defines benchmarking methods, benchmarking's history and explores different benchmarking methods and practice models.

Chapter 5: Benchmarking Process presents benchmarking process in general, compares practices and metrics in the process and highlights the tools used in benchmarking processes building a basis for the new construction presented in this study.

The third part examines the new construction: Group Benchmarking together with the separate methods assisting the new model. The part also explores the construction by strengthening Knowledge management as a theory on background. The third part consists of two chapters:

Chapter 6: A New Group Benchmarking Model describes the construction created in this study. It explains the separate methods included in the construction and their meaning for the whole model.

Chapter 7: The Role of Group Benchmarking Model in the Existing Knowledge Management Theories presents the process of creating and transferring knowledge in the new construction.

The fourth part presents the Empirical Tests of the Model in Chapter 8, and finishes the study in Chapter 9: Discussion and Conclusions, which presents the conclusions of this study. The chapter also highlights the contributions of the study and suggests some ideas for future research.

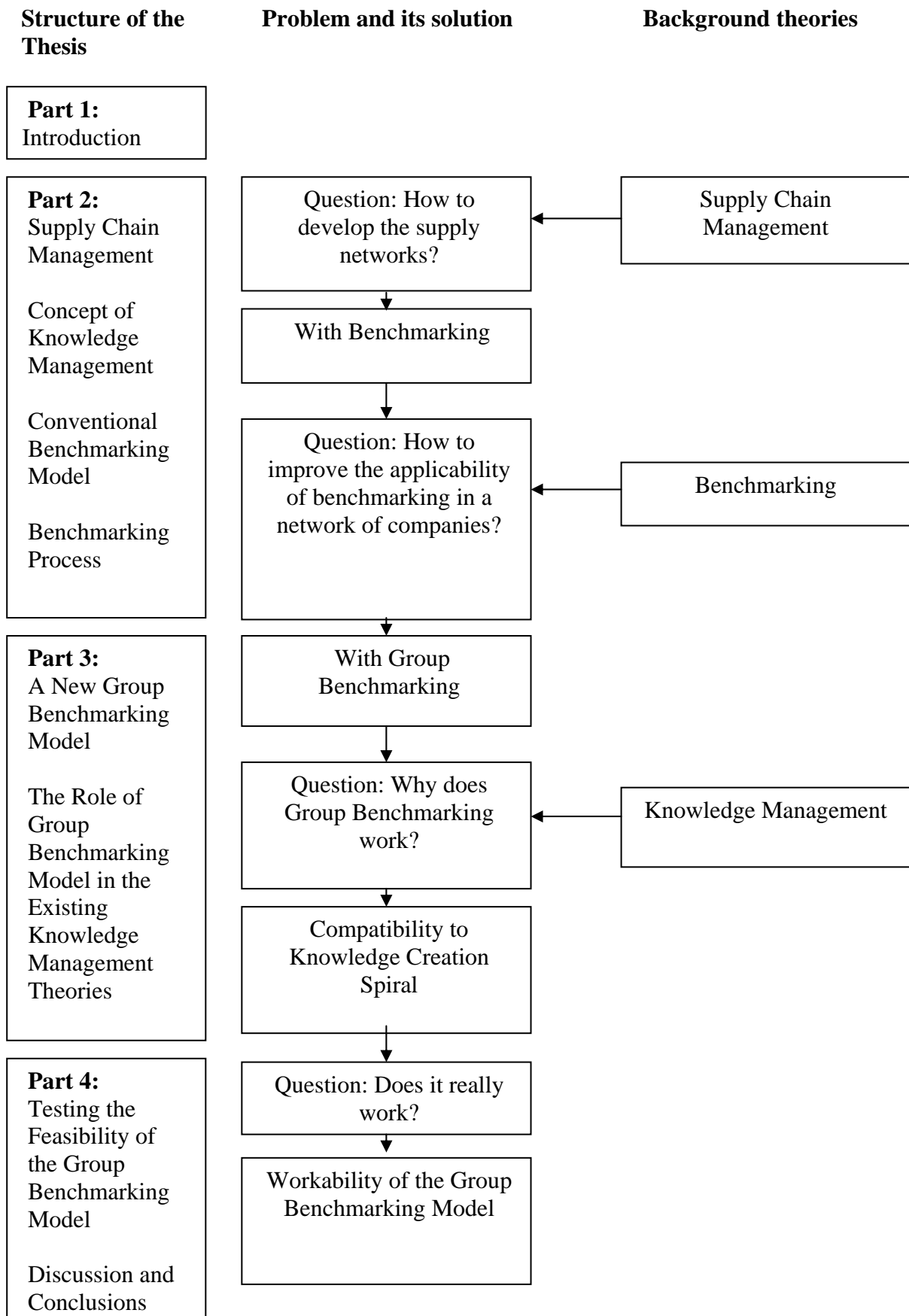


Fig. 1.2 The structure of the thesis

2 SUPPLY CHAIN MANAGEMENT

This chapter has been divided into five sections. In the first section, the idea of historical review is to show how the concept of supply chain has changed during the last decades and what the reasons of the changes are. This will make it easier to understand the current conception of supply chain as well as a variety of concepts related to supply chain.

In the second section the definitions of supply chain together with the related concepts; Supply Chain Management (SCM) and partnership, are explored. The definitions of separate authors will be analyzed and whether the differences between definitions are meaningful is examined. This section explores the main views of supply chain management as a review from literature. There can be found three main concepts of buyer/supplier relationships by Ellram (1991), Sako (1992) and Cox (1996). There are also some features that are essential in supply chain management giving the basis for the modern successful supply chain i.e. trust and commitment as well as Lean model. The section is important in showing the variety of views, which further explains the difficulties of companies in developing their supply chains to the best possible direction.

The third section explores the concept network in general and supply network in particular. The concept network comes up as a developed version of supply chain and as a form of sourcing (network sourcing) in literature. Because network seems to be the type of supplying that is aimed at by many companies, it needs to be examined in more details.

Finally, in the fourth section, the ways for companies to develop their supply chain toward the competitive advantage will be examined. In practice there are different situations in which buyer/supplier relationship appears. When an industrial productive company buys food supplies for its personnel canteen, it does not need to make a technical design and development together with a supplier of potatoes. Instead, it buys potatoes from a supplier, which is cost effective and delivers good quality. Whereas, when the company buys new high tech production equipment, long and reliable relationship with the supplier is beneficial for both parties. When it outsources some components needed in production for a supplier, the buyer/supplier relationship is different but again trust and long-term contract are necessary. The aim is to find understandable features of different types of buyer/supplier relationships for these and many other supplying situations. The usual problem in developing supply operations is to know the current

relationships in use, the best possible relationships for each situation and the way to develop the relationships. The fifth section concludes Chapter 2.

2.1 A Historical Perspective on the Supply Chain Management

The changes in production and operations management activities have strongly affected the changes in supply chain initiatives and that is why a short review about historical aspects will be made. During the period from 1960 to 1975, corporations had vertical organization structures and optimization of activities was focused on functions. Relationships with vendors were win-lose interactions, and many times adversarial. (Chandra et al., 2000) The emphasis was on materials planning, utilizing materials requirements planning techniques, inventory logistics management with one warehouse multi-retailer distribution system, and push and pull operation techniques for production systems.

In the timeframe 1975 to 1990, corporations were still vertically aligned but several were involved in process mapping and analysis to evaluate their operations. There was realization by organizations of the benefit of integration of functions such as product design and manufacturing. Various quality initiatives, such as the total quality management (TQM) philosophies of Deming, Juran, and Crosby as well as ISO standards were initiated by many organizations (Chandra et al., 2000).

Starting in 1990's, corporations all over the world have been experiencing increasing national and international competition. Strategic alliances among organizations have been growing. Organization structures are starting to align with processes. Manufacturing systems in organizations have been enhanced with information technology tools such as enterprise resource planning, distribution requirements planning, electronic commerce, product data management, collaborative engineering etc. There has been a growing appreciation in many firms of total cost focus for a product from its source to consumption, as opposed to extracting lowest price from immediate vendor(s) (Turbide, 1997). A number of factors have contributed to this shift (Chandra et al., 2000). First, there has been a realization that better planning and management of complex interrelated systems, such as materials planning, inventory management, capacity planning, logistics, and production systems, will lead to overall improvement in enterprise productivity. Second, advances in information and communication technologies complemented by sophisticated decision support systems enable designing, implementing and controlling strategic and tactical strategies essential to delivery of integrated systems. The availability of such systems has the potential of fundamentally influencing enterprise integration issues.

There has also been an increased reliance on purchased materials and outside processing with a simultaneous reduction in the number of suppliers and greater sharing of information between vendors and customers. The increase of customized products instead of mass production has been a major change in the marketplace. This has resulted in the emphasis on greater organizational and process flexibility and coordination of processes across many sites. The need for rule-based, real-time decision support systems to attain organizational and process flexibility, as well as to respond to competitive pressure to introduce new products more quickly, cheaply and of improved quality have become the decisive factors in tough competition (Chandra et al., 2000).

Already in 1985 Michael Porter advocated that the coordination of complex global networks of company activities is becoming a prime source of competitive advantage (Spekman et al., 1998). According to Porter (1985), the secret is to achieve breakthrough changes and improvements so that the expertise of members of the value-added network is shared throughout the system. After that, 1990 Hahn et al. wrote as a final analysis that a firm's ability to produce a quality product at a reasonable cost, and in a timely manner, is heavily influenced by its suppliers' capabilities. Consequently, without a competent supplier network, a firm's ability to compete effectively in the market can be hampered significantly. Before that time, very little publication space has been devoted to the subject (Hahn et al., 1990).

2.2 The Supply Chain

Section 2.2.1 will present definitions for supply chain and the related concepts. The presented definitions of the terms supply chain, supply chain management and partnership by different authors seem to vary in some degree. However, the section will show that there is no discrepancy between the different definitions, but the differences are mostly in the wideness of the whole supply chain concept. Section 2.2.2 will point one way of thinking supply chain management being to describe tools and techniques that provide for increased operational effectiveness and efficiency throughout the delivery channels. Additionally, Section 2.2.3 will describe the features of successful supply chain; it comply with network sourcing by adapting the features of Lean philosophy and having trust as a basis for the relationships between companies operating in the chain.

2.2.1 Defining Supply Chain and Related Concepts

During past years several various definitions have been offered for *supply chain* after the concept started to gain popularity. The APICS Dictionary describes the supply chain as (Cox et al., 1995):

1. The processes from the initial raw materials to the ultimate consumption of the finished product linking across supplier-user companies; and
2. The functions within and outside a company that enable the value chain to make products and provide services to the customer.

There is also a definition of supply chain as the network of entities through which material flows. Those entities may include suppliers, carriers, manufacturing sites, distribution centers, retailers, and customers (Lummus et al., 1997).

The Supply Chain Council (1997) uses the definition: “The supply chain – a term increasingly used by logistics professionals – encompasses every effort involved in producing and delivering a final product, from the supplier’s supplier to the customer’s customer. Four basic processes – plan, source, make, deliver – 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.” Later the term “return” has been added to the concept as the fifth process. Supply Chain Council has also published The Supply-Chain Operations Reference-model (SCOR) based on the terms. It will be discussed later in this study.

Quinn (1997, p.43) defines the broader supply chain as “all of those activities associated with moving goods from the raw-materials stage through to the end user. This includes sourcing and procurement, production scheduling, order processing, inventory management, transportation, warehousing, and customer service. Importantly, it also embodies the information systems so necessary to monitor all of those activities.” This definition mentions separately information systems, which are now in essential role in all business life.

In addition to defining supply chain, several authors have further defined the concept of *supply chain management*. The term was used originally in the early 1980’s (Oliver et al., 1992; Houlihan, 1984) to refer to the management of materials across functional boundaries within an organization but was soon extended beyond the boundary of the firm to include “upstream” production chains and “downstream” distribution channels (Womack et al., 1990; Womack et al., 1996; Harland et al., 1990; Christopher, 1998). As defined by Ellram et al. (1993, p.1), supply chain management is “an integrating philosophy to manage the total flow of a distribution channel from suppliers to ultimate customer”. Handfield et al. (1999, p.2) stress

competitive advantage in their definition of supply chain management as “the integration of these activities through improved supply chain relationships, to achieve a sustainable competitive advantage”. Montczka et al. (1997, p.69) state that “integrated supply chain management is about going from external customer and then all the processes that are needed to provide the customer with value in a horizontal way”. In their definition Montczka et al. emphasize value provided to the customer, which can be concluded to be the main reason to supply anything at all. They believe that supply chains, not firms, compete and that those who will be the strongest competitors are those that can provide management and leadership to the fully integrated supply chain including external customer as well as prime suppliers, their suppliers, and their supplier’s suppliers. This idea is commonly accepted also by many other writers e.g. Handfield et al. (1999), Hughes et al. (1998) and Cox (1999). In other words, a firm’s success is tied, in part, to the strength of its weakest supply chain partner (Spekman et al., 1998).

Lummus et al. (1999) state a summary definition of the supply chain as: all the activities involved in delivering a product from raw material through to the customer including sourcing materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, delivery to the customer, and the information systems necessary to monitor all of these activities. Whereas supply chain management coordinates and integrates all of these activities into a seamless process. (Lummus et al., 1999) A key point in supply chain management is that the entire process must be viewed as one system. Any inefficiency incurred across the supply chain must be assessed to determine the true capabilities of the process.

There have been some historical changes in the idea of the concepts, which can be noticed in the article of Spekman et al. (1998). The traditional view of supply chain management is to leverage the supply chain to achieve the lowest initial purchase prices while assuring supply. Typical characteristics include: multiple partners; partner evaluations based on purchase price; cost-based information bases; arms-length negotiations; formal short-term contracts; and centralized purchasing. This kind operation encourages fierce competition among suppliers and uses rewards or punishment based on performance. The fundamental assumption in this environment is that trading partners are interchangeable and that they will take advantage if they become too important. Also there is a belief that maximum competition, under the discipline of a free market, promotes a healthy and vigorous supply base, which is predicted on the “survival of the fittest”. (Spekman et al., 1998)

Under the new paradigm, supply chain management is redefined as a process for designing, developing, optimizing and managing the internal and external components of the supply system, including material supply, transforming materials and distributing finished products or services to customers. Analytically, a supply chain is simply a network of material processing cells with the following characteristics: supply, transformation and demand (Davis, 1993). The essence of supply chain management is as a strategic weapon to develop a sustainable competitive advantage by reducing investment without sacrificing customer satisfaction (Lee et al., 1992).

Although these two comprehensions of supply chain management are separated here as belonging to the different historical time, they can both still be valid and found in industry even in one company at the same time concerning separate suppliers. Actually, they can be seen as different strategies for separate parts of the supply chain of a company as will be shown later in this study.

The term *partnership sourcing* comes up in the context of supply chain and should therefore be defined as well. Partnership Sourcing Ltd defines it as follows: “Partnership sourcing is a commitment by both customers and suppliers, regardless of size, to a long-term relationship based on clear, mutually-agreed objectives to strive for world-class capability and competitiveness”. (Saunders, 1997, p.259)

Gentry (1996) states that partnerships are the foundation on which an effective supply chain can be built. Also Cox (1996, p.65) sees the partnership sourcing concept generic and refers to a complex range of dissimilar collaborative relationships. Supplier relationships and partnerships have been widely researched during the last years and as a consequence, there are several definitions differing each other’s in the attributes they include. For example, Brennan (1997) sees partnership quite incomplete in term of dependency between the two parties. Whereas Ellram et al. (1995) define partnership wider as a relationship between two firms, which involves a commitment over an extended period of time, the sharing of information, as well as the risks and rewards of the relationships.

Definition of partnership in the literature often exhibits the following characteristics and the problems formed (Lemke et al., 2003):

- They are vague and rarely include measures (of the degree of partnership), which could help in operationalizing the concept (e.g. Landeros et al., 1995).
- Where measures are included in definitions, these are based on the authors’ perceptions, and are not empirically tested (e.g. Ellram, 1995).

- Different definitions from different research show inconsistency, which suggests that different attributes are measured.
- Where definitions identify partnership attributes, these are usually based on very limited empirical evidence.

On the whole, partnerships can be characterized by a high level commitment, mutual dependency, trust, and a long-term orientation where the sharing of information as well as risks and rewards are typical (Lemke et al., 2003). However, a consistent definition of partnership based on empirical evidence cannot be found in the literature and no commonly accepted theoretically derived definition yet exists.

In this study partnership is an important characterization of relationship that companies are aiming to in developing their supply chains. In addition, partnership could be seen as a target for the relationship that companies participating the Group Benchmarking development process are forming in cooperative research project.

The presented definitions of the terms supply chain, supply chain management and partnership by different authors seem to vary in some degree. However, there is no discrepancy between the different definitions, but the differences are mostly in the wideness of the whole supply chain concept. For example supply chain widens from material flow between the raw material supplier and end users to the concept including also the information flow, achievement of competitive advantage and added value in the whole chain. In this study the widest versions of the definitions can be considered valid. Partnership is seen as a characteristic of buyer/supplier relationship. Section 2.2.2 will describe the current philosophy of supply chain management together with the features of relationships in the chain.

2.2.2 The Philosophy of Supply Chain Management

To balance customer's demands with the need for profitable growth, many firms have moved aggressively to improve supply chain management (Advanced Manufacturing Research, 1995; Copacino, 1997; Poirier et al., 1996). Their channel integration efforts have focused on many issues like supply chain coordination, organizational structures and associated relationships, inter- and intra-enterprise communication, sourcing, manufacturing orientation, and inventory and cost management (Chandra et al., 2000). In this context organizational relationships are especially interesting. Strategic alliances and partnerships are crucial to the success of a supply chain. Firms are encouraged to focus their attention on the entire supply chain and reduce the number of suppliers that they have to deal with. Many firms have developed preferred supplier programs as well as core transport carriers to ensure that a quality

product is received where and when it is needed. The literature (e.g. Chandra et al., 2000) expresses the idea that a successful strategic alliance or a partnership relationship must be based on extreme trust, loyalty, positive sum game (a win-win relationship), cross-functional teams, sharing common goals and cooperation that includes willingness to assist, and positive negotiations based on fairness. The ability to have a closer customer/supplier relationship is very important because these suppliers are easier to work with. Although companies are aware of the characteristics of successful supply chain, they ask how to achieve these kinds of relationships. Companies require detailed features for the relationships and the concrete methods to achieve them.

With the evolution toward especially long-term and close supplier relationships, companies need full disclosure of information such as financial performance, gain-sharing strategies, and plans for jointly designed work. They may establish a comparable culture and also implement compatible forecasting and information technology systems. This is because their suppliers must be able to link electronically into a customer's system to obtain shipping details, production schedules and any other needed information. (Copacino, 1996; Coyle et al., 1996; Keller, 1995) Also in less ambitious relationships open information is essential in order to find the mutual benefit in the cooperation. The strategies that give support for the success of both companies are necessary in guide lining the common supply chain.

One way of thinking supply chain management is to describe tools and techniques that provide for increased operational effectiveness and efficiency throughout the delivery channels. The channels, that are seen internally in addition to external channels between companies (Cox, 1999), must be created to support and supply existing corporate product and service offerings to customers. This way of thinking originates from the success in Japanese automotive industry in the 1970's and 1980's (Womack et al., 1990). It is even argued that a great deal of supply chain management practice today is replicating the external resource management originally pioneered by Toyota (Cox, 1999). The approach is often referred to "Lean thinking" which is presented by Womack in the early 1990's. This way of thinking is based on operations of big companies like Toyota. How well those tools and techniques are applicable in small and medium sized companies is often asked by those companies.

Before researching the mentioned tools and techniques, Section 2.2.3 will explore the main features of buyer/supplier relationships as well as trust and the Lean model as the basis of modern supply chain management.

2.2.3 Features of Buyer/supplier Relationships

There is a continuum of possible buyer/supplier relationship styles from pure arm’s length to extremely close business-to-business relationships. The three main concepts of continuum are presented by Ellram (1991): Supply Chain model, Sako (1992): ACR-OCR – framework, and a continuum of buyer-supplier relationships by Cox (1996).

According to Ellram (1991) supply chain management can take a variety of forms, including contracts of varying length, joint ventures and equity ownership. A continuum of alternative legal forms for organizing the relationships competitively is shown in Figure 2.1.

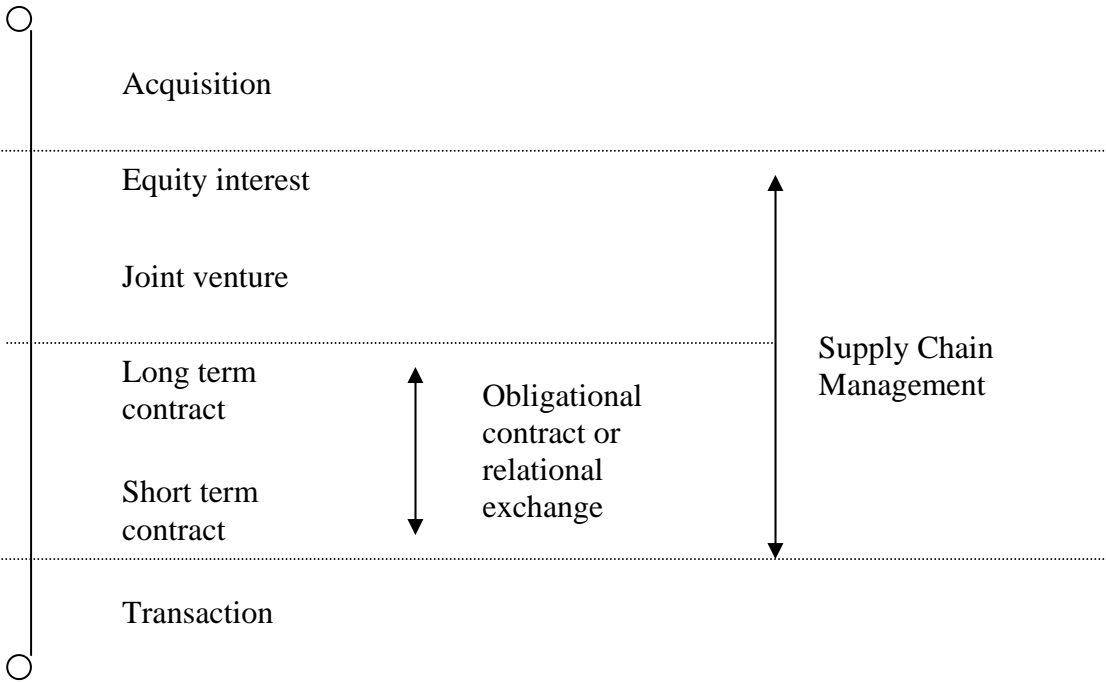


Fig. 2.1 Type of competitive relationships (Ellram, 1991, p.14, modified)

According to Ellram (1991), vertical integration can be viewed as an alternative to supply chain management in that it attempts to manage and control supply chain operations effectively through ownership. Vertical integration can be defined as the combination within a company of functions that can be carried out by separate companies. The reasons to vertical integration may be grouped into three broad categories: control, communications and costs (Ellram, 1991). It allows a company to improve control over the way it brings its products to market. Vertically integrated companies need to have better communication network and usually common ownership improves the cost structure by creating economies and reducing transaction costs.

Obligational contracting can be viewed as one form of supply chain management in that it attempts to manage a part of supply chain through formal contracts and agreements.

Obligational contract is an ongoing, collaborative relationship with another company, which is bound by legal agreement. According to Ellram (1991), the advantages of contractual relationship are cost reduction or risk reduction.

Supply chain as a competitive form brings together many advantages of obligational contracting and vertical integration. Supply chain management allows each company in the value chain do what they do best, while spreading the risks of assets ownership and reducing market risks through improved cooperation and communication. (Ellram, 1991)

Sako (1992) made an investigation into inter-firm relationships in Britain and Japan and suggested that the relationships can be represented as a continuum between two ideal types: arms-length contractual relationship (ACR) and obligational contractual relationship (OCR). The ACR is typified by specific discrete transactions where there is no commitment between the parties and an absence of goodwill trust. Such relationships are short-term, leveraged arrangements defined by an explicit contract. In the event of default the parties are searching for redress of action, usually through remedies of damages, and legal action ensues. The opposite, OCR, is typified by high degree of interdependence, goodwill trust and reciprocity, and as the relations develop over the long-term a high degree of collaboration is induced to the point where no contract is considered necessary.

Sako's ACR-OCR framework describes two extremes, between which she recognized there is a continuum of contractual relations. However, she does not describe any interim relations, only a contrast between the extremes. She, also, does not offer any guidance on how relations within the continuum can be generated or maintained. The work of Sako's is, however, considered significant for its analysis of the concept of trust in context of buyer/seller relationship (Saunders, 1997).

Cox (1996) has also suggested a continuum of buyer/seller relationships which goes further to define the boundary of the firm and a range of outsourced/quasi-vertically integrated relationships (Figure 2.2). On the extreme right of the continuum is competitive market procurement using spot prices. On the left-hand extreme, there is vertically integrated company in which all sourcing between departments occurs according to managerial direction.

The problems that the practitioners faced were mostly associated with an inability to avoid the problems of adverse selection and moral hazard. The power matrix was meant to be a solution for practitioners to enable them to understand their objective circumstances.

The term of *network sourcing* is picked up from the possible sourcing options in Figure 2.2. Network sourcing, which is originally developed by Hines (1994, 1996), is the idea that it is possible to create a virtual company at all levels of the supply chain by engineering multiple-tiered partnership relationships at each stage, but without moving to vertical integration. This way the first tier suppliers who control an extremely important medium asset specific expertise for the prime contractor has a partnership with the prime contractor in the value chain and develop partnership with those second-tier suppliers who find themselves in the same position. This chain reaction can be passed down the supply chain. (Cox, 1996) The term network sourcing originates from Japanese industry.

Hines (1996) lists an overview of network sourcing:

- a tiered supply structure with a heavy reliance on small firms,
- a small number of direct suppliers with individual part numbers sourced from one supplier but within a competitive dual sourcing environment,
- high degrees of asset specificity among suppliers and risk sharing between customer and supplier alike,
- a maximum buy strategy by each company within the semipermanent supplier network, but a maximum make strategy within these trusted networks,
- a high degree of supplier innovation in both new products and processes,
- close, long-term relations between network members, involving a high level of trust, openness and profit sharing,
- the use of rigorous supplier grading systems increasingly giving way to supplier self-certification,
- a high level of supplier coordination by the customer company at each level of the tiered supply structure, and
- a significant effort made by customers at each of these levels to develop their suppliers.

In addition to these three basic types of describing buyer/supplier relationships, there are some more definitions for them. For example, Saunders (1997) determines two relationship types; the adversarial model and the partnership model which are often the extremes in the development of buyer/supplier relationship. They are also called win-lose and win-win relationships. He also determines different elements of exchange in interaction of parties in the

relationship. There are product or service exchange, information exchange, financial exchange and social exchange. The Saunders's modelling can be considered as a simplification of the range of possible sourcing relationships presented in Section 2.2.3. The following sections will explore more the concepts that are important in describing buyer/supplier relationships; trust and commitment and Lean model.

Trust and commitment

This section will explore trust as a remarkable basis for selection of suppliers as long-term partners as well as a factor affecting organizational learning and, through that, it is a feature toward a long-term obligational relationship between supplier and buyer. This section will also show how commitment seems to reflect dedication of partners to the cooperation in SCM.

Supply chain management is built among other things on a foundation of trust and commitment (Lee et al., 1992). The consensus is that trust can contribute significantly to the long-term stability of an organization. Trust is conveyed through faith, reliance, belief or confidence in the supply partner and is viewed as a willingness to forego opportunistic behavior. Trust is simply one's belief that one's supply chain partner will act in a consistent manner and do what he/she says he/she will do. Commitment is the belief that the trading partners are willing to devote energy to sustaining this relationship (Dion et al., 1992). That is, through commitment partners dedicate resources to sustain and further the goals of the supply chain. To a large degree, commitment makes it more difficult for partners to act in ways that might adversely affect overall supply chain performance. Trading partners throughout the supply chain become integrated into their major customer's processes and more tied to their overarching goals. (Spekman et al., 1998)

Trust is also mentioned by Hines (1994) when writing about the features of network sourcing being additionally close relations, long-term relations, and negotiation and profit sharing. Tissen et al. (2000) believe that trust will lead to the belief that the company will benefit from the knowledge and thus helps filling the company's knowledge carriers.

Sako (1992) suggests three types of trust:

- contractual trust – both parties keep their promises
- competence trust – both partners can perform their role competently
- goodwill trust – mutual expectation of open commitment to each other or the willingness to do more than is formally expected.

According to Sako, contractual and competence trusts are present in both relationships, but it is the presence of goodwill trust that is significant for an obligational relationship (Saunders,

1997). The three types of trust are obviously interlinked but the last, goodwill trust, cannot occur if the former two are not present (Hines, 1994).

When buyer/supplier relationship is developed to partnership sourcing, there is always a question about power-dependency. According to Saunders (1997), it is possible to distinguish the three types of partnership situations, although there is also disputation whether the relationship can be a genuine partnership, if it is dominated by one of the parties. It depends, perhaps, on how the dominant partner chooses to use that power and how far trust and mutual interest are pursued.

On the road to partnership and network sourcing, it is important to remember that not all firms will prove to be good candidates for a partnership arrangement. Buyers will need to decide whether there are more favorable alternatives or whether they will need to continue on a more traditional basis. (Saunders, 1997)

Spekman (1988) wrote about selection of suppliers as long-term partners and the standard criteria of quality, price and delivery being necessary but not sufficient conditions for consideration. The standard criterion is appropriate for short-term, transactional purchasing, but they are inadequate when searching for partners. For the latter purpose, factors that determine long-term future performance and the potential for innovation and improvement need to be identified. Less tangible issues such as commitment, openness and trust are also improved if the partnership is to succeed. These attributes are not easy to assess. (Saunders, 1997)

Trust is also one of the factors affecting organizational learning in supply chain. There are number of variables that contribute to transfer of knowledge among the different levels of the supply chain. For example, variables which produce less conflict and opportunism, greater cooperation, and heightened performance among supply chain partners (e.g. Coffin et al., 1997; Brown et al., 1997) as well as variables, which help explain the nature of close ties among buyers and suppliers are mentioned in literature (e.g. Koskinen et al., 2003). There must be a basis of trust between partners and, they must be committed to the concept of SCM. Without a basis of trust and a sense of commitment, there can be no alliance (e.g. Morgan et al., 1994). Trust is truly the cornerstone of any collaborative supply chain as it is the foundation for social order. Research devoted to trust in organizations has a 40-year history (Lewicki et al., 1998).

Trust is the belief that one's partner will act in a predictable manner, will keep his/her word, and will behave in a way that will not negatively affect the other. This last point is particularly salient under conditions where one partner might feel vulnerable due to a heightened dependence on the other. Trust enables one partner to place himself at risk knowing that his partner will not act in his own self interest (e.g. Gulati, 1995). However, trust takes time to

develop; many companies lack both the patience and the skills that allow trust to flourish (Spekman et al., 2002). This also holds true with commitment. Interestingly, when one partner demonstrates commitment, there is often a similar response from the other, and it goes in a virtuous cycle. Commitment is simply one partner's willingness to devote time, energy, and/or resources to the alliance. (Spekman et al., 2002)

As a conclusion, trust can be considered as a remarkable basis for selection of suppliers as long-term partners as well as a factor affecting organizational learning and, through that, it is a feature toward a long-term obligational relationship between supplier and buyer. Commitment reflects dedication of partners to the cooperation in SCM.

Lean model

This section will investigate whether most of the supply chains consider the features of Lean philosophy, which became a trend in the beginning of 1990's. Womack et al. (1994) suggest that the management of supply chains should be taken one step further with the formation of a "Lean enterprise" which they define as a group of legally separated but operationally synchronized companies. They envisage such an enterprise achieving an enormous increase in the performance of the supply chain (Sadler et al., 2002). "If individual breakthroughs can be linked up and down the value stream that creates, sells and services a family products, the performance of the whole can be raised to a dramatically higher level" (Womack et al., 1994, p. 93).

Lean management is a philosophy concerning how to run a manufacturing organization, which includes all aspects of the business system in general and especially design, manufacturing, and supply management (e.g. Virolainen, 1998, p. 56).

There are some important features for Lean management (van Weele, 2002):

- Teamwork among line workers, who are trained in a variety of skills to conduct different jobs within their working group. These are not only related to manufacturing tasks: the workers are also trained to do simple machine repairs, quality checks, housekeeping and materials ordering.
- Simple, but comprehensive information display systems that make it possible for everyone in the plant to respond quickly to problems and understand the plant's overall situation.
- Total commitment to quality improvement on the shop floor. Workers are encouraged to think and act positively on how to improve the effectiveness of their work, whereas their supervisors need to provide active support to bring these ideas to fruition.

Cox (1999) adds some more features, which better considers the role of customer and suppliers in Lean management:

- Strive for perfection delivering value to customers.
- Only produce what is pulled from the customer just-in-time and concentrate only on those actions that create value flow.
- Focus on the elimination of waste in all operational processes, internally and externally, that arise from overproduction, waiting, transportation, inappropriate processing, defects and unnecessary inventory and motion.
- Recognize that all participants in the supply chain are stakeholders and that value must be added for everyone in the business.
- Develop close, collaborative, reciprocal and trusting (win-win), rather than arm's length and adversarial (win-lose), relationships with suppliers
- Work with suppliers to create a lean and demand-driven logistics process.
- Reduce the number of suppliers and work more intensively with those given a preferred long-term relationship.
- Create a network of suppliers to build common understanding and learning about waste reduction and operational efficiency in the delivery of existing products and services.

The Lean supply or purchasing theory has been credited to Lamming (1993). According to his work, in Lean supply the entire flow from raw materials to consumer is considered as an integrated whole. Interfaces between stages (i.e. between companies – suppliers and customers) are thus seen as artificial – created not as natural transformation stages in the development of value, but as a result of the economic arrangement of assets (boundaries of firms) governed by many other factors (e.g. labor skills, convenient configurations of technology, geographical location of raw materials, etc.). It seems to be obvious that most of the supply chains consider these features of Lean philosophy. Is it a question about copying, adapting or something else, is not so important.

The presented sections give an idea about the successful supply chain; it comply with network sourcing by adapting the features of Lean philosophy and having trust as a basis for the relationships between companies operating in the chain. To understand the supply chain concept in relation to network concept the concept of supply network need to be defined and found out the way to develop from the traditional chain to modern network. This will be done in the Sections 2.3 and 2.4.

2.3 The Network

This section will explore the relation of supply chain to supply network beginning with defining network in general and widening the concept to network in sourcing. The section will describe network type of sourcing as a more complicated and diverse way of operations on the supply field in comparison to a supply chain, which can be thought to be a simpler and linear communication and material flow. It will highlight different network sourcing theories and show the continuum of possible sourcing options of Cox (1996) and the Lean philosophy, giving the best benefit for the organizations operating in the same supply network. Network as an optimal supply form for companies to aim at will be considered without forgetting the benefits of the traditional supply chain forms.

2.3.1 Network Concept in General

The term network can be interpreted as those between individuals, groups and organizations, as well as between collectives of organizations. In all these cases, the network construct demands that description and analysis does not concentrate only on a section of the relationships existing between the network participants and network relationships, but also comprehends the network in its entirety. There is also a definition for a social network, which can be seen as a specific set of linkages among a defined set of actors (Seufert et al., 1999). The characteristics of these linkages may be used to interpret the social behavior of the actors involved. Consequently, the term network designates a social relationship between actors. Actors in a social network can be persons, groups, but also collectives of organizations, communities or even societies.

The relationships evolving between actors in a network can be categorized according to contents, form and intensity. Typically, network relationships are characterized by a multiple mixture concerning form and contents i.e. relationships between actors are various forms, which may consist of diverse contents to be exchanged. Besides formalized networks, the literature stresses the importance of informal networks as the results of and prerequisites for decision-making processes in organizations (Morgan, 1986), the importance of the interconnection of organization-wide actions, and the influence of manager's positions in the internal network on organization's cognition and information-processing. (Walker, 1985)

Networks are structural as well as cultural. The relationships between network members can be understood as deriving from their autonomy and interdependence, the coexistence of cooperation and competition as well as reciprocity and stability. Since the boundaries of networks are difficult to determine, the focus is shifted from the consideration and protection of

the boundaries of a company to the management of and care for relationships. (cf. Seufert et al., 1999)

Network may result on the one hand through internalization, which means an intensification of cooperation, or externalization in the form of a limited functional outsourcing achieved by loosening hierarchical coordination mechanisms. Both internalization and externalization may occur horizontally i.e. on the same level as well as vertically with regard to actors on different levels of the value chain, e.g. suppliers or customers. (cf. Seufert et al., 1999; Cox, 1996)

2.3.2 The Supply Network Concept

A supply network is defined as a set of inter-connected supply chains, embodying the flow of goods and services from original sources to end customers (Harland, 1996; Lamming et al., 2000). The relatively recent incorporation of the term “network” into supply chain management research represents an attempt to make concept wider and more strategic by harnessing the resource potential of the network in a more effective manner (Lamming et al., 2000). The focus of the definition of the supply network is on a limited manageable set of operational tasks performed to meet the order-winning criteria of individual end customer segments (Hill, 1995; Christopher, 1998).

Table 2.1 Classifications of networks within the literature (Lamming et al., 2000, p.685)

Authors	Types of network	Classifying variables
Grandori and Soda (1995)	Social, bureaucratic, proprietary	Mix of coordination mechanisms; degree of formalization and centralization
Rosenfeld (1996)	Hard Soft	Object of exchange
Hinterhuber and Levin (1994)	Internal, Vertical, Horizontal, Diagonal	Network orientation / direction
Campbell and Wilson (1996)	Social, Value-creating	Structural autonomy and strategic alignment
Snow and Miles (1992)	Internal, Stable, Dynamic	Network dynamic
Robertson and Langlois (1995)	Japanese Kaisha, Venture capital	Ownership integration and coordination integration
Cravens et al. (1996)	Flexible, Virtual, Hollow, Value-added	Type of relationships and environmental fluctuations

There is no comprehensive classification framework for inter-organizational networks. However, the classification in Table 2.1 shows many possible dimensions of networks. Grandori et al. (1995), for example, distinguish network forms according to their characteristic mix of coordination mechanisms. Rosenfeld (1996) focuses on the object of exchange as the basis for classification and distinguishes between “hard networks” in which three or more firms join forces to co-produce, co-market, co-purchase, or co-operate in products or market development,

and “soft networks” in which groups of firms form in order to solve common problems, share information, or acquire new skills. Also the direction or orientation of networks may provide the basis for classification. Hinterhuber et al. (1994) distinguish between horizontal, vertical, and diagonal networks while also recognizing that networks may be internal and external. Some networks may be particularly value creating or strategic (Campbell et al., 1996) and some may be more or less dynamic (Snow et al., 1992) and differ in terms of degree of integration (Robertson et al., 1995). Cravens et al. (1996) identify four types of network – “flexible”, “hollow”, “virtual”, and “value-added” – according to the dimensions of volatility of environmental change and the type of inter-organizational relationship involved (collaborative or transactional). (Lamming et al., 2000)

Lehtinen (2001) has written a review of research concentrated on supply networks or similar inter-organizational arrangements. According to Lehtinen (2001), supply network is a relatively new term largely evolved from the fields of supply chain management, logistics and Lean supply/enterprise. She presents a figure that explains the differences between the terms supply chain, supplier network and supply network (Figure 2.3). The term supplier network is exchanged to the term suppliers’ network in order to include all the suppliers in upstream network. The focus is in looking beyond immediate relationships from end customers to original raw materials suppliers, apart from broadening the perspective from single supply chains to networks, which result in a more holistic and strategic view of the process of supply. The supply network appears to be more complex than the supply chain concept. When supply network characterizes lateral links, reverse loops; two-way exchange, supply chain is more simplistic and linear (Zeng et al., 2001).

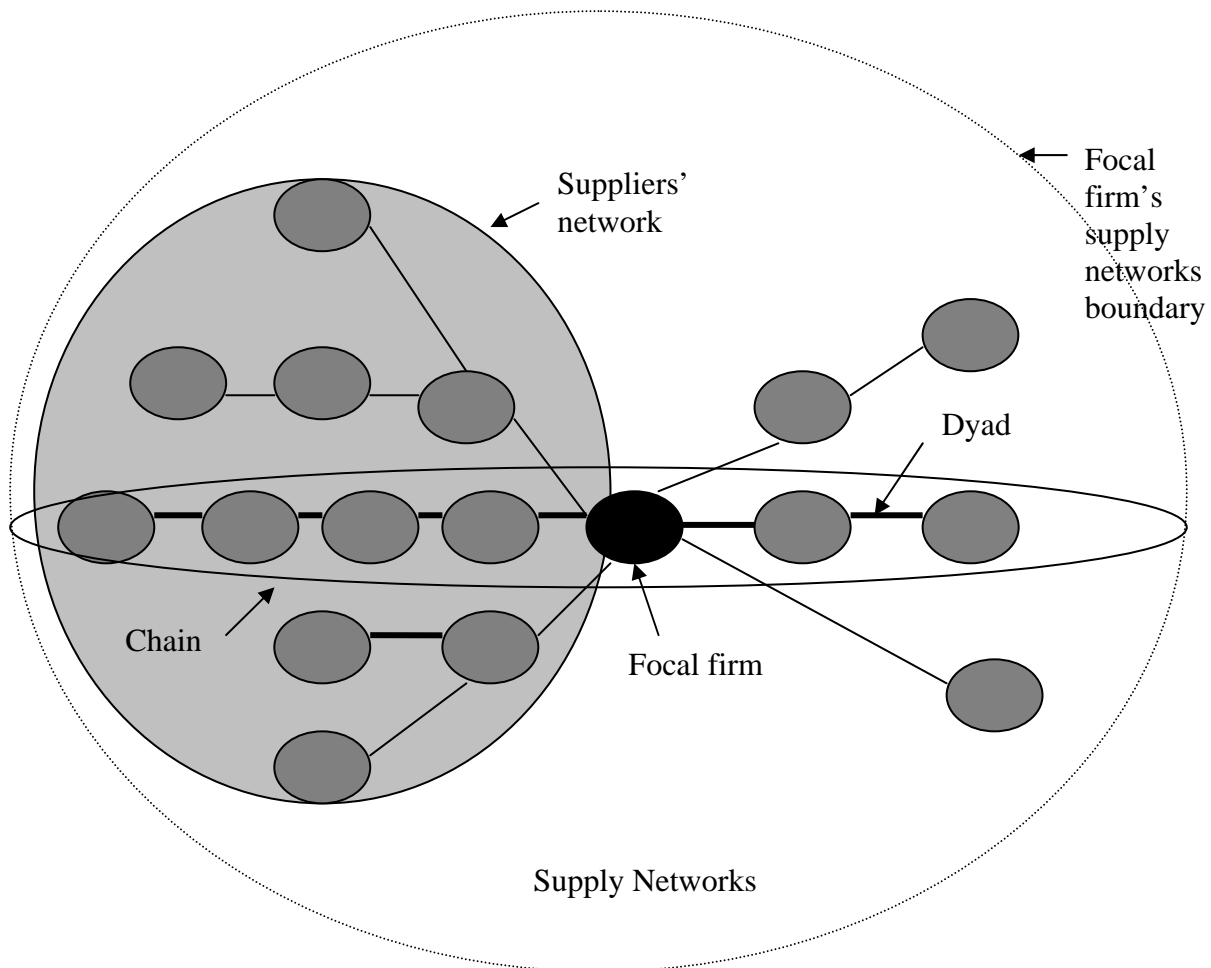


Fig. 2.3 The networks of the focal firm (Lehtinen, 2001, p.26, modified)

Supply networks differ significantly not only between industries, but also along a range of other dimensions (Zeng et al., 1999), even though the exploration of these variables is still at an early stage. According to Zeng et al. (2001), two main dimensions to categorize supply networks are the degree of the focal firms' influence on the network and supply network dynamics. This latter dimension measures the conditions under which the network operates, both in internal and external conditions.

Swaminathan et al. (1996) define a supply chain network, which can be a complex web of systems, sub-systems, operations, activities, and their relationships to one another, belonging to its various members, namely, suppliers, carriers, manufacturing plants, distribution centers, retailers, and consumers. It appears to be very close to Lehtinen's (2001) supply network definition.

The design, modeling and implementation of a network system, therefore, can be difficult, unless various parts of it are cohesively tied to the whole. Chandra et al. (2000) propose a framework to manage a supply chain system being to facilitate integration of its various

components through a common set of principles, strategies, policies, and performance metrics throughout its developmental life cycle.

In spite of the definitions and the classifications (i.e. Table 2.1) of different networks there is little guidance for firms addressing specific supply-related problems such as choosing the type of supply network appropriate for particular circumstances or how to employ network technologies to enable the effective flow of supplies from raw material to the end customer. It can be concluded to be a problem in the field of supply chain management.

It is concluded that network type of sourcing is a more complicated and diverse way of operations on the supply field in comparison to a supply chain, which can be thought to be a more simple and linear communication and material flow. Still, as a conclusion of the continuum of possible sourcing options of Cox (1996) and the Lean philosophy, the operations characterized as network sourcing can be considered as giving the best benefit for the organizations operating in the same supply network. Network as an optimal supply form for companies to aim at can be considered. However, whether the traditional supply chain activity is aimed at, which is the case with a part of suppliers, or the aim is optimal network construction, the basis is the relationship between buyer and suppliers. The characteristics of relationships determine whether the operations are called supply chain, tiered network sourcing or a complex supply network.

While developing supply activities in order to achieve supply network type of performance, the problems are: what kind of relationships a company has with its suppliers, what kinds of relationships are beneficial for both parties in relation to their competitive advantage, and how to achieve the most beneficial relationships. Section 2.4 will handle these questions.

2.4 Developing Buyer/supplier Relationships

This section will make a literature survey about different ways to characterize the buyer/supplier relationships. The aim is to find the most applicable road map from the traditional arms length relationship toward supply network relationships among suppliers. The method should give answers to the questions: what kind of relationships a company has with its suppliers, what kinds of relationships are beneficial for both parties in relation to their competitive advantage, and how to achieve the most beneficial relationships. This section will show that the model of Hines (1994) seems to be the most diversified for the purpose because of the 20 characteristics, which can be seen as well descriptive as measurable. It is also well applicable both in classifying buyer/supplier relationships and determining the stages of different sourcing types and further the road map from the traditional purchasing to the

uncommon network sourcing. Hines's model also seems to include the characterization of Spekman et al.(1998) as well as the stages of Ansari et al. (1997).

As, for example, Sako (1992) left open the question about how to generate different buyer/supplier relationships or how to maintain them, also many companies are searching for a road map to different type of relationships and their management. The literature offers some suggestions for the audit, analysis and development of the buyer/supplier relationships.

MacBeth et al. (1989) made one of the first sets of management aids to audit buyer/supplier relationships and to develop action plans to improve them. Another important study was made by Lamming (1993), who presented a model, which was developed in automotive industry. He classified the type of relations using a five-stage, nine-point measurement scheme. The nine factors to evaluate are as follows:

1. The nature of competition in the components supply market
2. The basis on which sourcing decisions are made
3. The role played by data and information transfer, and the approach towards managing it jointly
4. The attitude to capacity planning and the approach to managing it jointly
5. Delivery practices
6. The manner in which price changes are dealt with
7. The attitude towards product quality and the approach towards managing it
8. The role of research and development (products and services) in the relationship, and the approach towards managing it
9. The level of the pressure in the relationship

The fifth and the last stage is referred to Lean Supply Model (Lamming, 1993, p.194). The closeness of the relationship as exhibited by this model is shown by the fact that resourcing as a last resort only, there is a close two-way communication of information, joint efforts for cost reductions and integrated design. The other four stages are: traditional (before 1975), stress (1972-1985), resolved (1982 onwards) and partnership (Japanese 1990 onwards) (Lamming, 1993, p.152). The key difference between the fourth; partnership and the fifth; Lean supply model concerns the power-dependence relationship between the component suppliers and the car assembly companies. The partnership stage is one in which the power lies in the hands of buyers, and although cooperation is sought and obtained from suppliers, Lamming argues, that it is not collaboration between equals.

When moving from one stage to another in buyer/supplier relationship, the shift happens especially in the level of intensity among trading partners. Therefore, the stages of

buyer/supplier relationships can be illustrated also as a function of intensity of communication (Figure 2.4). Cooperation, whereby firms exchange bits of essential information and engage some suppliers/customers in long-term contracts, has become the threshold level of interaction (cf. Spekman et al., 1998). That is, cooperation is the starting point for supply chain management and has become a necessary but not sufficient condition. The next level of intensity is coordination whereby both specified workflow and information are exchanged in a manner that permits JIT (Just in Time) systems, EDI (Electronic Data Interchange), and other mechanisms that attempt to make seamless many of the traditional linkages between and among trading partners.

Figure 2.4 illustrates the model of Spekman et al. (1998), the transition from being an important supplier to becoming a supply chain partner. Many firms have already achieved cooperation and coordination with key segments of their suppliers and customers. Nonetheless, the movement from coordination to collaboration requires levels of trust and commitment that are beyond those typically found in both JIT and EDI relationships. For example, firms can coordinate production and logistics activities to ensure JIT delivery but never reach the next step of integration whereby future design and product performance, and long-term strategic intentions are shared. Collaboration requires high levels of trust, commitment and information sharing among supply chain partners. In addition, partners also share a common vision of the future. Collaborative behavior engages partners in joint planning and processes beyond levels reached in less intense trading relationships.

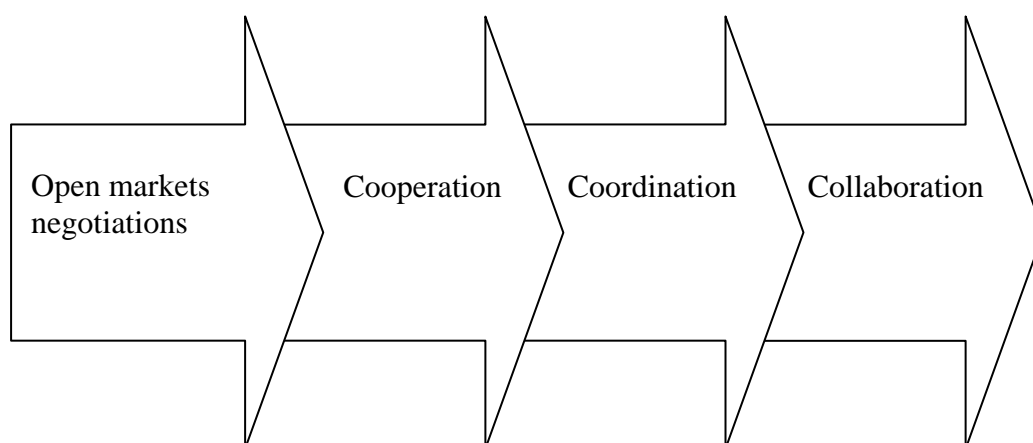


Fig. 2.4 The key transition from open-market negotiations to collaboration (Spekman et al., 1998, p.61, modified)

According to Spekman et al. (1998), the road from open market negotiations to cooperation to coordination and to collaboration is a long one and should not be traveled by each and every buyer/seller relationship. One should select both partners and supply chain strategies carefully. Coordination and collaboration are different; require different levels of trust and commitment; and, often, lead to different outcomes. Spekman et al. (1998) still emphasize that not all trading relationships should be collaborative and that it is acceptable if not necessary to engage in arm's length transactions provided that such behavior is appropriate.

According to Ansari et al. (1997), understanding the nature and number of suppliers and rationalizing the supply chain are critical for managing the extended enterprise. This requires classifying suppliers by how far they are in the supply chain and by the extent to which they perform design work for the project. The distance depends on whether suppliers sell directly to the principal. Suppliers who sell directly are referred to as tier one firms. These suppliers have numerous other firms from whom they buy parts or subcomponents. These other firms are referred to as tier two firms and so on. Ansari et al. (1997) suggest that one of the criteria to evaluate a supplier may be the way it manages, trains, and involves its suppliers in managing cost, quality, and time. The second criterion for classifying suppliers is the extent to which they participate in product and process design.

Table 2.2 Types of supplier relationship (Ansari et al., 1997, p.89)

Type of supplier	Control of design	Supplier role	Description
Customized goods supplier	CAD drawings and manufacturing process specified by market maker	Details controlled by core firm	Core firm provides detailed instruction and guidelines for manufacturing
Ordered custom goods-design provided suppliers	CAD drawings supplied by market maker	Manufacturing process designed by supplier	Core firm approves process
Ordered custom goods-design approved suppliers	Rough drawings supplied by the market maker	Supplier does CAD drawings and designs manufacturing process	Core firm approval, black box process
Ordered goods-design approved suppliers	Specification issued by market maker	Supplier designs product and process	Core firm approval, black box
Commodity	Selection from	Supplier	Supplier has many

The classification of suppliers happens to five classes according to their role in design of product and process. In the lowest class a supplier is simply a supplier supplying commodities

whereas the topmost class includes suppliers who are dependent on the principal supplying customized goods. (Table 2.2). (Ansari et al., 1997)

Developing more effective supply chain happens through long-term relationships with a more concentrated supply base. In addition, efficiencies are gained by increasing reliance on suppliers who participate in the design process. Market makers should have a strategy of reducing tiers of end item suppliers. This reduces the internal costs of procurement management. Working with a large number of suppliers causes inconsistencies in input, congestion in production, and difficult administrative procedures. (Ansari et al., 1997)

The conception of Ansari et al. (1997) is strongly based on effective cost managing achieved mainly by choosing and developing suppliers according to their ability to participate in product and process design of market maker. Another way to classify suppliers is based on the extent of trust in the relationship of buyer/supplier (McHugh et al., 1995; Kuitunen et al., 1999). The characteristics of different types of suppliers are quite similar to those of Ansari et al. (1997), but they are characterized with more attributes. The amount of classes is only four as follows in Table 2.3.

Table 2.3 The levels of subcontracting as a function of trust (e.g. Kuitunen et al., 1999, p. 121; McHugh et al., 1995, modified)

					Low trust
The level of subcontracting	Quality	The way of delivery	Development of product technology	The criterion for selecting a supplier	↑ ↓
Traditional subcontracting	Product is produced and quality checked	Order and delivery when asked	Principal is responsible	Price	
Cooperation	Physical quality of product is developed	As planned	Common product design	Total costs	
Partnership	Operational quality of product is developed	Systematically	Common product development	Fastness	
Company network	Quality of operations is commonly developed	Automated	Common vision	Potential for development	

The amount of trust needed in the buyer/supplier relationship is the highest on the company network level whereas the lowest on the traditional subcontracting level. When developing

subcontracting or supplying from the lowest level to the higher level i.e. toward the company networking level, the biggest changes are seen in the way of thinking and attitudes. The changes do not happen over night, but they take time and need a commitment from the whole organization both at supplier and buyer. The characteristics illustrating the changes are seen in dependency, sharing of risks, opportunism, sharing the workload, competition in network, time period, and communication. (Kuitunen et al., 1999)

Also Hines (1994) divides suppliers into four classes in his model for the translation of network sourcing. The model is called *The Strategic Competitive Positioning Model*. It shows the development stages an assembler (and their supplier network) needs to go through in order to remain competitive in the rapidly changing commercial world. There is no timescale built into the model since the rate of development will be primarily dependent on industry sector and competitor activity. However, this model with the classification of suppliers offers a certain road map for companies to develop in the surrounding network as an exception from all the previously described classification and analysis methods.

The Strategic Competitive Positioning Model is divided into four stages (Table 2.4). The model is based on the concept that a firm starts from a position where it uses low single-technology techniques and offers no added value services. That is, it provides only a very basic product. In these circumstances it will typically be forced to compete on price alone.

According to Hines (1994), in order to arrive at the next stage in the model the firm has to master fully the price competition stage, by doing the basics well. It can then choose to progress to stage 2 – quality competition. Competition in *stage 2* is characterized by a quantum leap improvement in the quality of, not only the product, but all the management processes of the firm. This implies not only achieving a minimum quality standard such as ISO9000 but a complete company Total Quality Program. There are features, like using Statistical Process Control and MRP1/MRP2 and precision materials, typical for the second level. At stage three, the principals can only be effectively deployed if the firm has already embraced the methodologies of stages 1 and 2. *Stage 3* is essentially the time when firms fully appreciate that if perhaps 60 percent or more of their value is added before the goods reach the companies then a significant percentage of the problems they face are built in to the products and process before the customer becomes involved in the value adding process. The key to reduce supplier problems and achieve a true total quality is to coordinate and develop the suppliers so that the latter can also remove their quality problems. It means that suppliers are seen as entities that may be sources of assistance and competitive advantage, rather than a group of adversaries to be negotiated with over win-lose contracts. Also the ties between buyer and supplier become

increasingly long term in nature. The third stage is also characterized by extensive use of advanced manufacturing technology and precision materials. There are an increasing number of value-adding processes, or process capabilities, though these are now shared with the first tier suppliers. (Hines, 1994)

Table 2.4 General features of the Strategic Competitive Positioning Model (Hines, 1994, p.220)

<p>Stage one: Price Competition Characteristics:</p> <ul style="list-style-type: none"> - Low technology manufacturing and materials used - Competition on cheap prices only - No added value services
<p>Stage two: Quality Competition Prerequisites: Stage One Characteristics:</p> <ul style="list-style-type: none"> - Limited use of high technology manufacturing techniques - Limited use of precision materials - Competition by high quality PPM or ZD products - Limited value adding processes available in the firm - Vertical integration
<p>Stage three: Close Cooperation (Coordination and Development of Suppliers) Prerequisites: Stage two Characteristics:</p> <ul style="list-style-type: none"> - Extensive use of high technology manufacturing techniques - Extensive use of precision materials - Competition by close cooperation with customers, management ability and JIT deliveries and production - Many value adding processes available in supply chain - Always seeking ways of continual improvement - Close proximity to suppliers and customers - Long term/lifetime relations - Use of Activity Based Costing - Zero industrial relations problems - Vertical disintegration
<p>Stage four: Strategic Partnership (Development of subcontract Network/Lean Production) Prerequisites: Stage three Characteristics:</p> <ul style="list-style-type: none"> - Member of customer subcontract team, probably into a Kyoryoku Kai association - Facilities available for product design for customers - Extensive use of own mutually dependent subcontract network - Creation of firm specific advantages - Active technology transfer with customers and other members of the subcontract team - Increase in product diversity and customer choice - Real JIT production - Maximization of value adding processes in network but minimization by OEM or by lower tier customer - Close long term relations with low cost sources of finance, probably in a Keiretsu type arrangements - Extension of supplier coordination and development to lower tier firms.

According to Hines (1994), the fourth stage was only being seen in its infancy outside Japan when he wrote the model. The fourth stage that is still not very commonly seen outside Japan, is the Strategic partnership stage where, not only the first tier suppliers, but also lower tier suppliers are strategically involved with the assembler. Thus the final assembler has made the

decision that to further improve competitive positioning it is not only necessary to improve direct suppliers but also to facilitate the development of all members of the supplier network.

Hines (1994) states a reason for firms to follow this progression. There are incremental benefits at each stage towards ultimate consumer satisfaction. A summary of these benefits is shown in Table 2.5. As companies move through the first stage benefits will be reaped through the closer control of internal costs. During the second stage internally generated competitive advantages are yielded through the improved quality and reliability of the products. During the third stage the price of the end product may continue to fall as technology is transferred to suppliers, allowing the latter to produce more efficiently. In the fourth stage the competitive advantage is further increased. This is largely because the indirect suppliers are included in the supplier network coordination and development efforts.

Table 2.5 Incremental benefits achieved at each stage of the Strategic Competitive Positioning Model (Hines, 1994, p.225)

<p>STAGE 1</p> <ul style="list-style-type: none"> - Reduction in price of end product due to control of costs - Control of basic management processes - Reduced waste in manufacturing process
<p>STAGE 2</p> <ul style="list-style-type: none"> - Improvement of quality and reliability of end product - Reduction of price of end product as cost of poor quality removed
<p>STAGE 3</p> <ul style="list-style-type: none"> - Continued price reduction due to transfer of technology to suppliers - Improved company performance due to knowledge of internal costs - Reduced disruption to supply of goods - Improved product variety and reduced time to market - Improved performance as company employs suitable advanced technology
<p>STAGE 4</p> <ul style="list-style-type: none"> - Continued improved performance as direct suppliers improved - Continued price reduction as technology is transferred to 2nd tier suppliers - Firm specific advantages improve product value to consumer - Further increase in product variety and reduced time to market - Cost of resourcing reduced due to long term supplier relations - Improve investment in manufacturing leading to reduced productive costs

In order to improve continually a firm’s competitive advantage it is important that once a company has mastered one stage it progresses to the next to ensure that it keeps up with or ahead of competitors. The transition through the stages will occur at different rates for different firms.

According to Hines (1994), the Strategic Competitive Positioning Model has obvious consequences for purchasing staff and suppliers. This impact is felt particularly in the third and fourth stages where direct suppliers and the complete supplier network respectively are pinpointed for achievement of competitive advantage. In order for purchasing organizations and

their suppliers to understand where they stand in this stage model a derivative matrix has been compiled from the Strategic Competitive Positioning Model that focuses particularly on the impact and role of suppliers in the various stages. The Supply Chain Positioning Matrix is illustrated in Table 2.6. The matrix is made up of 20 characteristics of the changing relationships as customer and supplier alike seek new competitive advantages.

Table 2.6 The Supply Chain Positioning Matrix (Hines, 1994, p.228-229)

	Price competition	Quality competition	Close cooperation	Strategic partnership
<i>Impact on suppliers</i>	<i>Stage 1</i>	<i>Stage 2</i>	<i>Stage 3</i>	<i>Stage 4</i>
1. Buying criteria	Lowest price	Lowest cost	Maximum mutual benefit	Maximum network benefit
2. Purpose of supplier	To supply goods the customer does not make	To supply goods the customer cannot make	To provide possible benefits & advantages	To provide mutual competitive advantage
3. Relationship type and length	Adversarial/short	Arms length / variable	Close / long	Strategic / lifetime
4. Customer involvement in supplier activities	Little or none, from Purchasing	Sporadic, by Purchasing and/ or quality	Frequent from many functions	Often from many process improvement teams
5. Interaction with suppliers	One off or infrequently	Annual negotiation or quality audit	Frequent problem solving activities	Often seeking areas of competitive advantage
6. Overall relationship description	Traditional / reactive	Developing / reactive or proactive	Progressive / proactive	Network / interactive
7. Quality requirements	Minimal or none	Quality control	Quality assurance / TQM	TQM spread to own suppliers
8. Delivery requirements	Minimal	Timely	Pseudo JIT	True JIT spread to own suppliers
9. Cost requirements	Lowest price by tender	Lowest cost by negotiation	Stable /non inflationary	Target costing / Kaizen reductions
10. Design requirements	None	Limited (customer designs)	Design ability with customer	Integrated design with customer and suppliers
11. Technological requirements	None	Limited (customer technology)	High with joint sharing with customer	Essential with joint sharing with customer
12. Coordination by customer	None	By occasional one-to-one meeting or standard letters	Yearly supplier conferences	Kuoryoku Kai (cascading down tiers)
13. Development by customer	None	Quality control instructions / audit feedback	One-to-one consultancy/ audit problem solving	One-to-one and group activities with Kyoryoku Kai
14. Reliance on grading	None	Some reliance on reactive scores	Heavy reliance on reactive and predictive scores	Some reliance particularly on predictive scores
15. Data interchange	Little / infrequent at operational level only	Limited / sporadic at operational level only	Detailed and frequent at operational level, occasional at strategic level	Detailed and frequent at strategic and operational levels
16. Cost transparency	None	Occasional but very limited	Transparent at highest tier buyer/supplier level	Transparent throughout supplier network
17. Level of pressure	Low / medium	Medium / high	Very high	Very high and transmitted to own suppliers
18. Number of suppliers	Very high and unstable	High and relatively stable	Low and very stable	Very lo and very stable
19. Asset specificity	None / very low	Low / medium	High	Very high and high/ very high with own suppliers
20. Tiering structure	None	Flat pyramidal	Steep pyramidal	Network format

This model is designed to help companies pin-point where they are in their search for competitive advantage as well as suggesting a possible route to the improvement of their competitive position. A 20-point Supply Chain Positioning Matrix will help companies in seeing where they presently fit in their inter-company competitive advantage abilities. Again, the stages shown in the matrix, which are ahead of the position already achieved by individual organizations, will give an outline guide to these firms' future direction. (Hines, 1994)

Although this model is presented from the principal firm's point of view, the development through the stages is not possible to execute without cooperation together with the suppliers/subcontractors. This is due to the fact that most of the 20 characteristics are reflected straight to suppliers or from suppliers, and performed only together with suppliers.

A point in applying this model is to set a question about different suppliers and different stages of sourcing in the beginning of development. A situation in a firm in the beginning of systematic network development is very seldom the one described in the Hines's model. In fact, there are products, which have different suppliers operating on different stages of the model. It is also noted earlier that supplier network or partnership type sourcing is not reasonable with all the suppliers (e.g. Saunders, 1997 and Spekman, 1998). Sometimes it is better to compose the traditional, short-term relationships. This model does not respond to the question about different suppliers.

However, the model of Hines (1994) seems to be the most diversified in the literature because of the 20 characteristics, which can be seen as well descriptive as measurable. It is also well applicable both in classifying buyer/supplier relationships and determining the stages of different sourcing types and further the road map from the traditional purchasing to the uncommon network sourcing. It is also concluded that Hines's model includes the stages of Spekman et al. according to intensity of communication, and the stages of Ansari et al. according to the position of supplier in supply chain and supplier's participation in design work.

The aim in developing supply chain toward the supplier network emphasizes the close cooperation in most of the activities that the company transacts with its suppliers. It is evident that this kind of communication takes time and that is why the number of suppliers forming this kind of relationship with the company must be limited. However, there might be certain risks in reducing suppliers i.e. the imbalance in dependence of parties. The smaller the number of suppliers the more dependent the company is on them and greater are the risks for example in shortage situations. Therefore, the company must consider carefully the risks when developing

its supplier network. The evaluation of risks may be done in Group Benchmarking model when classifying suppliers as presented in Section 6.2.

2.5 Summary of the Chapter “Supply Chain Management”

This chapter defines supply chain and supply chain management together with related terms. The terminology seems to be quite diverse especially what comes to the term partnership. Cox’s (1996) idea of partnership covering widely different sourcing options as a continuum is very illustrative. McHugh et al. (1995) and Kuitunen et al. (1999) consider partnership as a lower level sourcing than network type of operations among companies. In Hines’s Strategic Competitive Positioning Model *strategic partnership is the highest stage of network sourcing*.

In this study partnership is understood as describing buyer/supplier relationship as a feature of network kind of sourcing operations i.e. the feature of the highest level of the operations in supply chain environment. The definition is due to the choice of using Hines’s matrix model as a basis for determining buyer/supplier relationships in the analysis and development process of the Group Benchmarking model. Noticeable is also that Hines’s idea of network is a pyramid with a tiered structure. In this study network will be understood in a similar way.

This chapter presents different possibilities to classify network, suppliers and the relationships between buyer and suppliers as well as means for developing the relationships. *Trust and commitment* are highlighted because of their importance in the successful supply chain. *Lean management* is described due to its connections to the features of supply chain management. *The matrix model of Hines* includes all the characteristics of supply chain management presented in this section. Because it also determines the road from the arms length relationship to the strategic partnership relationship, it is chosen to the process of Group Benchmarking in order to analyze and develop a company’s buyer-supplier relationships.

The Hines’s matrix model presents the features of each stage on the way to strategic partnership but what is still missing are the means to develop from previous stage to the next stage. A principal together with its suppliers operating in a traditional way of price competition can be imagined. Although both parties are well aware of the next stage in the model and can examine all the 20 characteristics of the matrix, they still miss the means to achieve the next stage. They need methods to find a way to develop their supply network.

That problem can come from another direction, too. When developing the relationships of buyer and suppliers toward the strategic partnerships, there are basic features like cooperation, collaboration and integrated operations, which lead to the competing supply chains instead of the traditional competing companies. The supply chains or supply networks are searching for a

common competitive advantage. This is relevant also in company research networks in which companies operate on totally different fields without doing business with each other as in the Group Benchmarking model. According to resource-based theory of strategy, knowledge and resources that are unique, valuable, imperfectly imitable and impossible to substitute allow firms to sustain their competitive advantage (e.g. Barney, 1991). Each firm in the supply chain or network has knowledge and resources of their own. To form a collaborative network of several companies and supply chains, they need to have *common knowledge* and resources. Sharing knowledge means transferring knowledge from one company to another. There are different opinions whether knowledge can be transferred at all but only created as new knowledge. Anyway, to be able to share knowledge among the supply network, the companies of the network need understanding and methods to do that efficiently and focus the knowledge worth of sharing.

The need for sharing knowledge applies also to the situation of different supply networks. There are networks whose development toward the strategic partnership is on different stages. One has just started to find its way toward the quality competition and another one has gone a long way to close cooperation. These networks get a lot of benefit if they can share knowledge about how to make progress on a way of networking. Chapter 3 will explore knowledge management as a basis for forming a network of companies searching for a common competitive advantage.

3 CONCEPT OF KNOWLEDGE MANAGEMENT

In this chapter the concept of knowledge management and its features that are accomplished in the Group Benchmarking process will be presented. Benchmarking is defined to be a method to learn success (Reider, 2000, p.xii) i.e. it is a learning method, which is accomplished by transferring knowledge from one company to another. This means that a concept of benchmarking is a concept among many other concepts under an umbrella called knowledge management. In order to explain how the new model strengthens the existing knowledge management theories, the philosophical background of creating knowledge, different types of knowledge, theories of creating knowledge, and enabling factors of knowledge creation will be explored.

This chapter is divided into six sections. The first section presents briefly an epistemological view for knowledge. The second section defines knowledge. The third section analyzes different knowledge types. The fourth section explores the principles of creating knowledge. The fifth section presents the factors enabling knowledge creation and the sixth section concludes the chapter.

The importance of knowledge is widely acknowledged. Already in 1993 Drucker (1993) argued that in the new economy, knowledge is not just another resource alongside the traditional factors of production – labor, capital, and land – but the only meaningful resource. This is even truer nowadays. According to Nonaka et al. (1995), knowledge creation is seen as a source of competitive advantage through continuous innovation. Another view states that current competitive advantages access to effective utilization of resources and knowledge. These resources and knowledge allow the firm to implement cost advantages, differentiation advantages (Porter, 1980; Barney, 1991), or both (Hamel et al., 1994).

3.1 Epistemological View

Before giving a definition of the term “knowledge” and a review for different types of knowledge, the epistemological assumptions will be presented. This section defines different alternative epistemological views of categorizing knowledge and gives the basis for the choice of autopoietic epistemology being used as a theoretical background for understanding of knowledge creation and transfer. The choice is based on the idea that tacit knowledge, which is the most interesting type of knowledge in this study, is not easily transferred but rather created utilizing existing knowledge platform and incoming signals.

Epistemology is a philosophical theory of knowledge and more precisely the ways of knowing. This section is mainly based on Koskinen (2001), who made a review of different authors writing about epistemology (cf. von Krogh et al., 1996 and Varela et al., 1991). Organizational epistemology gives us solutions for the problems like how and why organizations know through answering the core questions: what is knowledge, how does it develop, and what are the conditions for knowledge to develop.

The epistemological distinction of categorizing knowledge is helpful in knowledge management when understanding of knowledge assets increases in addition to identifying them. The distinction has been made to three knowledge epistemologies.

Cognitive epistemology. Organizations are considered to be open systems, which develop new knowledge by formulating increasingly accurate representations of their pre-defined worlds. The major knowledge development activities are data accumulation and dissemination in an organization; the more data, the closer presentation of the reality. Therefore, most cognitive approaches consider knowledge as information and data. In traditional epistemology, learning means adopting information from the environment and relating it to the previously acquired frames of reference.

Connectionistic epistemology is based on the description of cognitive epistemology with the difference in processing information being not universal, but varying locally. Organizations are seen as self-organized networks formed by relationships, and driven by communication. The main idea is to focus on relationships and not on the individual or the entire system. The model contains a large number of integrating units influencing each other. Also connectionists consider information processing as a basic activity of the system. Relationships and communication are the most important issues in connectionistic epistemology.

Autopoietic epistemology is a totally different understanding of the input coming from outside a system. Instead of information, the input is data, the smallest unit of information according to general assumption. Information is data put into a certain context. In the first process step knowledge is acquired. Knowledge cannot be directly conveyed from one individual to another, because the data has to be interpreted first. Therefore, autopoietic system is simultaneously open with regard to data and closed to information and knowledge. This closeness regarding information is the main aspect in an autopoietic system that organizes itself. Only data can pass the frontiers defined by the system itself.

In a cognitive autopoietic system – that is a system whose existence is grounded on the ability to self-produce its knowledge components and their interrelations – a fundamental role is played by creativity. An illustrative example is when a teacher delivers a speech; two students build different knowledge, according to their own attitudes, intelligence and previous knowledge. The transmission by the teacher is the same for the two of them, but the knowledge is different: knowledge therefore cannot be transmitted. According to some theory, there is a belief that tacit form of knowledge cannot be easily acquired, but, however, explicit knowledge can be transmitted or imported (Vicari et al., 2000).

According to autopoietic theory, knowledge cannot be imported: it can only be produced. The only way to learn is to produce new knowledge by using existing knowledge. Teachers, books, manuals, colleagues, business partners can transmit signals or can help in producing the conditions a system uses to produce knowledge, but they cannot provide knowledge.

Vicari et al. (1996) present assumptions for autopoietic vs. the traditional view of knowledge in Table 3.1. The presentation is based on Maturana et al. (1992) and von Krogh et al. (1995).

Table 3.1 The autopoietic vs. the traditional view of knowledge (Vicari et al., 1996, p.185)

Autopoietic view	Traditional view
Knowledge is creational and based on distinction making in observation	Knowledge is representation of a pre-given reality
Knowledge is history dependent and context sensitive	Knowledge is universal and objective
Knowledge refers to information inside the system as opposed to data outside the cognitive system	Knowledge, information and data are used interchangeably
Knowledge is not directly transferable	Knowledge is transferable

Autopoietic systems are organized so as to be able to maintain their own unity, producing continuously the relations, which make up their own organization (Maturana et al., 1992). Autopoietic systems are therefore circular; that is to say, they produce their own components in a continuous process of self-production and self-reproduction (Vicari et al., 2000). They can continuously generate their own organization, even when the system’s environment produces perturbations (Maturana et al., 1992).

In this study autopoietic epistemology is used as a theoretical basis for understanding of knowledge creation and transfer. The choice is based on the idea that tacit knowledge, which is the most interesting type of knowledge in this study, is not easily transferred but rather created utilizing existing knowledge platform and incoming signals. The choice is also based on the future use of knowledge conversion model.

3.2 A Definition of Knowledge

The term “knowledge” has been defined in many different ways. Generally, “knowledge” is used in the meaning of knowing when something is familiar or acquainted. This is the case when “knowledge” corresponds to “know about”. Second meaning for “knowledge” is “capacity for action” (Senge, 1990), which is used when understanding of facts, methods, principles and techniques is concerned. This usage of the term is the case when referring to “know-how”. The third meaning of “knowledge” is referring to codified, captured, and accumulated facts. This is used when “knowledge” corresponds to a body of knowledge that has been articulated and captured in the form of books, papers, formulas etc. (Koskinen, 2001)

Another way to categorize knowledge is to make a distinction between data, information and knowledge. Data and information fit within the third category above and knowledge is a result of information being processed by a person. Commonly used knowledge typology is as follows (cf. Holma et al., 1997):

Data → Information → Knowledge → Understanding → Wisdom

Data is raw knowledge without meaning or interpretation. Information includes data points joined to others in a way that relationships, interpretations, and meaning are formed among them. Knowledge is processed information being apart of personal knowledge base. Understanding implies joining together various pieces of knowledge and comprehending as how knowledge is used, its effects, and its consequences. Finally, wisdom is defined being the highest and most demanding step of knowledge. It is the complex interrelationship and combination of knowing and understanding. (Koskinen, 2001) Additionally wisdom enables reasoning ability, sagacity, learning from ideas and environment, judgment, expeditious use of information and perspicacity (Matthews, 1998).

Vicari et al. (2000) present the traditional view of knowledge transmission as routed in the widespread confusion between four different concepts: signal, data, information, and knowledge. However, the four concepts are different and they should not be confused. *Signals* are codified messages used by someone for transmission. *Data* are not facts but are representations of facts, collected by someone for a purpose. *Information* is one’s action of shaping reality, giving sense to signals or data: from the same data people produce different information, because there is no information in nature. Information is a process of sense-making that needs, and depends upon, an observer. *Knowledge* is information organized by somebody

for a purpose: it is not the warehouse but the organization of the stuff inside the warehouse. (Vicari et al., 2000; Marchand, 1998). Tissen et al. (2000) go on with *meaningful knowledge*.

Data, information and knowledge are the result of someone's work of representing facts, making sense of them, and organizing meanings according to a purpose. Transmission is concerned only with signals being neither information nor knowledge. If knowledge cannot be imported or acquired but only produced, how is it possible to create new knowledge or learn? The answer is creativity according to Vicari et al. (2000).

Aadne et al. (1996) summarize different views of several authors concerning general assumptions about knowledge:

- Knowledge represents a pre-given world
- Knowledge is universal and objective
- Knowledge results from information processing
- Knowledge is transferable
- Knowledge enables problem solving

These quite general assumptions could be thought to be compatible to the above-mentioned definitions of knowledge. The transferability of knowledge follows, however, the traditional view of knowledge.

3.3 Knowledge Types

This section will explore different types of knowledge. The general understanding seems to be that knowledge can be divided at least into two types; tacit and explicit knowledge. In addition to those types there appear some types, which are not so commonly known.

Knowledge can be categorized by dividing it into explicit, tacit and implicit knowledge (Nickols, 2000), explicit and implicit (Schüppel et al., 1998), or tacit, explicit and cultural knowledge in which tacit knowledge is personal knowledge, explicit knowledge is codified knowledge, and cultural knowledge is based on shared beliefs (Choo, 2000).

Nonaka et al. (1995, 1998) present the distinction between tacit and explicit knowledge based on Michael Polanyi (1966), and the definitions for them while researching the difficulties in communication of tacit knowledge. Tacit knowledge is personal, context-specific, and therefore hard to formalize and communicate. Seufert et al. (1999) further add that tacit knowledge can be conceptualized as possessing a technical and a cognitive dimension. Technical dimension contains informal, personal abilities and skills and cognitive dimension includes our mental model influenced by our beliefs, values and convictions. Explicit or

“codified” knowledge is transmittable in formal and systematic language. It is articulated and, more often than not, captured in the form of text, product specifications, formulas, procedure manuals and so on (Hamel, 1991; Koskinen, 2001). Badaracco (1991) defines “easily encodable” or “decodable” knowledge being transferable and tacit knowledge being highly embedded knowledge.

The distinctions between tacit and explicit knowledge are shown in the Table 3.2.

Table 3.2 Two types of knowledge (Nonaka et al., 1995, p.61)

Tacit Knowledge (subjective)	Explicit Knowledge (objective)
Knowledge of experience (body)	Knowledge of rationality (mind)
Simultaneous knowledge (here and now)	Sequential knowledge (there and then)
Analog knowledge (practice)	Digital knowledge (theory)

Table 3.2 presents features associated to tacit and explicit knowledge. For example, knowledge of experience is usually tacit, physical, and subjective, while knowledge of rationality tends to be explicit, metaphysical, and objective. Tacit knowledge is created in a specific, practical context. Sharing tacit knowledge between individuals through communication is an analogue process that requires a kind of “simultaneous processing” of the complexities of issues shared by the individuals. On the other hand, explicit knowledge concerns past events or objects and is oriented toward a context-free theory. (Nonaka et al., 1995)

In addition to tacit and explicit knowledge, Nickols (2000) brings in the implicit knowledge that can be articulated but has not yet been done so, that is, its existence is implied by observable behavior or performance, but it has not yet been made explicit.

Tacit knowledge is considered to be a source of innovation (Nonaka, 1991, 1994) but only the combination of both tacit and explicit knowledge, within and between organizations, leads to the timely development of new products and/or services. In other words, the firms being able to combine them are knowledge-creating companies (Nonaka et al., 1998).

Scharmer (2000) assumes that innovations entail the enrichment of tacit knowledge such as skills and a certain view of the world. Actually, there are two forms of tacit knowledge: (1) embodied tacit knowledge, which is usually referred to as tacit knowledge, and (2) not-yet-embodied tacit knowledge, which is referred to as “self-transcending” knowledge. (Scharmer, 2000)

The term “tacit knowledge” usually denotes knowledge that is embedded and embodied in everyday practices (Nonaka et al., 1995). However, the second type of tacit knowledge can be

thought of as not-yet-embodied, or “self-transcending” knowledge. The distinction between embodied tacit knowledge and not-yet-embodied knowledge is relevant for several reasons. First, the epistemological foundations and phenomenological experience of tacit knowledge is fundamentally different from that of not-yet-embodied knowledge. Embodied tacit knowledge is based on action experience, whereas not-yet-embodied knowledge is based on aesthetic experience. Second, from a managerial point of view, embodied tacit knowledge needs a different kind of infrastructure from that needed by not-yet-embodied knowledge. Third, the capacity to tap into the sources of not-yet-embodied knowledge (like customers’ imaginations) is the only sustainable source for competitive advantage in an age of hypercompetition. An example of embodied tacit knowledge is the act or process of baking bread (Nonaka et al., 1995). An example of not-yet-embodied tacit knowledge is the invention of baking bread in the first place. (Scharmer, 2000)

In addition to two types of tacit knowledge also explicit knowledge is presented in Table 3.3, which shows the three forms of knowledge and their differences from epistemological point of view.

Table 3.3 Three epistemologies (Scharmer, 2000, p.39)

	Explicit knowledge	Embodied tacit knowledge	Self-transcending knowledge
Form of knowledge	Knowledge about things	Knowledge about doing things	Knowledge about originating sources for doing things
Data	External reality	Enacted reality	Not-yet-enacted reality
Experience type	Observation experience	Action experience	Aesthetic experience
Action-reflection ratio	Reflection without action	Reflection on action	Reflection in action
Truth	Matching reality	Producing reality	Presencing reality
How do you know that you know	Can you observe it?	Can you do it?	Can you tap into the field of its emergence?
Perspective	External: view on objective reality	Internal: view on enacted reality	Both internal and external: view on not-yet-enacted reality
Subject-object relationship	Separation	Unity (after action)	Unity (in action)

According to Scharmer (2000), companies operate, consciously or not, on 12 types of knowledge. Nonaka et al. (1995) determine a framework based on two distinctions: one ontological (individual – group - organization - inter-organization) and one epistemological (tacit – explicit). In the Scharmer’s model, the epistemological distinction differentiates between three forms of knowledge: explicit knowledge, tacit knowledge and self-transcending knowledge. The ontological differentiates among four levels of corporate action: delivering results that create value (performing), improving the process-based context of performing

(strategizing), re-framing the assumption-based context of performing (mental modelling) and reconceiving the identity-based context of performing (sculpturing). Table 3.4 describes the relations between the differentiations.

Table 3.4 Twelve types of knowledge in organizations (Scharmer, 2000, p.43)

Epistemological/ action type	Explicit knowledge	Tacit knowledge	Self-transcending knowledge
Performing	Know-what	Knowledge-in-use	Reflection-in-action
Strategizing	Know-how	Theory-in-use	Imagination-in-action
Mental modelling	Know-why	Metaphysics-in-use	Inspiration-in-action
Sculpturing	Know-for	Ethics/aesthetics-in-use	Intuition-in-action

Based on Table 3.4 and the three columns in it, the historical development of knowledge management can be presented as a play that is enacted on three stages. The first stage is knowledge about things. Knowledge is nothing but information. This is still dominant in many institutions. An example of this knowledge can be a balance sheet (know-what), accounting rules (know-how), a report based on activity-based costing (know-why), and the mission statement of a company (know-for). In all these examples, knowledge is disclosed in the same structure: it is presented as a piece of information that is separate from the practice or reality it denotes. (Scharmer, 2000)

The second historical stage covers the first and the second column. Knowledge is not a thing but a process. The stage is based on the interplay between explicit knowledge and tacit-embodied knowledge. This stage is largely based on the work of Nonaka (1991, 1994) and Nonaka et al. (1995). In their theory of knowledge creating company, Nonaka and Takeuchi present a view of knowledge creation that takes into account both explicit and tacit knowledge. Knowledge develops as cycles between explicit and tacit forms of knowledge in evolving “knowledge spiral” which is examined more in the following sections.

According to Scharmer (2000), Nonaka’s et al. (1995) theory has left a question open: What is the driving force that moves the knowledge spiral? On the third historical stage, knowledge is situated in an incipient, not-yet-enacted reality, which is brought into existence through an act of action-intuition or self-presenting. The terms “action-intuition” and “self-presenting” signify a state of mind in which the distinctions between inside and outside, and knowledge and action become blurred and meaningless. Hence, the third stage is based on the interactions between three stages, on which the explicit, the tacit-embodied, and the not-yet-embodied forms of knowledge are being enacted simultaneously. (Scharmer, 2000)

Managing the stage one (explicit knowledge) is commonly known by companies. Less knowledge about how to manage stage two (tacit embodied) and the least knowledge about how to manage stage three forms of knowing (self-transcending) is spread among companies (Scharmer, 2000). Maybe the term managing is not quite right when stages two and three are concerned. Data banks can be managed but human experience cannot be managed.

In this section different types of knowledge have been explored. The general understanding seems to be that knowledge can be divided at least into two types; tacit and explicit knowledge. In addition to those types there are some types, which are not so commonly known. In this study the focus will be on sharing tacit and explicit knowledge between companies. Section 3.4 will cover the creation of knowledge, which is seen as the format of transferring knowledge according to autopoietic epistemology.

3.4 Creating knowledge

According to autopoietic epistemology, the knowledge can not be transferred or imported but only produced or created. So the only way to learn is to produce new knowledge by using existing knowledge. This section presents Nonaka and Takeuchi's (1995) ideas of knowledge spiral as a method of creating knowledge. The model called SECI describes the knowledge conversion modes from tacit to tacit, tacit to explicit, explicit to explicit and explicit to tacit knowledge. Thus, organizational knowledge creation is a spiral process starting at the individual level and moving up through organizational boundaries. The section presents also other corresponding spirals of knowledge conversion, but the Nonaka and Takeuchi's model being the most famous one, is chosen to be used in this study.

3.4.1 Knowledge Spirals

According to Nonaka et al. (1998), explicit and tacit knowledge are mutually complementary entities. They interact with one another and may be transformed from one type to another through individual or collective human creative activities. The theory of Nonaka et al. (1998) presents an organizational knowledge creation in which new organizational knowledge is created by human interactions among individuals who have different types (tacit or explicit) of knowledge. This social and epistemic process brings about what is called the four modes of knowledge conversion: socialization (from individual tacit knowledge to group tacit knowledge), externalization (from tacit knowledge to explicit knowledge), combination (from separate explicit knowledge to systemic explicit knowledge) and internalization (from explicit knowledge to tacit knowledge). (Nonaka et al., 1995, 1998) Marchand (1998) discusses about

converting knowledge to knowledge, knowledge to information, information to knowledge and information to information (Figure 3.1) when presenting the same four mode's conversion process.

The model called SECI describes the four conversion modes from tacit to tacit, tacit to explicit, explicit to explicit and explicit to tacit knowledge. All four conversions are necessary for the creation of knowledge. Each of the conversion modes can be understood as a process of self-transcendence, as every conversion involves transcending the self of individuals, teams and organizations. See Figure 3.1.

		Tacit knowledge	To	Explicit knowledge
From	Tacit knowledge	<p>Socialization</p> <p><i>Existential, Information transfer between people (conversation)</i></p>		<p>Externalization</p> <p><i>Reflective, A person transfers knowledge through documents, messages, data</i></p>
	Explicit knowledge	<p>Internalization</p> <p><i>Collective, Documents, data, messages convey meaning to a person</i></p>		<p>Combination</p> <p><i>Systemic, Information about information: documents, data, messages are organized into indexes, maps, rules and repositories</i></p>

Fig. 3.1 Four modes of knowledge conversion (cf. Nonaka et al., 1995, p.62; 1998, p.148; 2000, p.90; Marchand, 1998, p.256)

Each mode without other modes is insufficient for the creation of knowledge. Socialization aims at the sharing of tacit knowledge. Unless shared knowledge becomes explicit, it cannot be easily leveraged by the organization as a whole. A mere combination of discrete pieces of explicit information into a new whole does not really extend the organization's existing knowledge base. When tacit and explicit knowledge interact, an innovation emerges. Organizational knowledge creation is a continuous and dynamic interaction between tacit and explicit knowledge. This interaction is shaped by shifts between different modes of knowledge conversion, which are in turn induced by several triggers. (Nonaka et al., 1995, 2000)

According to Nonaka et al. (2000), *socialization* is the process of sharing the tacit knowledge of the individuals. Sharing experiences is a key to understanding other's ways of

thinking and feeling. In a certain sense, tacit knowledge can only be shared if the self becomes part of a larger self. The socialization mode usually starts with building a “field” of interaction. This field facilitates the sharing of member’s experiences and mental models.

Second, the *externalization* mode is triggered by meaningful “dialogue or collective reflection”, in which using appropriate metaphor or analogy helps team members to articulate hidden tacit knowledge that is otherwise hard to communicate. Externalization requires the articulation of tacit knowledge and its translation into forms that can be understood by others. Individual transcends the inner and outer boundaries of the self in dialogue i.e. listening and contributing to the benefit of all participants.

Combination involves the conversion of explicit knowledge. To diffuse scattered knowledge, editing and systemizing such knowledge are the keys to this conversion mode. Here, new knowledge transcends the group and is diffused throughout the organization. The combination mode is triggered by “networking” newly created knowledge and existing knowledge from other sections of the organization, thereby crystallizing them into a new product, service, or managerial system.

Internalization means the conversion of newly created explicit knowledge into the tacit knowledge of individuals. Learning by doing, training and exercises are important to embody explicit knowledge. Thus on-the-job training, simulations or experiments are used to induce internalization of new knowledge.

In this model each of the four modes of knowledge conversion yields a knowledge content that is distinct from others. Socialization yields “sympathized” knowledge such as mental models and technical skills. Externalization yields “conceptual” knowledge. Combination yields “systemic” knowledge such as a prototype or a new component of technology. Internalization yields “operational” knowledge about management, production processes or policy implementation. See Figure 3.2.

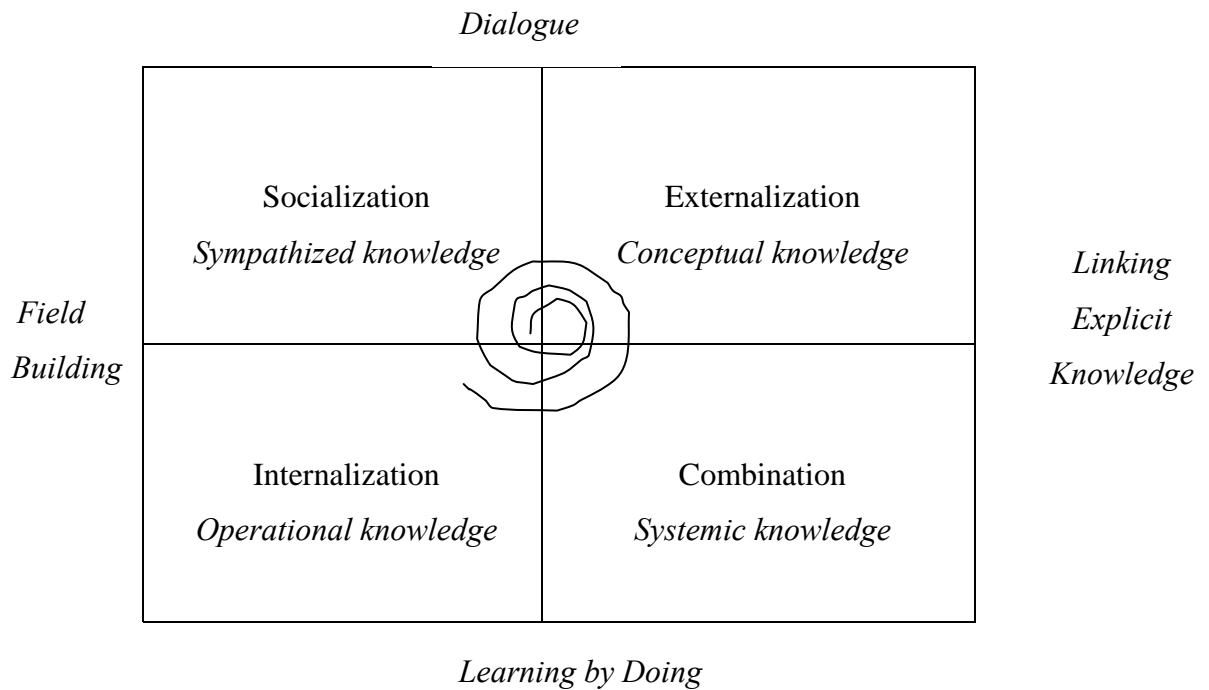


Fig. 3.2 Knowledge Spiral (Nonaka et al., 1995, p.71, 72)

These contents of knowledge interact with each other in the spiral of knowledge creation. The knowledge spiral can start from any mode, but usually begins with socialization. For example, sympathized knowledge about consumers’ wants may become explicit conceptual knowledge about a new product concept through socialization and externalization. Such conceptual knowledge becomes a guideline for creating systemic knowledge through combination. In addition, experience-based operational knowledge often triggers a new cycle of knowledge creation. This corresponds to the third stage in Scharmer’s theory of historical development of knowledge management and gives an answer to the question about the driving force that moves the knowledge spiral (Table 3.4).

According to Nonaka’s et al. (1995) theory, an organization cannot create knowledge by itself. Tacit knowledge of individuals is the basis of organizational knowledge creation. The organization has to mobilize tacit knowledge created and accumulated at the individual level. The mobilized tacit knowledge is “organizationally” amplified through four modes of knowledge conversion and crystallized at higher ontological levels. Thus, organizational knowledge creation is a spiral process starting at the individual level and moving up through expanding communities of interaction that crosses sectional, departmental, divisional and organizational boundaries.

This model describes dynamic process of self-transcendence. The individuals or teams go beyond their restricted knowledge to promote the dynamics of knowledge creation within an organization. Also, organizations can transcend their boundaries by engaging in conversion

processes with their partners, such as customers and suppliers. Each conversion can be understood as an episode of action and reflection. For example, socialization needs active encounter with and contemplation of tacit knowledge and externalization needs interactions within groups and reflective dialogues. Combination requires acquisition and reflection, and embodying needs action and reflection to retain internalized knowledge. Each action – reflection unit needs to be triggered and in turn needs to stimulate other units.

In addition to Nonaka and Takeuchi’s knowledge spiral, also Schüppel et al. (1998) present a knowledge spiral along with the bipolar dimensions. It is based on Nonaka’s (1991) and Nonaka and Takeuchi’s (1995) ideas of knowledge spiral and aims at transfer of knowledge between individual members, groups, the whole organization and its environment. In addition, the main target is the institutionalizing of individual and collective knowledge within the focal organization. The second target is that knowledge has to be anchored in an organization independent of the original bearers. Schüppel et al. (1998) present four bipolar dimensions for forming a knowledge management:

- Internal knowledge – external knowledge
- actual knowledge – future knowledge
- explicit knowledge – implicit knowledge
- knowledge from experience – knowledge from rationality

Schüppel et al. (1998) offer numerous instruments in every bipolar dimension which can “kick off” the above-mentioned knowledge spiral. Because the purpose is to show the compatibility of Nonaka and Takeuchi’s knowledge spiral with the Group Benchmarking model, the instruments for using and multiplying explicit knowledge and for making tacit knowledge explicit are mainly interesting. They are presented in the Tables 3.5 and 3.6.

Table 3.5 Instruments for the management of explicit knowledge (Schüppel et al., 1998, p.235)

Instrument	Description	Intended effects
Materialization of knowledge in documents	Systematic collection of already explicit knowledge in distributable documents	Basis for usage and distribution of knowledge and for standardization processes
Combination of materialized knowledge	Creation of new knowledge through “endless” combination processes	Multiplying existing knowledge in different product and service context
Concepts for personnel integration	Familiarization with existing knowledge, produced etc.	Internalizing already existing knowledge; reproducing standard operating procedures

Table 3.6 Instruments for the management of tacit knowledge (Schüppel et al., 1998, p.236, modified)

Instrument	Description	Intended effects
Learning by example	Perceiving, reflecting on and imitating existing procedures	Passing on tacit routines; standardizing procedures; <i>socialization</i> effects
Common sense in groups	Opening up horizons for collective actions	Passing on tacit knowledge through collective experience; building shared understanding
Metaphors, analogies, models	Using picture-like tools to represent implicit knowledge	<i>Externalizing</i> , articulating and passing on tacit knowledge; materializing knowledge
Shared vision	Discussion of central assumptions in groups	Externalizing, articulating and passing on tacit knowledge; building shared understanding

These tables present the same ideas of the four modes of knowledge spiral than SECI model does. The first table (Table 3.5) offers methods for converting explicit knowledge to explicit knowledge (combination) and explicit knowledge to tacit knowledge (internalization). The second table (Table 3.6) describes instruments that aim to convert tacit knowledge to tacit knowledge (socialization) and tacit knowledge to explicit knowledge (externalization).

Only a small part of one’s knowledge can be expressed. Explicit knowledge can be considered as the visible tip of the iceberg. Explicit knowledge is often public knowledge, and thus available to all competitors. Therefore it can seldom become basis for sustainable competitive advantage. Very big part of the iceberg is invisible – that is tacit knowledge. It can be possible to articulate for observers although the people having it are not able to express it. To create competitive advantage, tacit knowledge needs to be articulated and utilized by companies and their partners. An even larger part of the iceberg is invisible to both beholders and observers of the knowledge. Such knowledge cannot be expressed or utilized easily. To use this rich layer of tacit knowledge, it is necessary for a company to engage in dialogues and improvisations with metaphors and analogies. (Nonaka et al., 2000)

This section presents Nonaka and Takeuchi’s (1995) ideas of knowledge spiral as a method of creating knowledge. It consists of four modes; socialization, externalization, combination and internalization. The model called SECI describes the conversion modes from tacit to tacit, tacit to explicit, explicit to explicit and explicit to tacit knowledge. These modes are performed as a continuous basis so that the previous one triggers the next one. Thus, organizational knowledge

creation is a spiral process starting at the individual level and moving up through expanding communities of interaction that crosses sectional, departmental, divisional and organizational boundaries. The section presents also other corresponding spirals of knowledge conversion, but the Nonaka and Takeuchi's model being the most famous one, is chosen to be used in this study. In Section 3.4.2 the learning process from individual level to organizational learning will be investigated.

3.4.2 From Individual Learning to Organizational Learning

In this section the features of learning starting from an individual and ending to an organization are explored. The section will show that most of the learning theories seem to apply the theory of knowledge conversion of Nonaka and Takeuchi and emphasize the meaning of past experience with the help of which new knowledge is created according to autopoietic epistemology.

The need for organizational learning is based on continuous change around and inside the organizations. It is widely agreed that learning consists of two kinds of activity. According to Senge (1990), they are generative (active) and adaptive (passive) learning. The first kind of learning is obtaining know-how in order to solve specific problems based upon existing premises. The second kind of learning is establishing new premises (i.e. paradigms, schemata, mental models) to override the existing ones. From the viewpoint of Nonaka et al. (1995), the creation of knowledge involves interaction between these two kinds of learning processes, which forms a kind of dynamic spiral.

In order to understand how organizations learn, the issue of individual learning is explored and then the complexity of an organizational setting is added. Therefore, the starting point in that understanding should be the learning of human being. Through learning processes individuals develop new understandings, and research in the field of cognitive and behavioral sciences describes this process as involving the acquisition and interpretation of knowledge (Lindsay et al., 1977). The process does not need to be conscious or intentional, like it mostly is in the benchmarking process, nor does it always increase the learner's effectiveness or result in observable changes in behavior (Friedlander, 1983). Learning tends to occur through processing of information and changing one's "cognitive maps or understandings" (Friedlander, 1983) and as a result the range of one's potential behavior changes (Huber, 1991).

Thus, learning has to be linked to a change in an individual's interpretation of events and action (c.f. autopoietic epistemology). The product of the individual process of interpretation is a change in individual beliefs or schemata and individual behavior. This means that individual

learns through developing different interpretations of new or existing information and thereby developing a new understanding of surrounding events (Lyles et al., 1996).

Learning from past events is a frequently applied way to increase the ability for problem solving. It has been shown that people use past situations or cases as models when learning to solve problems. It can further be described as a cyclic and integrated process of solving a problem, learning from this experience and solving a new problem. (Lyles et al., 1996) Now it can be asked if this theory is applicable also in benchmarking process when learning is supposed to happen from the solutions of other’s problems.

What is thus organizational learning? Cohen et al. (1990) emphasize that organizational learning is different than the sum of individual learning. Organizations represent patterns of interactions among individuals, especially through communication, and therefore learning in organizations to a large extent depends on the ability to share common understandings so as to exploit it (Daft et al., 1984). It has been suggested that organizational learning involves at least four phases: information acquisition, information distribution, information interpretation, and information storage in organizational memory, including knowledge retrieval (Huber, 1991).

The link between individual and organizational learning is tied to the context of group learning according to Crossan et al. (1992). The concept of individual learning should be embedded in the context of group learning, which in turn should be embedded in a concept of organizational learning.

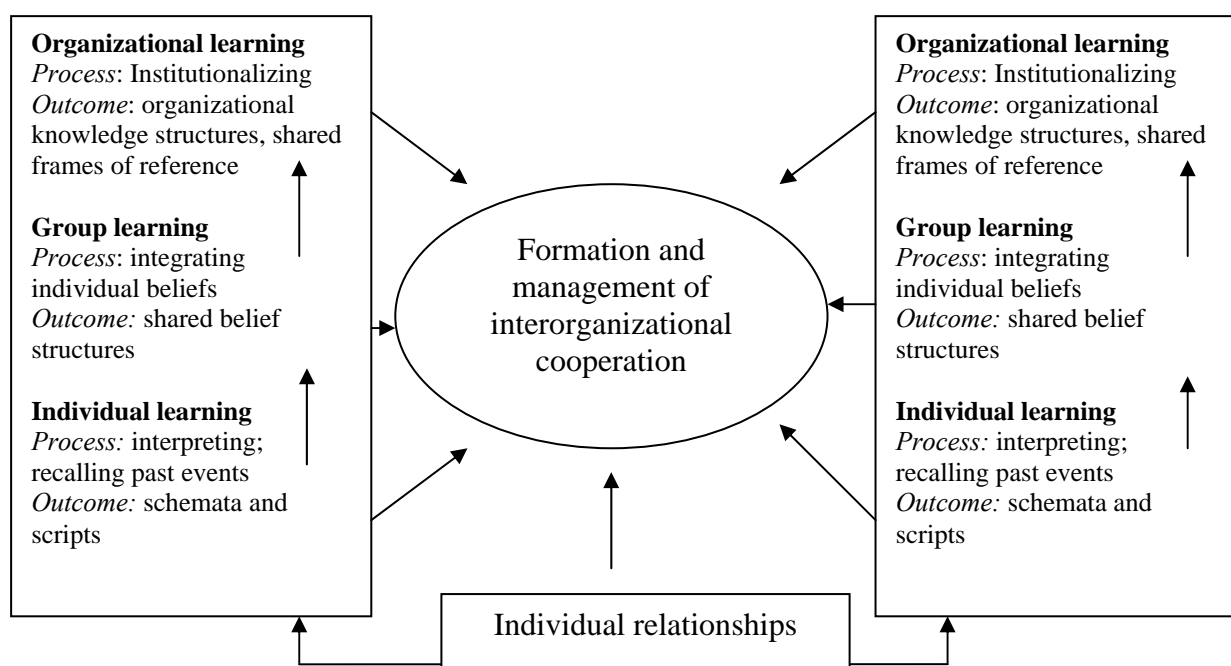


Fig. 3.3 Learning levels influencing formation and management of cooperations (cf. Lyles et al., 1996, p.86, modified)

Figure 3.3 presents the learning levels of organizations; their processes and outcomes. When examining this figure and the whole organizational learning theory, it is interesting to notice how well the Nonaka and Takeuchi's model follows the learning theory.

The whole process starts with the individual learning phase when individuals learn through developing different interpretations of new or existing information and developing a new understanding of surrounding event as well as using past situations or cases as models when learning to solve problems. This is the phase happening in every organization. This phase can be considered also as a socialization phase in the knowledge spiral of Nonaka and Takeuchi. It can also be reflected to the ontological dimension in the theory of knowledge creation of Nonaka and Takeuchi.

Because organizations represent patterns of interactions among individuals, especially through communication, and therefore learning in organizations to a large extent depends on the ability to share common understandings so as to exploit it, also benchmarking process executes this theory in performing discussions and communication between members in organizations but also between members and groups of different organizations as will be examined later in this study. According to Nonaka and Takeuchi's knowledge creation theory, this happens during externalization phase as well as combination phase, respectively. In Figure 3.3 both group and organizational learning are produced now. By adding the arrows inside the boxes in Figure 3.3, the correspondence of Figure 3.3 to the learning process of Nonaka and Takeuchi is improved.

In this section, the features of learning starting from an individual and ending at an organization have been explored. Most of the learning theories seem to apply the theory of knowledge conversion of Nonaka and Takeuchi and emphasize the meaning of past experience with the help of which new knowledge is created according to autopoietic epistemology. This section raises a question about a possibility to learn from others experiences instead of own past experience. Before searching an answer to that question the factors that act as enablers in knowledge creation process will be examined in Section 3.5.

3.5 Knowledge Enablers

In this section a wide variety of attitudes about learning enablers as well as some hindrance factors will be explored. The section will show that the most important enabling factors are trust, communication, motive, and openness. In addition, culture of the organization must support learning by enabling knowledge sharing. Different organizational conditions are

mentioned by many authors like Ichijo et al.(1998) and Nonaka et al.(1995). There will also be an interesting association between knowledge and networking enablers.

Knowledge would not be created, captured and capitalized on in firms without its intentional development by means of knowledge enablers. Knowledge development in organizations should not be left unintentional. Otherwise, knowledge development will occur at random and will be unsystematic since knowledge is very fragile. To develop knowledge capital as one of its core competences, a firm should have knowledge enablers. Here knowledge enablers are defined as organizational mechanisms for intentionally developing knowledge in organizations. (Ichijo et al., 1998)

Knowledge enablers have three significant roles. First, knowledge enablers should stimulate individual knowledge development. Individual organizational members should develop their range of activities so that they will have a variety of experiences, which will be sources for individual knowledge development. Second, knowledge enablers should protect knowledge development in organizations, tackling obstacles to its existing in organizations. Since knowledge is very fragile, it would not be nurtured in organizations without intentional facilitation and protection. Knowledge enablers are expected to play this facilitation and protection role. Third, knowledge enablers should facilitate the sharing of individual knowledge and experience among organizational members so that individual knowledge will be transformed into organizational knowledge. In the following, each five knowledge enablers of Ichijo et al. (1998) will be introduced and its function will be explained. (Ichijo et al., 1998)

1. Creating knowledge intent. Organizational members individually as well as collectively have a variety of experiences. These individual or collective experiences are shared by other organizational members, who collectively interpret these experiences, reason the truth behind these experiences, justify this truth, referring to corporate values as justification criteria for organizational activities, and thus finally develop organizational knowledge.
2. Developing organizational conversations. If an individual organizational member creates new knowledge, there might be no legitimate language in which this knowledge can be expressed. Therefore firms should focus on the role of language played in knowledge creation, and find the way to facilitate languaging (von Krogh et al., 1995, 1996) in firms and to use language, which will be commonly shared and understood by organizational members.
3. Developing organizational structure facilitating knowledge development. The context for knowledge creation is where firms can accomplish innovation by means of creating,

capturing and capitalizing of their knowledge asset. Firms' structures should be organized so that they are close to the context for knowledge and are able to act for knowledge creation. Firms should know where they can accomplish a unique contribution to customers, actually penetrate into this context, be close to their customers and work with them so that knowledge will be created, captured or capitalized on. Firms should also have such mechanisms by which a variety of information and interpretation will be facilitated among their members due to the general conclusion that integrating a variety of information and its interpretations is beneficial for groups engaged in complex problem solving. In order to develop organizational knowledge in a turbulent environment, firms should have a variety of information sources, a variety of interpretation of this information, and a variety of perspectives developed from a variety of interpretation. Given this variety, the range of organizational activities will be enlarged and this wide range of activities will increase the possibility of developing organizational knowledge. Once it is shared among organizational members, a variety of information and interpretation will stimulate creativity among them, thus facilitating organizational knowledge development.

4. Managing care relationships. Tacit knowledge as a crucial source of innovation exists in individuals, groups or organizations in the form of individual experiences, images, skills, organizational culture, and organizational climate and so on. Therefore, in order to comprehend certain tacit knowledge, interactions between individuals are prerequisite. What underlies such interactions is independent, all-out commitment to the subject concern. Such commitment nurtures mutual trust, which facilitates constant, quality dialogue and discussions. Knowledge development is fraught with emotions, misunderstandings, misconceptions, rule-based entrapping etc. Mutually respectful relationships must exist among members of firms since organizational knowledge creation is a social process. Care characterizes a process of interaction between receiver and provider in firms, and should be understood as a quality of a relationship rather than in terms of roles and functions. When this relationship based on care is realized among organizational members, trust will emerge among people. This trust improves the quality of dialogue and discussion as a basis for organizational activities, and thus facilitates the sharing of tacit knowledge.
5. Developing knowledge managers. Those managers who value knowledge and its management (i.e. creation, capturing, and capitalizing on knowledge capital) must be intentionally developed. The way they are developed should be consistent with

knowledge development and management. The evaluation of those managers who actively penetrate into the context for knowledge creation, collect various information, interpret it, share this information and interpretation with other colleagues, establish care relationship, and thus contribute to developing knowledge-based competence in the firm should be built in the incentive system. (Ichijo et al., 1998)

The enabling conditions that are connected to the Nonaka and Takeuchi's knowledge spiral are intention, autonomy, redundancy, creative chaos, and requisite variety (Nonaka et al., 1995, 2000). These enabling conditions are the driving forces for dynamic knowledge conversion.

The knowledge spiral is driven by organizational *intention*, which is defined as an organization's efforts to its goal. These efforts are included in the business strategy. From the organizational knowledge creation point of view, the essence of strategy lies in developing the organizational capability to acquire, create, accumulate, and exploit knowledge. Business organization should foster their employees' commitment by formulating an organizational intention and proposing it to them in order to create knowledge.

All members of an organization should be allowed to act autonomously, also at the individual level. *Autonomy* increases the possibility that individuals will motivate themselves to create new knowledge. Original ideas emanate from autonomous individuals, diffuse within the team, and then become organizational ideas. A knowledge-creating organization that secures autonomy may also be described as an "autopoietic system" (Maturana et al., 1992). Similarly to an autopoietic system, autonomous individuals and groups in knowledge-creating organizations set their task boundaries by themselves to pursue the ultimate goal expressed in the higher intention of the organization.

Redundancy, the third condition, may sound pernicious because of its connotations of unnecessary duplication, waste or information overloaded. However, the meaning here is the existence of information that goes beyond the immediate operational requirements of organizational members. In business organizations, redundancy refers to intentional overlapping of information about business activities, management responsibilities, and the company as a whole. A concept created by an individual or a group is shared by other individuals who may not need the concept immediately. Sharing redundant information promotes the sharing of tacit knowledge, because individuals can sense what others are trying to articulate. Therefore, redundancy speeds up the knowledge-creating process.

Creative chaos and *fluctuation* stimulate the interaction between the organization and the external environment. Fluctuation is considered as an order whose pattern is hard to predict at the beginning. When organizations adopt an open attitude toward environmental signals, they

can exploit those signals' ambiguity, redundancy, or noise in order to improve their own knowledge system. When there is fluctuation in an organization, its members face "breakdown" of routines habits, or cognitive frameworks, which offers them an opportunity to reconsider their fundamental thinking and perspective. The breakdown demands that the attention is turned to dialogue as a means of social interaction, thus helping us to create new concepts. An environmental fluctuation triggers a breakdown within the organization and the new knowledge will be created. This phenomenon is also called creative chaos.

According to Ashby (Nonaka et al., 1995), an organization's internal diversity must match the variety and complexity of the environment in order to deal with challenges posed by the environment. Members of organization can cope with many contingencies if they possess *requisite variety*, which can be enhanced by combining information differently, flexibly, and quickly, and by providing equal access to information throughout the organization. In maximizing variety, everyone in the organization needs to be assured of the fastest access to the broadest variety of necessary information.

Aadne et al. (1996) write about knowledge and cooperative strategies. They mention at least four issues being of substantial importance for understanding and managing knowledge transfer based on literature review: motives, openness, prior experience, and internalizing. When examining the issues deeper, it is quite obvious that those issues are important factors also in benchmarking process.

From the benchmarking point of view, understanding of both the company's own *motives* and the motives of potential partner is utmost important. The motives have impact on the choice of potential partner as well in cooperative strategic activities as in benchmarking activities, which may be strategic, too. Kogut (1988) mentions three different types of motives for joint ventures: transaction costs, competitive positioning, and organizational learning. Recently, a stronger emphasis on knowledge and learning motives has become dominant (Aadne et al., 1996). Hamel (1991) argues that knowledge transfer is rare when a clearly communicated learning motive is lacking.

A knowledge transfer motive is emphasized in the literature as a basic requirement for any learning to take place in cooperative activities. However, even if a company has a clearly defined and communicated learning motive, the potential for learning is highly determined by the *openness* of the partner (Hamel, 1991). So, openness can be seen as willingness to share knowledge, and to interact closely with a partner. Learning from *past experience* by transforming experiences into useful knowledge is a fundamental key for successful companies.

Diversity of knowledge is seen as a robust for learning, because it enhances the probability that incoming information may relate to what is already known (Cohen et al., 1990).

Given that motive is the desire or willingness to learn, and openness is the opportunity to learn, *internalization* is concerned with, or determines, the partners' ability or capacity to learn (Hamel, 1991). This part of the knowledge transfer process may be divided into two aspects; receptivity and dissemination. This distinction is used when describing the difference between individual learning and collective or shared learning (Aadne et al., 1996). Hamel (1991) experiences that the partner having the greatest need to learn has the highest barriers to receptivity. The problems occur in understanding what the partner is doing and also in understanding or tracing the process leading to the partner's knowledge development. The same problem is seen between American and Japanese companies by Crossan et al. (1992). Hamel (1991) argues that the organization's ability to absorb knowledge depends on both the process of altering existing perceptual maps and replacing old status quo behavior with new improved behavior. This argument describes clearly what the main idea in benchmarking process is, and at the same time makes these above-mentioned issues very relevant when designing benchmarking process in an organization. Hamel (1991) still goes on in describing the features of internalization when writing about distributing relevant knowledge throughout parent organization, and finally exploits its potential.

The corporate culture in learning organizations focuses more on liberating employees than on controlling them. Commonly these learning organizations encourage prudent risk taking, encourage holistic thinking, expect curiosity and creativity, encourage networking and teamwork, reward meaningful difference, and focus on transformational progress in addition to mere developmental change. (Bogan et al., 1994)

Goh (2002) writes about the factors influencing knowledge transfer and he mentions *organizational culture* as one of the enabling factors. One cultural dimension is cooperation and collaboration. Knowledge transfer requires the willingness of a group or individual to work with others and share knowledge to their mutual benefit. A fundamental variable in cooperation between groups or individuals is level of trust. A high level of trust is essential for a willingness to co-operate. Certain management practices can influence the level of trust in an organization. Open decisions offer widely available and accessible information for employees. In addition to co-operative climate, a need to foster a culture of problem seeking and problem solving improve knowledge transfer. Thus the culture can significantly increase the propensity of the organization's members to share knowledge and information freely with each other. (Goh, 2002)

Spekman et al. (2002) concentrate especially on the learning process in supply chain and they list the affecting factors being: trust, communications, the type of relationship between partners in supply chain, decision-making style, and company's culture.

In this section a wide variety of attitudes about learning enablers as well as some hindrance factors is explored. The most important enabling factors seem to be trust, communication, motive, and openness. Culture of the organization must support learning by enabling knowledge sharing. Different organizational conditions are mentioned by many authors like Ichijo et al. and Nonaka et al. (1995). Interestingly, many of the factors enabling learning and knowledge creation are exactly the same than enabling networking in supply chain context.

3.6 Summary of the Chapter “Concept of Knowledge Management”

The chapter explores knowledge management starting from the epistemological determination of theoretical view in this study. Although the perspective is chosen to be an *autopoietic* view, the literature, however, is very much written from the traditional view according to which knowledge is possible to be transferred between organizations. The definitions of knowledge are multiple but quite similar to each others. In this study the most of the definitions can be adjusted to as long as the possibility to create new knowledge instead of transferring existing one is kept in mind.

The chapter also presents few types of knowledge focusing on the division of Nonaka et al. (1995). Other presented theories of knowledge types cannot be considered incompatible with the types of Nonaka et al. (1995), but giving more extension to definitions. The theory of *knowledge conversion spiral* by Nonaka and Takeuchi is applied in this study as the most suitable for indicating the learning process during benchmarking. It is also considered commonly known and approved, which makes it interesting to be explored also in this study.

The chapter brings out the *enablers for knowledge creation* to be focused later in relation to Group Benchmarking. The enablers should be strongly considered in order to create a functional construction for learning; i.e. creating new knowledge on the existing knowledge platform. Chapter 4 will present benchmarking as a model for knowledge sharing in companies, supply chains and networks as well as between companies, supply chains and networks.

4 CONVENTIONAL BENCHMARKING MODEL

This chapter has been divided into three sections. The first section defines the concept of benchmarking and the related terms. The second section explores the history of benchmarking process and the third section analyses benchmarking as a method. The third section also presents different types of benchmarking as well as practice models.

4.1 A Definition of Benchmarking

In this section benchmarking is defined in various ways by using pure terms describing operations in the process of benchmarking, determining different types of benchmarking or illustrating benchmarking with adjectives of the organization's nature. This section will find out whether the definitions are all valid in this study.

Benchmarking as an activity has been defined by several different ways. The Webster's dictionary (1991) definition is informative. It defines a benchmark as:

"A mark on a permanent object indicating elevation and serving as a reference in topographical surveys and tidal observations....A point of reference from which measurements may be made....Something that serves as a standard by which others may be measured"

As the definition of Webster's dictionary implies benchmarking's linguistic and metaphorical roots lie in the land surveyor's term, where a benchmark was a distinctive mark made on a rock, a wall, or a building. In this context, a benchmark served as a reference point in determining one's current position or altitude in topographical surveys and tidal observations. In the most general terms, a benchmark was originally a sighting point from which measurements could be made or a standard against which others could be measured. (Bogan et al., 1994)

The definition of benchmarking by someone who has participated several benchmarking processes may be like this:

Benchmarking is the search for industry best practices that lead to superior performance.
(Camp, 1989, p.12)

A formal definition of benchmarking is derived from experience and success of the historical application of benchmarking:

Benchmarking is the continuous process of measuring products, services, and practices against the toughest competitors or those companies recognized as industry leaders. (David T. Kearns, Chief executive officer, Xerox Corporation)

This definition considers some important items typical for benchmarking process. The process is supposed to be continuous to be effective as a self-improvement and management process. The *continuity* is a necessity because industry practices constantly change; industry leaders get stronger or become replaced with new leaders. The term benchmarking implies *measurement*, which can be executed in two forms. The internal and external practices can be compared and illustrated with analytical measurements as gaps between practices. The quantitative metrics are an important part of the process but the practices on which the metrics are based should be pursued first. Benchmarking can be applied to all facets of a business including *products, services, and practices*. Benchmarking goes beyond the traditional competitive analysis to not only reveal what the industry best practices are, but to also obtain a clear understanding of how best practices are used. Benchmarking should be directed at those firms and business functions within firms that are recognized as the best or as industry *leaders*. The company serving as a benchmark partner is not always obvious, but fortunately there are ways to expose who and why they should be chosen. (Camp, 1989)

Reider (2000, p.xii) defines something that is good to remember:

“Benchmarking is not a panacea for success; it is a tool to learn success”.

Reider (2000, p.1) also gives a definition, which describes the process:

“...a process for analyzing internal operations and activities to identify areas for positive improvement in a program of continuous improvement”.

Benchmarking has also been defined as a continuous, systematic process for comparing performances of, for example, organizations, functions, processes or economies, policies or sectors of business against the “best in the world”, aiming only to not match those performance levels, but to exceed them (e.g. Camp, 1989; Hannus, 1994; Reider, 2000; Tuominen, 1997).

At the end, very common and philosophical definition is as follows (APQC, 1993):

Benchmarking is the practice of being humble enough to admit that someone else is better at something, and being wise enough to learn how to match them and even surpass them at it.

As can be concluded benchmarking is defined in a various ways by using pure terms describing operations in the process of benchmarking, determining different types of benchmarking or illustrating benchmarking with adjectives of the organization’s nature. All the above-mentioned definitions can be considered to be valid, because they do not exclude each other.

4.2 History of Benchmarking

This section will show that benchmarking is strongly related to quality aspects and development of quality management in organizations. As will be presented, the history of benchmarking is well known and documented. The section is going to explore if the development of the process follows the development of business management in general.

The tendency of people developing methods and tools for setting, maintaining and improving standards of performance can be seen as early as ancient Egyptians who developed accurate methods of measurement by the use of a tool “royal cubit”. What about ancient Greeks who left us with exemplars of architecture, art and design and Romans who built upon the achievements of both Egyptians and Greeks by developing the ability to construct bridges and roads to standardized designs. (Bendell et al., 1993)

The first recorded references to the actual physical process of benchmarking itself can be traced to the early 1950’s when the Japanese paid many visits to Western organizations. Paying particular attention to the manufacturing processes of those organizations situated in the US and in Western Europe the Japanese excelled in the absorption of best business practices into their own manufacturing industries. (Bendell et al., 1993) This is an operation, which has effectively resulted in the international reputation of the Japanese in the commercial market.

The evolution of benchmarking should be understood through development of quality context; from the early development of standards in relation to the control of quality, the development of statistical process control, the emergence of the quality gurus and Total Quality Management to the early approach by the Japanese to benchmarking. Benchmarking can be considered as a natural evolution from principles of quality measurement and TQM. Some of the quality gurus have developed methods, which belong to the tools used also in benchmarking processes such as Deming cycle (PDCA cycle) and Ishikawa’s cause and effect diagram.

Benchmarking literature (e.g. Reider, 2000; Camp, 1989) describes without exception the Rank Xerox case, which is considered as a starting point to the use of systematic benchmarking process as a management tool. Xerox Corporation of America adopted a vigorous approach to benchmarking in 1979, when they found that their competitors were able to sell products more cheaply than Xerox could make them. The approach they adopted has now become the model for others to follow. Rank Xerox became the first winner of the European Quality Award in 1992 (Reider, 2000).

Benchmarking’s rise as a cornerstone quality-improvement concept can be observed in the evolution of the Malcolm Baldrige National Quality Award. The Baldrige criteria represent the national standard for thinking about the concepts, tools, systems, and processes currently driving

organizational improvements. Benchmarking and competitive comparisons are the management concepts with the single greatest influence (550 points) over 1000 points that can be awarded in a Baldrige assessment. No other business concepts, including process management, empowerment, employee involvement, cycle time reduction, strategic quality planning, new product development or innovation, occupies such broad-reaching influence in the Baldrige criteria. (Bogan et al., 1994; Bendell et al., 1993; Boxwell, 1994) Actually, the Baldrige Award's influence is twofold: first, companies that receive the award are required to share information regarding quality and business process improvements with other organizations, thus creating a readily available source of benchmarking data; second, the award criteria requires that organizations implement and maintain trend data and conduct competitive comparisons (Yasin, 2002). Also other quality awards like Deming Prize, European Quality Award and British Quality Award are widely based on comparison to "best-in-class" organizations. The International Benchmarking Clearing House, a service of American Productivity and Quality Centre has announced three separate awards, the Benchmarking Awards. This illustrates the significance of Benchmarking in the commercial environment. (Bendell et al., 1993)

While the early non-manufacturing benchmarking efforts against direct product competitors were partially successful, it became obvious that focusing on competitors' practices only could align attention from the ultimate purpose that is superiority in each business function. Concentrating solely on competitors may lead to meeting the performance of competitors but not necessarily to optimal performance. This understanding has resulted in several different ways of benchmarking finding the best practices wherever they exist.

Watson (1993) in examining the historical development of concepts suggests that benchmarking is moving from an art to a science. In so doing, it has traversed distinct generations of development. (Figure 4.1)

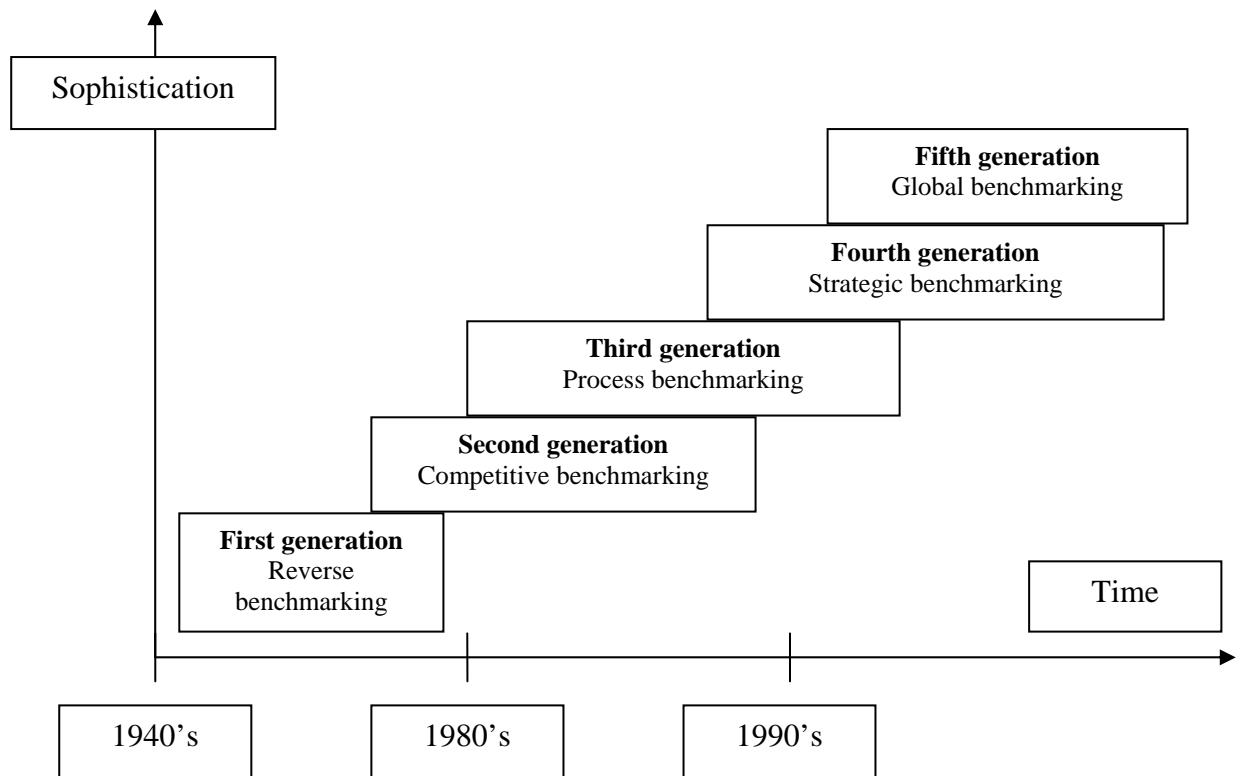


Fig. 4.1 Development in the art of benchmarking (adapted from Watson, 1993, p.34)

While Watson (1993) suggests the arrival of the strategic and even global era, Ahmed et al. (1998) are suggesting that strategic benchmarking is still relatively uncommon and also global approaches are rare. Strategic benchmarking is seen as a systematic process for evaluating alternatives, implementing strategies and improving performance by understanding and adopting successful strategies from external partners. Global benchmarking involves applying and learning globally crossing cultural barriers. (Ahmed et al., 1998)

It is concluded that benchmarking is strongly related to quality aspects and development of quality management in organizations. As presented in Section 4.2, the history of benchmarking is well known and documented. Also the development of the process seems to follow the development of business management in general. However, the time we are now living is a period of strategic and global benchmarking according to Watson (1993), but in practice the common type of benchmarking is still process benchmarking and the opinions of Ahmed et al. (1998) seem quite truthful. Section 4.3 will explore benchmarking from the practical point of view.

4.3 Benchmarking as a Tool

This section will explore the versatility and applicability of benchmarking as a tool, the need for careful determination of the process to be benchmarked and the best practice target to learn from. The relation between practices and metrics is discussed although they will be explored more later. It seems to be essential to understand that benchmarking is not copying or spying, but emulating and adapting the best practices.

Benchmarking is a tool for strategic purposes and as such focuses on closing gaps for long-term competitiveness. Benchmarking offers an opportunity for managers to ask questions about results (how often, how many, how big/small, how good/bad) i.e. the performance of processes through asking more important questions about process behaviors i.e. process management (such as what, why, where, when, how). (Zairi, 1994)

Benchmarking can be conceived in a number of ways. At the simplest level it might be viewed as a strategy for enabling people to think outside the boxes they normally inhabit: the boxes being departments, service or functional units or institutions (Spendolini, 1992). It is first and primarily, a learning process structured so as to enable those engaging in the process to compare their services, activities, and results in order to identify their comparative strengths and weaknesses as a basis for self-improvement and/or self-regulation. Benchmarking offers a way of identifying “better and smarter” ways of doing things and understanding why they are better and smarter. These insights can then be used to implement changes that will improve practice or performance. (cf. Jackson, 2001)

The justification of benchmarking lies partly in the question:” Why re-invent the wheel”. Benchmarking is not just competitive analysis or number crunching, nor is it spying, espionage or stealing. It is a process to establish the ground for creative breakthroughs. Many organizations publicize what they have achieved, but it is unusual for them to be open on the more mundane facts of how this transformation was made to work. More than 70 percent of the Fortune 500 companies use benchmarking on a regular basis, including AT&T, Ford, Eastman Kodak and IBM (Bhutta et al., 1999).

“You can’t just impose a best practice. It has to be adapted to your own company’s style,” says Arun Maua, VP at Arthur D. Little. This refutes the assumption that all processes work for all companies (Boxwell, 1994). One cannot just pick up a “best practice” and surgically implant it on one’s own organization. One has to look at the way things are being done, the culture prevailing, the human resource employed to do the job, etc. before one can adapt a process. And that is what the main crux of the benchmarking model is i.e. to adapt the process from leading companies to one’s own organization.

The benchmarking follows a process, which can be divided even to 33 steps but can also be performed in four steps. A fundamental process evaluation reveals five major components of the benchmarking process that are linked together like spokes on a wheel, which is the idea in the name of the process, benchmarking wheel used by Bhutta et al. (1999) and Andersen et al. (1999). The steps on the wheel are as follows: Plan the study, Search for benchmarking partners, Observe the partners' process (both performance and practice), Analyze the gaps in performance and the causes for them, and Adapt the best practices.

In principal benchmarking are two things: setting goals by using objective, external standards and learning from others – learning how much and, perhaps more important, learning how. It means that benchmarking is not a numbers-only exercise. Numbers are at their best only half of the benchmarking process. (Boxwell, 1994)

Therefore, benchmarking can be divided into two parts, practices and metrics. Practices are defined as the methods that are used; metrics are the quantified effect of installing the practices (Camp, 1989). Camp recommends approaching benchmarking on the basis of investigating industry practice first, because benchmarking is seen as an understanding of practices. Once they are understood they can be quantified to show their numeric effect. The metrics, that quantifies the effect of practices, begs the answer to the question, "why", which can be answered after understanding the practices (Camp, 1989). The main task in the beginning of benchmarking process is therefore determining the practices, which are certainly qualitative measures of the performance.

One important aspect in the benchmarking process is to find the "best in the world" practices for comparison. Camp (1989) focuses on identification and use of information sources for selection: relevance of the data to the operation and ease of data collection. Internal and direct product comparisons are going to be those seen as having the most relevance. In those cases the comparison is made within the same industry. Unfortunately there is no assurance that internal functions have best practices installed. The industry leaders and the generic processes are difficult to benchmark because the benchmarker must have a level of insight to see the possibilities of incorporating the practices in internal processes. The search of valid information should be made before making any set up of visits. The benefit of the information search is not only in cataloging existing information, but also in further help of defining the investigation, making it more focused, and pinpointing information of highest priority.

As with any quality-driven process, any action must be in line with the organization's business strategy. In the case of benchmarking, the procedure should be applied to those processes that are critical to the success of the organization (i.e. the company's "critical success

factors”). These factors are the conditions, variables or characteristics which, if properly managed, will have a direct effect on customer satisfaction and hence the organization’s prosperity. A key feature of successful benchmarking is therefore the ability to only benchmark those processes that are critical to the organization’s goals. Typical goals, beyond simple profit maximization, can include customer satisfaction, improving competitiveness and increasing performance. Where metrics can be readily applied to the goals, for example, standard of business metrics for reducing costs or increasing performance, the goals can be easily benchmarked. Where metrics are difficult to establish, for example, customer satisfaction, the benchmarking process will be less straightforward (Spendolini, 1992). It is, however, essential that some form of specific standard of measurement is identified. Without at least one, a performance gap cannot be identified and thus benchmarking is impossible.

It is concluded that benchmarking is a versatile and applicable tool whenever the process to be benchmarked is carefully selected to be the critical success factor, the best practice target is appropriate, and, what is important, practices are examined before focusing on metrics. It is also essential to understand that benchmarking is not copying or spying, but emulating and adapting the best practices. In the following sections benchmarking types, as well as practices and metrics will be explored more in details.

4.3.1 Different Benchmarking Types

This section explores the classification of benchmarking types being very complicated and more or less artificial named according to the classifier. The section will reveal that a generally accepted, uniform methodology does not exist. In practice the benchmarking process often seems to be a mixture of several benchmarking types. However, in developing and examining the benchmarking process and educating organizations in using it, a vocabulary for description and separating different alternatives is needed. This will become obvious also later when presenting a new benchmarking model.

Bendell et al. (1993) divide benchmarking types to four categories, which have their own advantages and disadvantages. *Internal benchmarking* involves making comparisons with other parts of the same organization. It can be with other departments, other sites, other companies within the same group, either in the same country or abroad. This type of benchmarking is usually straightforward to arrange and fairly common. It is relatively easy to obtain all the information necessary for a good comparison to be made. However, it is unlikely to yield improvements, which meet world best practice. *Competitor benchmarking* is much more difficult. Any information obtained is likely to be very relevant but, for reasons of

confidentiality, it will be almost impossible to get a full picture of how a direct competitor operates. Looking at outputs and available figures can give some information, but they can also mislead if the processes that deliver the outputs cannot be determined. Some of the larger organizations, however, do exchange information in selected areas in the interest of jointly coming to terms with best practice. *Functional benchmarking* involves making comparisons with typically non-competitive organizations, which carry out the same functional activity that one is interested in. Examples are warehousing, procurement, catering etc. This type of benchmarking has several advantages: functional leaders are easy to identify in many areas; confidentiality is not usually an issue; approaches, which may be novel for ones industry can be discovered; two-way partnerships can be developed. Weighing against these is likely to be problems in adopting and adapting their practices for ones operation. *Generic benchmarking* goes step further and may compare business processes, which cut across various functions and in quite different industries. Opportunities discovered by this process are likely to be the most innovative and to create breakthroughs for unprecedented improvements. However, the integration of novel concepts into a different industry is also likely to be the most challenging.

The corresponding division among the benchmarking types can be found in many other benchmarking books e.g. Hannus (1994) and Camp (1989) and almost the same division without the last, generic benchmarking is described by Karlöf (1995). Tuominen (1997) divides the benchmarking types according to an object in comparison. Also he describes four types of benchmarking: strategic benchmarking, product benchmarking, process benchmarking and know-how benchmarking.

Reider (2000) makes a division to two main benchmarking types. The idea is that after performing internal benchmarking by analyzing company's existing practices, the organization goes on with external benchmarking. *External benchmarking* consists of comparing company operations to other organizations in some kind of formal study such as competitive benchmarking, *industry benchmarking* and *Best-in-Class benchmarking*. Industry benchmarking corresponds to functional benchmarking and Best-in-Class benchmarking corresponds to generic benchmarking in the types mentioned earlier.

Boxwell (1994) mentions three common categories of benchmarking into which most of the benchmarking that is taken place across the world falls; competitive, co-operative and collaborative benchmarking. Also Boxwell considers *competitive benchmarking* as the most difficult form of benchmarking because, as its name suggests, target companies are not usually interested in helping the benchmarking team. Competitive benchmarking means measuring functions, processes, activities, products, or services against those of competitors and improving

the own ones so that they are, ideally, the best-in-class but, at a minimum, better than those of the competitors. Collecting and analyzing data about the competitor is a fairly straightforward, though time-consuming, process. After collection of the data, the most important is to use it and learn from it the information, which have positive effects on their performance.

According to Boxwell (1994), cooperative and collaborative benchmarking are the most talked-about forms of benchmarking because they are relatively easy to practice, because they make interesting news copy, and because teams engaged in competitive benchmarking usually do not tell about it. In *cooperative benchmarking*, an organization that desires to improve a particular activity through benchmarking contacts best-in-class firms and asks them if they are willing to share knowledge with the benchmarking team. The target companies are usually not direct competitors of the benchmarking company, which is a key factor in securing cooperation. In cooperative benchmarking, the knowledge usually flows in one direction – from the target companies to the benchmarking company. Although the benchmarking team often offers to provide the target companies with some benefit in return, the targets typically give more than they receive.

Boxwell (1994) goes on with *collaborative benchmarking* in which a group of firms share knowledge about a particular activity, all hoping to improve based upon what they learn. There are collaborative efforts that have produced great results. One consortium that includes Arthur Andersen, Eastman-Kodak, and Xerox, among others, has been sharing data and knowledge in a number of areas, with many positive gains to show for it.

Jackson et al. (2000a) think that all schemes for classifying benchmarking activities are somewhat artificial because many exercises contain elements of different classifications. Nevertheless, classification is useful in developing a conceptual understanding of processes and purposes, and in creating a vocabulary to describe and distinguish between different types of activity. Therefore, Jackson (1998) classifies benchmarking activities according to the nature of the referencing processes that underpin the activity (Jackson, 1998) and/or whether the process is:

- implicit or explicit
- conducted as an independent or a collaborative exercise
- internal or external to an organization
- focused on the whole process (vertical benchmarking) or part of a process as it magnifies itself across different functional units (horizontal benchmarking)
- focused on inputs, process or outputs (or a combination)

- based on quantitative and/or qualitative methods.

Schofield (1998) classifies benchmarking activities according to whether the activity is implicit i.e. a by-product of information-gathering exercises such as survey undertaken by a national agency or explicit i.e. a deliberate and structured process to facilitate comparison and identify directions for change that will lead to improvement. Explicit is the type of benchmarking usually discussed.

Independent benchmarking is considered when there are instances, where a single institution or administrative unit within an institution wishes to compare its own practice and performance against information in the public domain or a customized database provided by an external agency or consultant. Collaborative benchmarking involves the active participation of two or more organizations or organizational units in a formal structured process that facilitates comparison of agreed practices, processes or performance. (Jackson et al., 2000a)

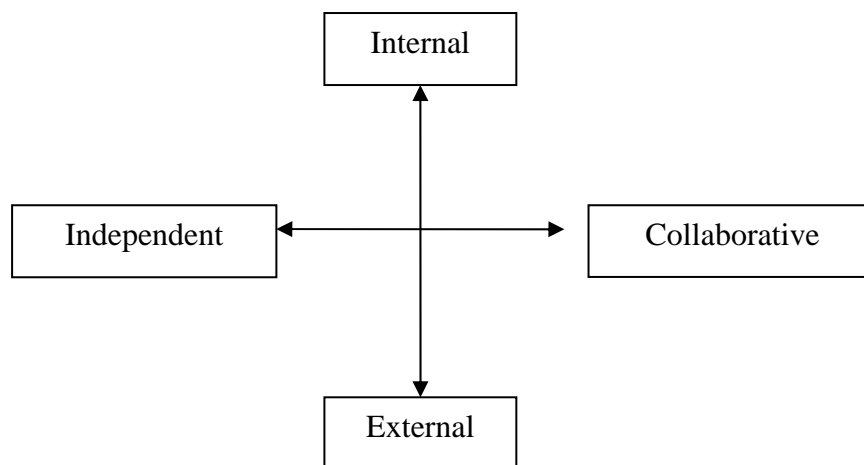


Fig. 4.2 Classification of benchmarking (Jackson et al., 2000a, p.8)

Camp’s (1989) and Reider’s (2000) division to internal and external benchmarking is on the vertical axis in Figure 4.2. External benchmarking including three other benchmarking types; competitive, functional and generic benchmarking, is further refined by *external competitive* and *external collaborative* benchmarking offered by Schofield (1998) (Figure 4.3).

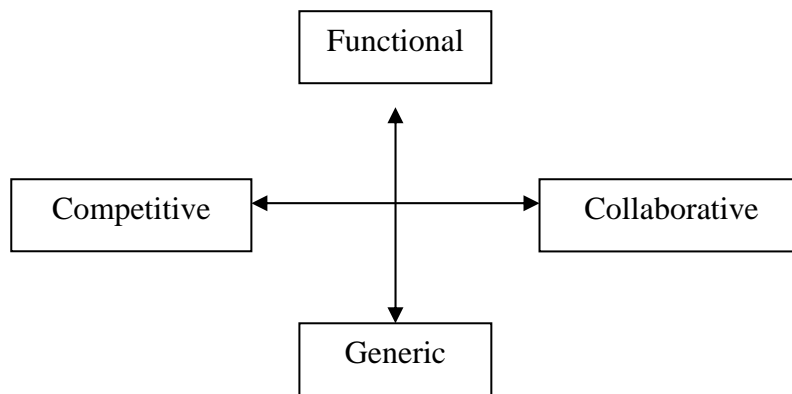


Fig. 4.3 Typology of externally focused benchmarking activities (Jackson et al., 2000a, p.9)

Benchmarking can be focused on a single business process or incorporate a number of processes that collectively enable a function to be discharged. Alstete (1995) classifies benchmarking processes into vertical and horizontal components (Figure 4.4). Vertical benchmarking aims to quantify or qualitatively understand work processes in a discrete functional area. In contrast, horizontal benchmarking examines work processes that cross-cut the functional areas and organizational units.

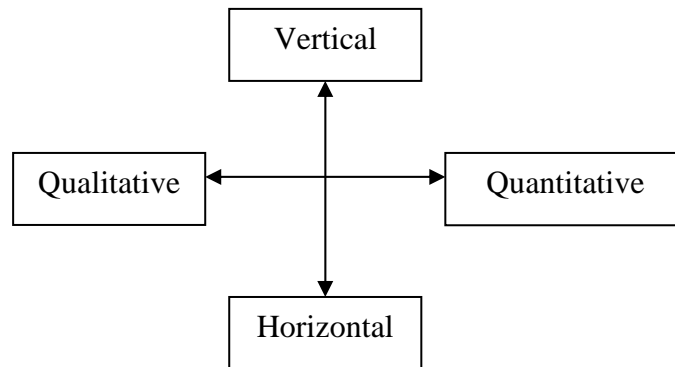


Fig. 4.4 Nature of benchmarking activities (Jackson et al., 2000a, p.9)

A classification can be done according to what extent a benchmarking process uses quantitative and qualitative methods. In many cases, however, the complexity of interacting variables and the particularities of context require a mixture of quantitative and qualitative approaches. Benchmarking can be focused on the process and/or the inputs into and outputs

from the process. Many benchmarking exercises, however, seek to understand the relationships between inputs, process and outcomes. (Jackson et al., 2000a)

As the previous section explores, the classification of benchmarking types is very complicated and more or less artificial named according to the classifier. A generally accepted, uniform methodology does not exist. In practice the benchmarking process is often a mixture of several benchmarking types. However, in developing and examining the benchmarking process and educating organizations in using it, a vocabulary for description and separating different alternatives is needed. This will become obvious later when presenting a new benchmarking model consisting of different types. Before that the different concepts will be used in presenting some useful practice models.

4.3.2 Benchmarking Practice Models

The practice models presented in this section will divide benchmarking practices according to participants in the process. The models will give some ideas about how to get information in different benchmarking processes. Whatever the chosen model or type is, the principles of benchmarking process still seem to be the same.

Jackson et al. (2000b) describe four practice models that are defined in terms of whether the benchmarking process is independent (no direct involvement of partners) or collaborative (active involvement of partners).

1. Collaborative, group partnership
2. Collaborative, one-to-one partnership
3. Brokered models, which involves an individual or agency intervening to create the 1. or 2. collaborative models
4. Independent self-referencing

This schema can be overlaid by a second set of defining characteristics based on whether the benchmarking process is essentially dialogical (involves active research and discussion between participants) or bureaucratic (essentially a referencing process based on specifications, codes of practice, exemplar, performance criteria or metric data). (Jackson, 2001)

Collaborative group partnership model treats benchmarking as a process of action research and active learning. The dynamic is created through a forum or club composed of people who are committed to the process of learning more about themselves through learning about others. The process starts by establishing the main research topics and develops through elaboration of the key research questions and the construction of data gathering instruments. Information is gathered and synthesized in feedback reports which provide the basis for discussion and further

enquiry targeted at identifying benchmarks or good/effective practice and understanding the reasons for this. Participants adjust practice using the knowledge and insights gained. (Jackson, 2001)

Collaborative one-to-one partnership is a model in which one institution creates a partnership with another and systematically gathers information in line with its own developmental agenda, normally on the understanding that sharing information will be a two-way process and the dialogue will be of benefit to both institutions. Information is collected using survey instruments by telephone, mail/e-mail, visits, and interviews. Information is synthesized by the lead institution and shared with the partner. An institution may conduct a number of one-to-one exercises effectively building its own information base but no attempts is made to engage the participants in group discussion. (Jackson, 2001)

Brokered models of benchmarking combine the metric/bureaucratic or collaborative approaches with the intervention of a consultant, agency or organizational broker. Jackson (2001) refers to the educational context in which the brokerage might be defined as a purposeful, facilitative and collaborative process for identifying, mapping, sharing, organizing and making accessible information, and growing new knowledge and understanding about an area of policy or practice. This example is surely applicable to many other business areas.

Independent benchmarking requires only the presence of a database of relevant statistics and performance indicators (metric benchmarking) or alternatively, textual information like codes of practice and specifications (bureaucratic benchmarking) (Jackson, 2001).

The type of benchmarking and organizations chosen to benchmark against depends on many factors. Whether the organization is a large market leader or smaller company has a significant meaning on requirements for searched best practice. (Bendell et al., 1993) A simple starting point in choosing the type of benchmarking is the knowledge already within the own company; the marketing function, for example. Also customers, suppliers and other contacts within the same industry can usually contribute good ideas. Consultants, academics and other industry observers can be asked who they think are the leaders in any particular area. Trade journals, magazines, books and other library material are useful, and ideas can also be picked up at conferences, workshops and seminars. (Bendell et al., 1993)

The above-mentioned practice models divide benchmarking practices according to participants in the process. The models also give some ideas about how to get information in different benchmarking processes. Whatever the chosen model or type is, the principles of benchmarking process are the same. They will be presented in Chapter 5. This chapter will be

summarized in the end of Chapter 5 and its connection to the constructed model will be presented later on the following chapters.

5 BENCHMARKING PROCESS

This chapter has been divided into six sections. The first section explores the features of benchmarking process. The second section focuses on practices and metrics and compares their meaning to the benchmarking process. The third section analyses different tools and techniques for performing benchmarking process. The fourth section sets two essential questions in the benchmarking process: How to select a subject for benchmarking and how to find appropriate best practice targets for the process. The fifth section discusses a specific subject in this study namely benchmarking especially supply chain field. The sixth section concludes Chapters 4 and 5.

5.1 Generic Benchmarking Process

This section will show the process steps useful in different types of benchmarking processes. It will argue that in some cases part of the steps may not be necessary and some other cases need to have some additional steps. It will also point that literature does not present any recommendations of specific variations of process to apply in different size of companies, different industrial fields, or for different benchmarking targets.

Successful benchmarking processes bear a Triple-A brand: Adopt, Adapt, and Advance (Bogan et al., 1994). After searching out and examining highly effective operating practices, benchmarkers adopt the best, adapt them to their own environments, and advance performance through implementation and continuous refinement of the practices. There are several critical factors that enable a successful benchmarking process. A well-designed performance measurement and benchmark system is essential. Other critical success factors include senior management support, benchmarking training for the project team, useful information technology systems, cultural practices that encourage learning and resources, especially in the form of time, funding, and useful equipment (Bogan et al., 1994; Hotanen et al., 2001). Camp (1989) adds carefully designed communication to the organization and the employee involvement to this list.

Benchmarking is related to target setting and treated as a component of the formal planning process (Camp, 1989). The main focus of benchmarking is in best performances and methods, operational principles and know-how in the background. The benchmarking model itself consists of several stages (Hannus, 1994; Karlöf, 1995, Reider, 2000; Spendolini, 1992; Tuominen, 1997; Camp, 1989; Hotanen et al., 2001). The starting point of the process and the

amount of stages in the process varies in different models, but the basic idea is similar as well as the target of the process.

Some authors (e.g. Hotanen et al., 2001; Watson, 1993) have modeled the benchmarking process on the basis of Deming cycle (Deming, 2000), which is originally planned by Walter A. Shewhart (1986) as Shewhart cycle. The Deming cycle is a continuous looping model, which is composed of four functional elements: plan, do, check, and act. Various models may have a different number of phases from four steps to even 30 (Fitz-enz, 1993). The process begins by choosing the object for development. The object should be based on the targets of the management and the owners of the company. According to Reider (2000), the process begins by looking at where the company is at present moment in the various areas identified for benchmarking. Most companies start with those areas where they know they need to be competitive to remain in business. That is why the company needs to have a clear mission statement or list of business goals, which is used to focus improvement activity. (Bendell et al., 1993) It is essential to make sure, though, that the subjects chosen for benchmarking are based on current market demand and not just on areas that the company considers to be important.

There are four-step, six-step, seven-step, eight-step processes, and some other variations of benchmarking. Most companies employ a common approach that helps them plan the process, collect and analyze data, develop insights, and implement improvement actions. However, each company breaks this process into different numbers of steps depending on how much detail they wish to describe at each step of their template. The best approach reflects common sense: Adopt a benchmarking process that suits an organization's culture and existing quality-improvement initiatives!

The basic philosophical steps of benchmarking are fundamental to success: know the own operation (weaknesses and strengths), know the industry leaders or competitors, incorporate the best (learn from industry leaders and competitors) and gain superiority (Camp, 1989). Camp (1989) has presented a widely used generic benchmarking process, which describes several important points to help understanding of the process (Figure 5.1).

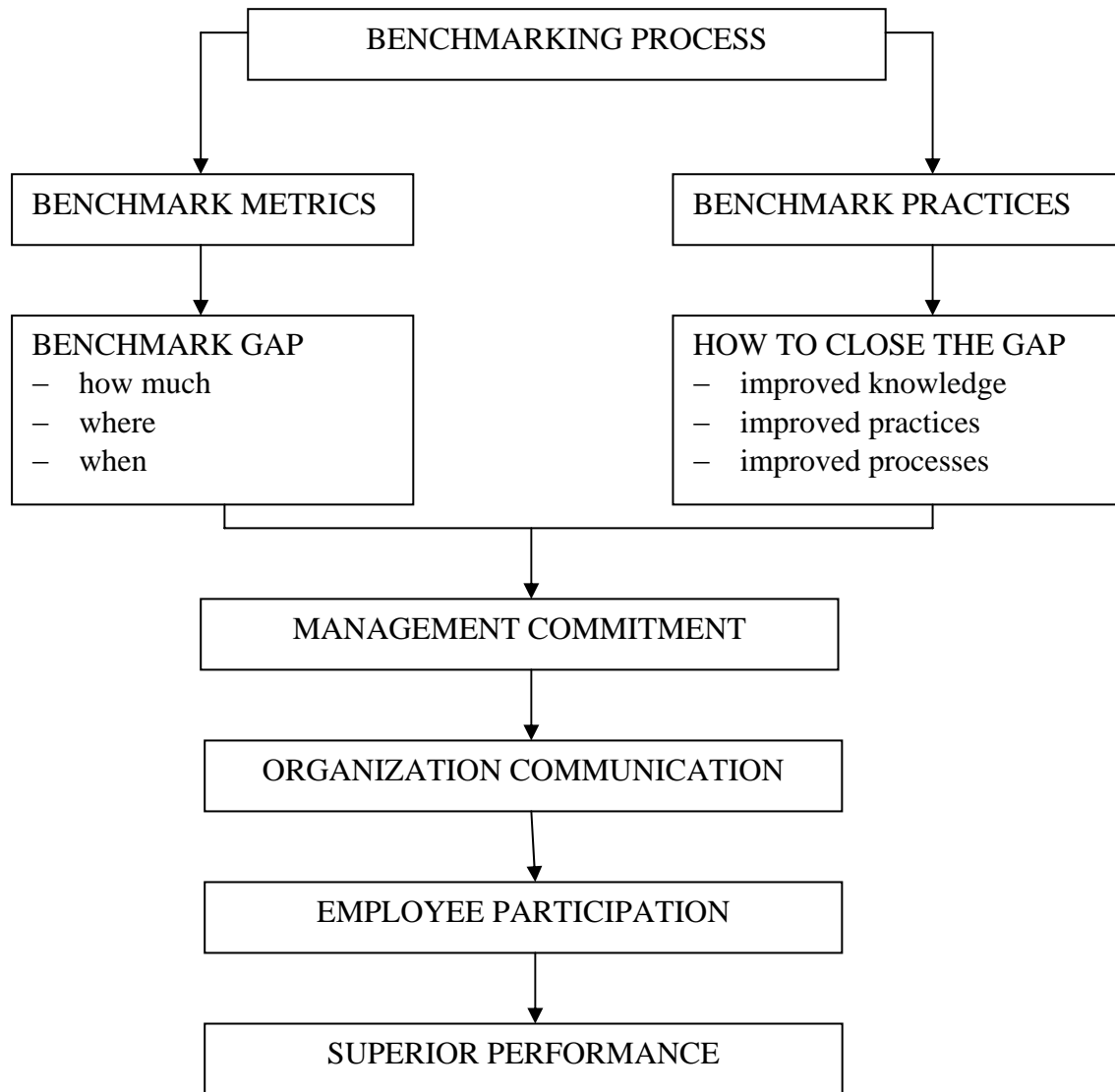


Fig. 5.1 Generic benchmarking process (Camp, 1989, p.5)

Additionally, Camp (1989, 1995) presents a formal 10-step process, which is commonly used and applicable although the amount of steps may be something else. It is also very similar to the processes of other authors e.g. Tuominen (1993, 1997) and Hannus (1994). The summarized process is as follows:

1. *Decide what to benchmark.* Identify the biggest possibility to improve performance in the organization. This requires identification of the key processes, prioritizing and flowcharting them for analysis and comparison of practices.
2. *Identify whom to benchmark.* Determine which other companies employ superior practices that can be adopted and adapted.

3. *Plan and conduct the investigation.* Determine what data are needed and how to perform the benchmarking investigation. Document the best practices found.
4. *Determine the current performance gap.* After completing the benchmarking investigation and observation, decide how much better the best practices are than current work methods.
5. *Project future performance levels.* Decide how much the performance gap will narrow or widen in the near future and what reflections this has for the organization.
6. *Communicate benchmarking findings and gain acceptance.* Inform the findings to all those who should know in order to gain acceptance and commitment.
7. *Revise performance goals.* Convert findings into operational statements that describe what is to be improved based on implementation of the best practices in the process.
8. *Develop action plan.* Compile specific implementation plans, measurement, assignments, and timetables for taking action on the best practices.
9. *Implement specific actions and monitor progress.* Implement the plan and report progress to process owners and management.
10. *Recalibrate the benchmarks.* Continue to benchmark and update practices to stay current with continuous industry changes. Determine where the organization is in its quality pursuit and the implications for benchmarking.

The model that Camp (1989) presents is adopted by many corporations. However, this model does not comprise a path concerning customer satisfaction. Thus, Vaziri's (1992) model is highly recommended as it includes a needs assessment team, which produces inputs to culminate in feeding information to the original benchmarking team. Therefore, Fong et al. (1998) present a modified model based on the models of Camp (1989) and Vaziri (1992). The model includes phases of planning, analysis, integration, action, and maturity. The last phase, maturity has a connection to the action phase or the planning phase depending on the situation in integrating practices into processes. (Fong et al., 1998)

When planning a benchmarking process in any amount of steps, it is important to remember that benchmarking is not about making visits to other companies to try to pick up one or two ideas that may be useful somewhere. Instead, it is centered on planned research, which has been focused by a company's recognition that it needs to make improvements in critical business areas. (cf. Bendell et al., 1993)

The process steps mentioned can be concluded to be useful in different types of benchmarking processes. In some cases part of the steps may not be necessary and some other cases need to have some additional steps. Literature does not present any recommendations of

specific variations of process to apply in different size of companies, different industrial fields, or for different benchmarking targets.

5.2 Practices vs. Metrics

This section demonstrates both metrics and practices being considered important in performing benchmarking process. The section will point how important it is to remember that metrics without practices do not necessarily lead to better performance because knowing “how much” is not enough, one should also know “how” to achieve improvement. In practice this means that performing the benchmarking process an organization needs to do measurement and description of activity concerned. It may feel a little complicated especially in small and medium sized companies in which there are not so much resources for the process. This section will address the demand for versatile and easy tools for collecting measurement information, analyzing it and combining it to qualitative descriptions. Also some advice for selecting the object to benchmark will be indicated as necessary.

Benchmarking represents a versatile process management method that helps organizations identify and understand what constitutes best operating practices. There are at least two ways according to which the differences in practices can be analyzed and their impact assessed. The ways are illustrated by Camp (1989) in Figure 5.1 and Bogan et al. (1994) in Figure 5.2. There are metrics that are presented as quantitative benchmarks and the information is usually data in number format defining the achievement level of any given practice or system. Another form of information is qualitative describing practices in text format.

Managers understand the meaning of short-term financial results. Consequently, companies are learning to manage systems and processes that reach across traditional departmental or functional boundaries measuring both financial and no financial measures, which are *quantitative* benchmarks. This new generation of process managers creates a balanced scorecard of operating metrics that enable them to carefully monitor, maintain, and improve the health of the systems and work flows. Typical among the growing scorecard of no financial benchmarks are measures of work process speed, quality, first-pass yields, employee turnover, reliability, productivity, innovation, training, employee involvement, and learning (cf. Bogan et al., 1994; Reider, 2000).

Zairi (1994) divides metrics as financial performance indicators (business performance), technical performance indicators (productivity measurement), and efficiency indicator (human contribution measurement), which have to be continually calculated and reviewed. The basic idea should be that the quantification of the benchmark metrics could be accomplished by

modifying existing metrics to reflect different practices in order to be able to notice what the operation would look like after the best practices are adopted.

The meaning of *qualitative* word description of the practice and statement of opportunity analysis is not only the answer to the question “what”. There are also answers to questions “why” and “how”. The gap i.e. difference between the performance levels in the organizations must be broken down and the process must be described to the lowest significant component. The meaning of benchmarks requires to be interpreted. To be able to make a qualitative analysis for an operation it has to be presented as a step-by-step process or as a flowchart, for example (cf. Camp, 1989; Reider, 2000). For each process there is an input, a process between and an output. For each step in the process there is a supplier and a customer. Reider (2000) calls these descriptions as performance drivers as an exception to the typical terminology. He defines a driver as an underlying characteristic or factor of the company or its environment that determines the amount and type of activities performed to meet stakeholders’ demands.

Again Zairi (1994) gives a definition to practices being characteristics, which describes internal and external business behaviors, which tend to lead to the creation of a performance gap. Practices could be related to:

- the processes themselves
- organizational structures
- management systems
- human factors
- strategic approaches.

According to figures of Camp (1989) and Bogan et al. (1994), combining these two analyzes; metrics and practices, is the way to find the best practices. Benchmarking investigations should concentrate on the understanding of practices before attempting to measure the results. For this reason the qualitative will be stressed first (Camp, 1989). Comparing numbers will not help one to compete; it is necessary to compare the practices that have given rise to the numbers (Bendell et al., 1993).

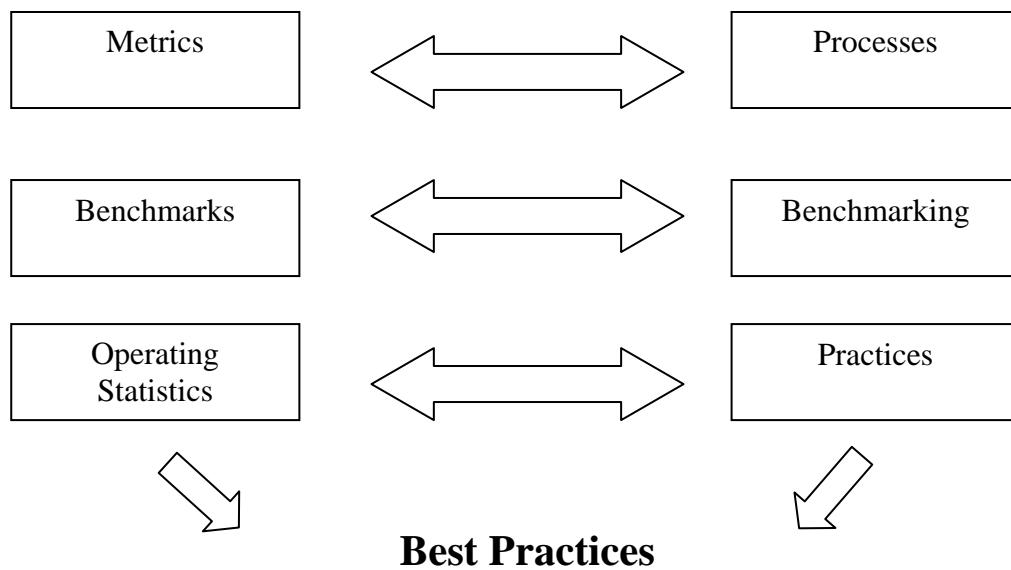


Fig. 5.2 Benchmarking for best practices (Bogan et al., 1994, p.5)

What gets measured is what gets managed and improved. It is the truth that many managers know and follow. Also in benchmarking process there is a tendency to stress the quantitative before the qualitative analysis. Fortunately, the rising tide interest in total quality management and the Malcolm Baldrige National Quality Award have highlighted the importance of performance indicators in achieving quality excellence (Bogan et al., 1994). Clearly, some form of quantitative measurement is essential in order to monitor progress towards the stated aims. However, often in the past, measurement has been carried out for its own sake. In general, what is required is a unified measurement system, which can be used for planning, for monitoring and for driving improvement. In benchmarking process there are some other important aspects like comparability of indicators in the form of units and the way that the information is gathered. There is a tendency to accept data and information that are believed to be comparable, especially from external visits (Camp, 1989). This could lead to acceptance of a cost per desired metric (cost per order for instance) as a correct statement of the benchmark although the orders are not comparable in the organizations because the order units are different. Another example of misleading comparison may be as simple as measuring the total delivery costs per product unit when the transportation distances and so also the freight costs are totally different. Normalizing data is one way to ensure that the information used is really comparable across companies. This is accomplished by mathematically deriving common denominators for all performance indicators. For instance, if the partner measures billing productivity per week and the

benchmarking team's company measures productivity per month, the measures are normalized to daily, weekly, monthly, or some other common denominator (Bogan et al., 1994).

Ideally, the measurements used should indicate clearly how the organization is progressing towards its mission, and should avoid the failures of the past in which most measurement was financial and/or historic and so unfocused as to be confusing. The key to any successful measurement system is simplicity, both in the nature of individual measures and in the means by which it is unified into a coherent, focused whole (Bendell et al., 1993).

Camp (1989) also mentions the psychological effect of metrics; while most operations are quantitatively goal driven and targets are a way of operational life, if benchmarking external firms produces performance gaps beyond what may be considered normal and reasonable the shock can be considerable. Still he emphasizes that what is wanted is an understanding of practices first, then quantification of the effect of the practices to reveal the size of the opportunity. He also reminds that what is wanted when quantifying an operation is the level, not the precise number. (Camp, 1989) The practice offers examples of primary information found from the benchmarking activities being flow charts and process descriptions. The more important is to find best practices than numerical performance data. (Andersen et al., 1999)

In Jackson's (2001) theories benchmarking results in three different products, which seem to cover metrics and practices as well as cooperative research environment:

1. Improved networking, collaborative relationships and mutual understanding between participants.
2. Benchmarking information – in the form of text, numerical or graphical information about the area of study (e.g. evaluative reports, guidelines, specifications, how to do it workbooks, specifications and codes of best practice, exemplars of good/different practice, statistics)
3. A better understanding of practice, process or performance, and insights into how improvements might be made. This understanding can be retained among the participants e.g. in order to gain or maintain competitive advantage, or it can be disseminated more widely through conferences, workshops, publications etc.

According to Boxwell (1994), not all benchmarking is created equal. Some collaborative efforts, although called benchmarking, are typical just data-sharing exercises that address the question "How much?" but fall short answering the question "How?" In that sense, these studies are not benchmarking as it is strictly defined, in which the benchmarking team learns not just how much improvement can be made but also how to make it.

As a conclusion of this section both metrics and practices can be considered important in performing benchmarking process. Important is to remember that metrics without practices do not necessarily lead to better performance because knowing “how much” is not enough, one should also know “how” to achieve improvement. In practice this means that performing the benchmarking process an organization needs to do measurement and description of activity concerned. It may feel a little complicated especially in small and medium sized companies in which there are not so much resources for the process. Versatile and easy tools for collecting measurement information, analyzing it and combining it to qualitative descriptions are needed. Also some advice for selecting the object to benchmark is necessary. In Section 5.3 these subjects will be explored.

5.3 Tools and Techniques for Benchmarking

Literature presents several different tools and techniques to assist the benchmarking process in choosing the benchmarking subject and analyzing the gap between performances. The following sections will analyze them as reviews.

5.3.1 Choosing the Benchmarking Subject

In spite of the methods that this section will describe, there still appears to be a need for further work to be done to incorporate tools that help to guide the process of choosing the benchmarking subject. Most of the benchmarking literature is frequently more concerned with how to develop a benchmarking process once the object of the study has been defined. Focused on the question of determining what to benchmark are the studies presented by Partovi (1994) and Büyüközkan et al. (1998). Partovi (1994) proposes the use of the analytical hierarchy process (AHP) as a means to prioritize benchmarking projects. In addition, there are other authors and organizations suggesting and using AHP, too (cf. Camp, 1995; Tuimala et al., 2000). Büyüközkan et al. (1998) propose the use of principal component analysis (PCA) and common factor analysis (CFA) also as prioritization tools. In both cases, the tools are not of simple use, requiring special software to handle the calculations. (Carpinetti et al., 2002) Moreover, using a quantitative method of analysis is no guarantee that a proper course of analysis of qualitative data will be performed (Carpinetti et al., 2002).

Yasin (2002) as many other authors, too, suggests using competitive analysis and quality function deployment (QFD) when deciding about the subject for benchmarking. Competitive analysis has been utilized by organizations for decades as a means of collecting data and measures regarding the markets, sales, products, production costs, or budgets of competitors.

Although competitive analysis is useful in assessing one's position relative to the competition, it usually does not provide insights as to how competitors achieved this position, i.e. through what methods or processes. QFD matrix or "house of quality" (cf. Vonderembse et al., 1996) is an approach to product development that allows an organization to interpret customer needs and expectations and state them in terms of technical requirements. QFD involves the utilization of customer competitive evaluations and direct competitive assessments to establish customer preferences and competitive performance of the products and/or services of the organization conducting the QFD project versus the performance of the products and/or services of other firms (Sullivan, 1986). Thus it is a form of competitive benchmarking. Still, it does not necessarily reveal how a competitor achieves its position or develops its products and services. However, QFD projects can and do draw on benchmarking information that has been generated as part of other organizational initiatives. (Yasin, 2002)

Although benchmarking procedures start by defining what should be benchmarked, there is generally no clear procedure for identifying improvement needs. One reason for that is the fact that benchmarking projects are often initiated by managers who, having a strong operational view of improvement, assume that process redesign and improvement can be made regardless of business and manufacturing strategy (Carpinetti et al., 2002). Still another reason is the functional organization of most companies (as opposed to a process based organization), which can leave the process of defining what should be benchmarked subject to functional boundaries and constrains.

Therefore, Carpinetti et al. (2002) suggest an analysis in which targets selected for implementation are those that can most contribute to the efficiency and effectiveness of business process mostly related to prioritized competitive criteria. The criteria are customer perceived quality, competitive priorities and performance of competitor, performance assessment and processes mapping. Other more tacit differentiating aspects can be gathered through researching target markets. (Carpinetti et al., 2002)

Mapping the business processes is a fundamental step to understanding the flow of information and resources through the business processes of the internal value chain. There are flowcharting and information technology tools available for that purpose. Mapping can also bring the benefit of helping in assessing performance of operational and supporting processes. Assessment of performance is essential to diagnose the root causes of problems or weaknesses so as to determine what to benchmark. Cause and effect diagrams such as the fish-bone diagram may be used for that purpose. The current reality tree from the theory constraints may also be used. It works by identifying cause-and-effect interrelationships among potential root causes and

undesirable effects or problems. Apart from qualitative analysis of performance, quantification of performance on critical dimensions can also be used as one of the instruments for guiding the identification of processes and dimensions of operations for benchmarking. (Carpinetti et al., 2002)

In spite of the methods mentioned in Section 5.3.1, Carpinetti et al. (2002) still think that further work has to be done to incorporate in the method tools that help to guide the process of deployment and priority definition, as well as a procedure for systematically revising the decisions taken to insure consistency all over the process.

5.3.2 Analyzing the Gap between Performances

This section will present a variation of methods for analyzing and interpreting information in the process of benchmarking. It will show that the Camp's (1995) presentation of tools and techniques for benchmarking process is more or less a summary of different methods to be used.

After making decisions about the benchmarking study object and mapping the business processes concerned, next step is to analyze the gap between performances. The most traditional analyzes are financial ones. Comparison to the prior year or month is a typical management interest. There are examples of different analyzes that are closely related to benchmarking. Information is derived from financial and operating results of participants in the industry and collected. What is missing, but increasingly being pursued as a follow-up activity, is tracing the gap back to the business processes that yielded the results. Another example of gap analysis is derived from TQM initiatives. The gap is characterized by the comparison of the firm's current state to its desired state. The current state is defined by current practices, and the desired state is defined by the benchmark best practices. Given the gap, the objective is to understand the difference between the current and desired states and to understand the basis for needed improvement. Getting to the root cause of the differences and then adopting and adapting the best practice to close the performance gap are the next tasks. (Camp, 1995)

There are also behavioral aspects to a gap analysis. It is a source of creativity and incentive for the organization to change. It raises questions like: What are the better practices? Why are they better? How can they be adopted or do they need to be modified? What will be the implications for the organization? (Camp, 1995)

Camp (1995) presents a list of tools and techniques useful in gap analysis. Some of them are internally developed techniques and are unique to the organization of the well-known benchmarking companies. Yet they are recognizable to the quality professional. Some of them have been developed by select authors. The tools and techniques are cross-referenced to the 10

step of benchmarking process (Section 5.1), but they could be grouped into two sets, too: (1) charts, graphs and diagrams; and (2) analysis activities and techniques. One set contains the approaches used to analyze the data and information and the other consists of the display model.

For gap analysis purposes, Camp (1995) picks up the following: flowcharts and process documentation; matrices; radar or spider charts; AHP; and Z charts. Two deal with process-to-process comparison, and three deal with the display of measurement data. Table 5.1 presents the tools and techniques that are recommended to the steps 4 and 5, which are the analysis steps, and 6 and 7 which belong to integration in the benchmarking process.

Table 5.1 Tools and techniques for the analysis gap and integration of the benchmarking process (adapted from Camp, 1995, p.137)

Tool/technique	Analysis	Integration
AHP maturity index	x	
Brainstorming		x
Cause-and-effect diagram (Ishikawa)	x	x
Check sheet	x	
Flowcharts	x	x
Force field analysis		x
Interview techniques	x	x
Matrix diagram	x	x
Multivoting	x	x
Pareto diagrams	x	
Policy deployment		x
Prioritization matrices	x	
Process documentation	x	
Project management	x	x
Quality function deployment	x	
Questionnaire/survey prep's		x
Quick reference guides/checklists		x
Radar / spider chart	x	x
Root cause diagram	x	x
Run charts	x	
Scatter diagram	x	
Selection matrix	x	
Tree diagram		x
Z chart	x	

The problem in benchmarking is very often how to illustrate analytical data, or benchmarks, which have multiple measurements. Most processes are characterized by several measurements and both pre-, in-, and post process measures and result measures. Therefore, there is a challenge to display multiple measures and their associated benchmarks to indicate the gap. In this context Camp (1995) has two approaches that have been successful: the spider or radar diagram, which displays multiple measures as the spokes on a wheel and the AHP maturity index which is a variation on the multiple measures display. Both methods are useful in displaying numerical gap information.

The next step of the gap analysis is to perform a matrix, which includes the attributes and measurements documented in the rows and the comparative companies in the columns. The last column would be the organization's assessment of the best practice. The idea of the matrix is to address the practice, which is the best for each process step. (Camp, 1995) After that the organization proceeds according to the procedure of benchmarking process searching for best-of-the-best practices from the matrix. Often the organization with the best practice is not compatible to the study company and they need to look at the second- or third-best practice to find the right practice to fit its situation (Reider, 2000). The activities used in this stage of benchmarking process are observation, operational review techniques, personal interviews, survey forms, questionnaires, data analysis, and so on.

Camp's (1995) presentation of tools and techniques for benchmarking process is more or less a summary of different methods to be used in analyzing and interpreting information in the process. Bogan et al. (1994) bring out one more method: Kaplan and Norton's Balanced Scorecard, which combines both financial and operational measures into an integrated system of performance indicators.

5.3.3 Concluding the Tools and Techniques

From the benchmarking organization's point of view, the whole benchmarking process might feel quite difficult. First, the organization has to learn the process of benchmarking and train the whole team to do it. Moreover, it has to know the possible tools and techniques to handle the information it will gather. It needs to have understanding enough to pick up the appropriate method for the information it has and for the interpretation to be done. Most of the tools and techniques are meant to be used when metrics are concerned. The metrics from different organizations need to be comparable, determined in a similar way and illustrating just the practice to be improved. How about qualitative information? How to make it comparable? How to combine it to metrics?

In addition to the need of new evaluation and analysis tools for the supply network operations and development as well as management of the suppliers (e.g. Lehtinen, 2001; Andersen et al., 1999), also the academic community is lagging in terms of providing and advancing models and frameworks that integrate the many facets of organizational benchmarking. It appears that most of the benchmarking know-how available is the result of practitioner's efforts. Especially researchers in the field of benchmarking are faced with the continuous need to develop innovative methodologies to guide benchmarking practices in emerging technologies and practices such as e-commerce and supply chain management (Yasin, 2002). Altogether, since benchmarking processes interact with and involve the different facets and entities of the organization, a systematic approach is required if the organization is to achieve the full benefits of the benchmarking process.

From the historical point of view, the benchmarking process originates from the quality context. It is driven by Malcolm Baldrige National Quality Awards, other qualifications and a competition between large, multi-national companies from which a lot of examples have been read. Also most of the commonly presented tools and techniques are appropriate in big companies, in which the amount of data is enormous and the information systems make it easy to handle the kind of information flow. The available literature presents very little cases about small and medium size companies, and even less tools and techniques to be useful for them. This presentation is aligned for them.

As a conclusion of Section 5.3, tools and techniques for selecting benchmarking object and analyzing performance gaps can be considered as great in number if not enough though. The tools and techniques seem to be planned for large companies with excessive resources to facilitate the benchmarking process. The tools and techniques are complicated, and combining qualitative information to quantitative data is still incomplete. In addition, choosing the best practice partner is still a question, which will be discussed in Section 5.4.

5.4 How to Find the Best Practices?

One problematic area in the benchmarking process is the selection of benchmarking partners after the type of benchmarking has been chosen. This section will offer a selection of methods to find the best practice organization. In spite of the guidelines in this section, the best practice company is very often chosen according to willingness to participate in the process. The section is going to address the problems occurring in practice when selecting the target for benchmarking.

In an American study (Bendell et al., 1993) it was revealed that the performance level of the company concerned, or the perception that that company is the best in class, is the most often regarded as critical in selection of study partners. In the American study 64 percent of survey participants identified this factor, while 50 percent identified a willingness of a recipient company to partner or share, 32 percent identified their potential credibility or reputation of a partner, 23 percent pointed to similar processes, 18 percent identified the same industry or similar business, and 11 percent pointed to the location.

Frequently an organization knows what to benchmark more clearly than it knows whom to benchmark. What to benchmark is based either on known information driven by internal priorities like improving processes or known external pressures like customers or competitors. (Camp, 1995) Whom to benchmark, however is primarily based on external information and is unknown.

Very often benchmarking is performed against the firms in the same industry. It is called competitive benchmarking. However, competitors may have practices that are not the best and not desirable of emulating. Another alternative is considering competitor in broader terms. Which firm has a function or operation worth of benchmarking? Is there any competitor for the function like logistics or marketing? Is it better to search operations where best practices, methods, or processes are used?

However some level of comparability should be found between the companies. Usually the primary business performance drivers should be similar. This means e.g. for logistics operations, that the size, shape, weight, and the handling sensitivity are comparable. (Camp, 1989) What does it mean when the process concerned is supplier networking? What are the measures that should be comparable? If the benchmarking process is done within the same industry, is it possible to compare for example the networking of the leading joinery industry company to the companies in the same business. Most of the companies in the business are competitors to the leading company.

Some consideration should be given to the company structure. A company e.g. in assembly industry can be compared to other companies operating in different business areas but also working in assemblies. There may be need for some adjustments during the analysis to ensure comparability, but when the processes inside the companies are the same in principal, also the value will be derived from similarly structured firms and operations (Camp, 1989).

Boxwell (1994) determines four groups of companies for selecting benchmarking candidates:

- Current industry competitors

- Latent competitors, including those in the same industry but not currently in the same market or those not in the same industry at all who could enter
- Best-in-class groups from within the same organization
- Best-in-class companies from other industries

Which organizations should be studied depends in large part on what is the practice to be improved. When focusing on production costs, direct competitor is the probable target to study in cost benchmarking. But if an area where none of the competitors is particularly good is the aim of improvement, it is likely to search the learning from outside the industry, from companies that are world-class in particular activities.

Boxwell (1994) suggests selecting the right companies to benchmark by always considering the direct competitors, asking customers and employees. Also Camp (1995) suggests the overall model for determining whom to benchmark:

1. Develop a candidate list using any and all readily available information and some preliminary research.
2. Reduce the list to a target number of companies through secondary research focused on the company and function. A further focus of the investigation is to validate the information from as many sources as possible.
3. Prepare for a contact with the target organization and set up a visit.

According to Reider (2000), once the type of external benchmarking study has been chosen, the company needs to decide which other organizations to include in the study. He lists several factors:

- Type of business – how similar to the host company?
- Size of business – gross sales, net income, number of employees, number of locations
- Type of ownership – public corporation, private corporation, closely held, family, and so on
- Organizational structure – single business, multi-businesses, strict hierarchical, loosely organized
- Geography – local, regional, national, international
- Product mix – single product, multi-product lines, low-mid-high end, diversified
- Market share – by product line and percentage
- Distribution methods – direct, wholesale, mail order, Internet

Reider (2000) recommends analyzing each potential participant on the basis of the above attributes to determine which organization would make the best match for the planned

benchmarking study. Consulting a number of different parties might be useful when identifying partners for benchmarking process. Vendors, customers, banks and financial institutions, and outside consultants are some examples of the parties.

According to Camp (1995), this phase of benchmarking process seems to require a major effort but in actual practice it becomes fairly straightforward. Knowledgeable process operator knows the leaders in their field or can find them with a minimum of effort. Still he recommends using a general scheme for knowing where best practices occur. He presents a matrix of 3x3 in which there is a horizontal axis of the subject company’s knowledge of best practices and the vertical axis of the same for another company (Table 5.2)

Table 5.2 What to benchmark? (modified from Camp, 1995, p.74)

		Known	Known	Unknown
		Implemented	Not implemented	
Known	Implemented	1	2	3
Known	Not implemented	2	2	3
Unknown		3	3	4

In Table 5.2 there is Quadrant 1 which shows that the subject company knows about the best practices and has implemented them as also has done another company. Quadrant 2 has been divided into two parts. There is the central part in which none of the companies has implemented the known best practice. Other parts of quadrant two shows that one of the companies has implemented the best practice and that another one has not implemented it despite it is known by both companies. Quadrant 3 shows that there are practices known to the other company but unknown to the subject company and vice versa. In Quadrant 4 neither company knows about the better practices. The point of the comparison is that there are a lot of best practices available. Only a disciplined search using benchmarking will locate them. This matrix gives an answer to the question of who has implemented the best practice and who has not. The questions of who is better than another and whom to benchmark are still open.

In order to find the potential organizations for benchmarking Camp (1995) suggests using a list of

- Fortune 100+ companies
- Recognized industry leaders
- Complex and changing businesses

- Technology-based products and services
- Multiple decentralized field sites for customer contact
- Direct general line sales force
- Worldwide competitors
- Systems competency with operations around the globe
- Technology leaders with unique competencies.

As can be seen on the lists above, there are several alternatives when selecting companies to a benchmarking study. The task of finding the "best-in-the-world" or "best-in-class" seems to be laborious and the success in the task must be more or less occasional. However, a growing number of organizations report significant payoffs from simply studying other good companies outside their indigenous industries. Stepping outside one's own industry is a useful first step in breaking the cultural mould that confines one's thinking (Bogan et al., 1994).

Not every improvement project requires a multi-industry best-in-class benchmarking study. Not every company is ready to perform a best-in-class investigation. Best-in-class benchmarking seeks the highest performers without regard to industry. Rising above industry comparisons, best-in-class benchmarking first seeks best-in-the-country benchmark partners. One run higher on the benchmarking hierarchy is best-in-the-world benchmark partners. (Bogan et al., 1994) The good advice for the benchmarking organization is to ask itself:

- Are our operations mature enough to emulate a world-class performer?
 - Do we compete internationally or globally?
 - Are we willing to devote adequate time, resources, and capital to undertake a best-in-class search?
 - Is our project area strategically important enough to warrant a best-in-class search?
- (Bogan et al., 1994)

How does one know that the company, which one has selected for benchmarking really represents best practice? According to Bendell et al. (1993), the answer is that one doesn't – and perhaps never will. If the research one has carried out indicates that it is the best one has yet come across, and their performance is better than ones, then proceed the process. Perhaps somewhere there is someone a little better; one may discover them at a later date.

Again the guideline above is more or less made for big companies, which can compare their performance to the best-in-the-world or best-in-the-country. They usually are well aware of the best companies on the field they operate. The situation is totally different with small and medium size companies, which search for the best practice companies of their size or a little

bigger, but not world class companies. They cannot expect big multinational companies to be willing to spend time with the companies operating at a small scale. However, also the smaller, national and local companies can find a big benefit in benchmarking process.

In practice, the best practice company is very often chosen according to willingness to participate in the process. In Finland the problem is often seen in both companies operating on the close business field, which is experienced as a hindrance to share knowledge of operations. The competitive benchmarking is not seen possible. Therefore, the best practice companies should be chosen from another business field but performing similar operations. In those cases it is difficult to know if the chosen best practice target really is better or the best. Small and medium sized companies with limited resources clearly need different tools to recognize the best or better practices to emulate among the willing companies.

In Section 5.5 some literature about benchmarking particularly in supply chain area will be explored.

5.5 Some aspects of Benchmarking Supply Chains

There are numerous methods for benchmarking especially supply chains. The purpose of this study is not to prove their strengths and weaknesses or their applicability, but to develop a new functional construction for the defined purpose and justify its functionality. However, there is a famous model SCOR (Section 2.2.1), which deserves some attention because of its popularity. Supply Chain Operations Reference –model (SCOR) is a process reference model that has been developed and endorsed by the Supply-Chain Council as the cross-industry standard diagnostic tool for supply chain management. SCOR enables users to address, improve, and communicate supply chain management practices within and between all interested parties. The model follows the typical principles of benchmarking process. It is concentrated on management of processes including all customer interactions from order entry through paid invoice. It excludes sales and marketing as well as research and technology development and product development. (The Supply-Chain Council, 2005) While concentrating on processes it differs from the construction developed in this study. The new construction is based on buyer/supplier relationship in which also product and technology development are decisive activities in defining the nature of relationships and the level of network sourcing (Table 2.6).

According to Cox (1999), there is no best way to manage supply chains. The key to success in business is based on recognizing the types of supply chains that exist and aligning strategy and operational practice with the specific properties of the supply chain that the company is positioned within. Cox (1999) also opens the benchmarking mentality of many practitioners to

question, and the consultant and academics that seek to advise them on the causes of business success (Cox, 1997). According to Cox, it may be a mistake to base business strategy and operational practice on the unthinking copying of other people's practices. The major reason for this is that the practices of those companies or entrepreneurs who are successful occur in specific supply chain and market circumstances, which are difficult to fully replicate after the fact. (Cox, 1999)

Furthermore, even if it is possible to replicate the circumstances under which others operate, these circumstances do not remain static – they change dynamically. This means that understanding why others have been successful is important because it enables the analyst to understand causal factors in success, but benchmarking to emulate those who have been successful is likely to be difficult, if not impossible, according to Cox (1999).

However, Cox et al. (1998) add that benchmarking is not necessarily a complete waste of time, but there are only certain circumstances in which benchmarking by copying and adaptation will be appropriate, but that benchmarking can hardly be viewed as the most satisfactory basis for business thinking and practice.

The author of this study must disagree with this issue. The idea of benchmarking is not copying or adapting as such the whole package of supply chain or anything else. The idea is to learn the best way to do things and then adapt and adopt by applying to the learners own circumstances, not *with* the circumstances of the learning target. Also the circumstances of the target company are changing all the time, which causes the successful supply chain to become less successful unless it does not adapt itself to the changes.

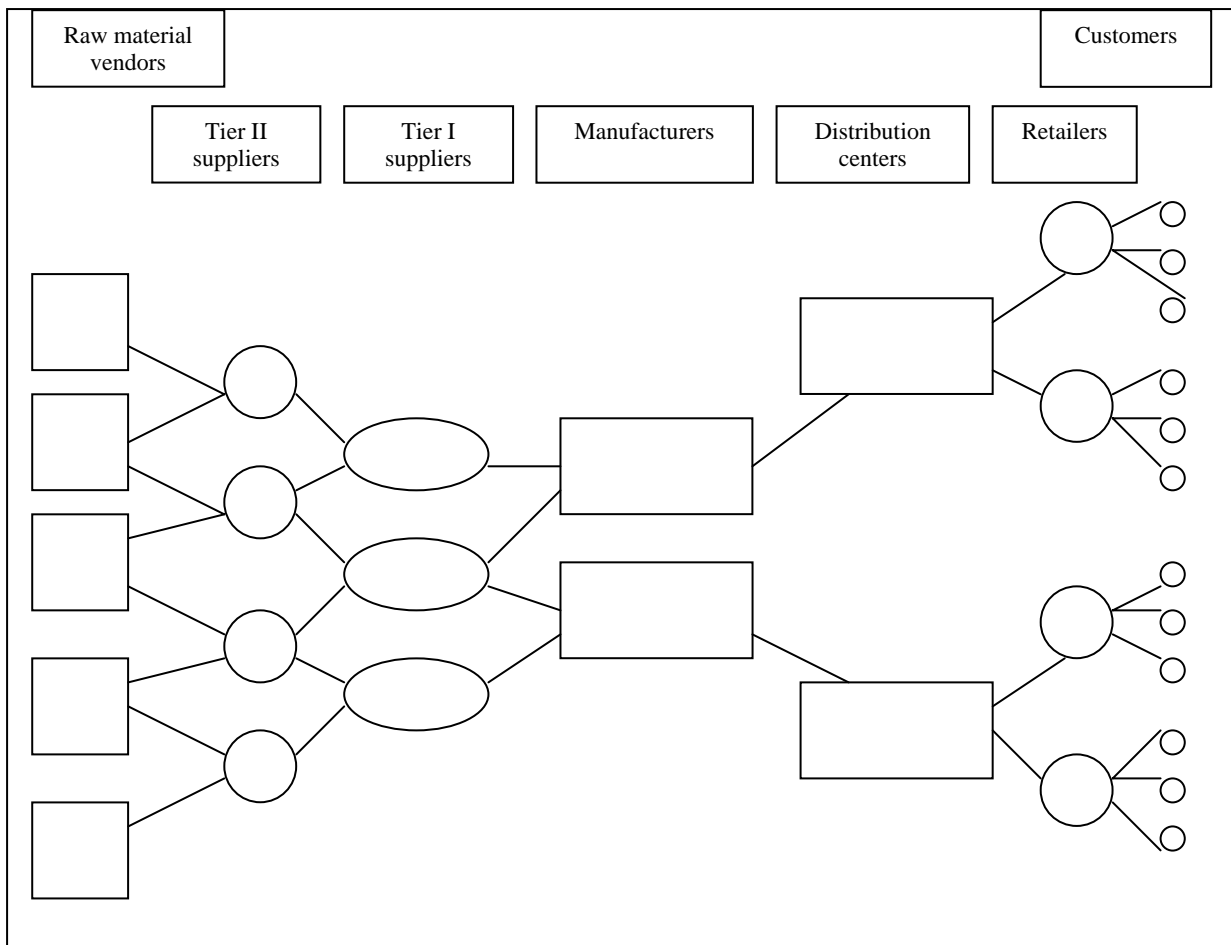


Fig. 5.3 A supply chain network (cf. Chandra et al., 2000, p.111, modified)

Another point concerning benchmarking of supply chain is the wholeness of the chain. It is extremely difficult to determine where a chain begins and where it ends, and who the members of one chain are, because the chains form a network together with other chains. (Figure 5.3) Therefore, it must be impossible to determine or benchmark the whole supply chain.

5.6 Summary of the Chapters “Conventional Benchmarking Model” and “Benchmarking Process”

Chapter 4 has defined the *concept benchmarking* from the practical point of view as well as from historical direction. Several *benchmarking types* and *practice models* are presented based on the literature. Chapter 5 presents the general *process of benchmarking* and discusses about the meaning of *practices and metrics* in the process. Also difficulties in finding the proper *benchmarking subject* and *best practice* company are explored.

The terminology around benchmarking is wide especially when types of benchmarking are concerned. This reflects a wide interest on the subject as well as the diversity of practices around

the process. However, there is very little literature about research of the benchmarking process; its suitability to different organizations and situations, or its applicability to different industry.

The tools and techniques aimed to be of assistance in making choices during the process are difficult and numerous to manage. They demand competence and facilities like information systems to be utilized. At the most fundamental level, benchmarking means learning from others. The skill is honed into an art by identifying and then comparing the own company to others who are very strong at what they do. When comparing the own company for improvement purposes, compare it to the best – or at least to those who are substantially better than oneself. Fast learning is a skill that can be difficult for large corporations to cultivate. Borrowing ideas facilitates fast learning. Small companies therefore demonstrate natural tendencies to import good ideas from elsewhere (Bogan et al., 1994). Why? Small organizations are almost always resource-starved. Survival teaches them to be fast, flexible, opportunistic, and quick to borrow and implement (Bogan et al., 1994). In order to encourage small and medium sized companies with limited resources to apply this learning method as an organized process, they need to have simpler guideline to perform the process.

The following items of benchmarking process are concluded to cause *problems* to companies:

- Metrics and practices are difficult to gather, combine and illustrate. Available tools and techniques are demanding.
- The gaps between present and the target are difficult to evaluate, analyze and determine. The special tools and techniques are laborious and difficult.
- The target of the better performance is set by best practice. Is it relevant and suitable for the strategy of the benchmarking company?
- Finding the appropriate best practice target is difficult. The given guideline is very ambitious and not necessarily useful.
- Knowing who is better and how much better is difficult.

This chapter makes benchmarking feel quite complicated and resource demanding process. That does not necessarily be the case, but it can be performed efficiently when well planned. There are some general aspects to take account when benchmarking in addition to the items above:

- It is essential to understand the own practices thoroughly
- Visits are not arranged until sufficient desk research has been carried out to ensure that the companies selected are the best that can be found

- The focus must be on Industry Best Practices
- There must be a willingness to share information. Reciprocal visits are arranged if required
- Sensitive information is always kept confidential
- Getting the process owners or operators to carry out the benchmarking studies is seen as being critical; trying to involve people after the study is too late.
- Do not concentrate on outcomes; it is the practices and processes that need to be understood.
- Benchmarking must be a continuous process; the competition is constantly changing.
- There must be a willingness to change based on the benchmarking findings. (Bendell et al., 1993)

There seems to be several different problems in performing benchmarking successfully. In addition, there are numerous advantages in the method and also factors that are critical for the success of it. The typical problems, advantages and the success factors are gathered in Table 5.3.

Chapter 6 will construct a new form of benchmarking, which will consider the problem items above and make improvements to the existing benchmarking processes in order to make it easier also for small and medium sized companies to utilize the method in challenges of rapidly changing competitive environment. The term *benchmarking process* is used when discussing about the general process in which benchmarking is performed according to the presented steps. Instead, the term *benchmarking project* is used when discussing about a research project which have a specific target or subject to benchmark. The benchmarking project can include also other research methods in addition to benchmarking process.

Table 5.3 The typical problems, advantages and the critical success factors of general benchmarking process

<p>The typical problems of benchmarking process</p> <ul style="list-style-type: none"> – to select the processes that are critical to the organization for benchmarking and to choose the most important of them i.e. there is no clear procedure for identifying improvement needs – the methods for selecting benchmarking subject are for big companies demanding a lot of resources to perform – to choose the most useful type of benchmarking – the methods of collecting measurement information about the processes and analyzing it are laborious – to establish metrics for identification of performance gap – to make metrics comparable between companies – to find methods for combining quantitative information to qualitative information – the tools and techniques for analyzing and illustrating the performance gaps are complicated – to find the “best in the world” practices for comparison – to know whom to benchmark – to know that the company, which is selected to benchmark against really represents the best practice – to recognize the best or better practices to emulate among the willing companies
<p>The advantages achieved in benchmarking process, the method</p> <ul style="list-style-type: none"> – goes beyond the traditional competitive analysis to not only reveal what the industry best practices are, but to also obtain a clear understanding of how best practices are used – enables people to think outside the boxes they normally inhabit – enables organizations to identify their comparative strengths and weaknesses as a basis for self-improvement and /or self-regulation – considers both quantitative and qualitative information i.e. practices and metrics – is easy general process to follow – forces the organization to present operations as a step-by-step process or as a flowchart, which reveal the problems and the bottlenecks in process – produces improved networking, collaborative relationship and mutual understanding between participants – produces in the form of text, numerical or graphical information about the area of benchmarking study – produces a better understanding of practice, process or performance, and insights into how improvements might be made
<p>The critical success factors in benchmarking process</p> <ul style="list-style-type: none"> – senior management support – benchmarking training for the project team – useful information technology systems – cultural practices that encourage learning and resources – useful equipment – carefully designed communication – employee involvement – following the benchmarking process from beginning to the last step

6 A NEW GROUP BENCHMARKING MODEL

In this chapter a new scientific construction for benchmarking, called *Group Benchmarking* will be developed. It is strongly based on existing benchmarking literature. In addition to improvements in existing benchmarking processes and practices, the model will focus on being applicable especially in supply chain management. In the previous chapter of SCM the Hines's Strategic Competitive Positioning Model was chosen as the most appropriate and versatile in developing the traditional supply activities toward the modern and competitive network-sourcing format. In this chapter some previously known forms of benchmarking will be utilized together with some traditional methods in supply chain field, one new method and the Hines's model when constructing the new model. The chapter has been divided into six sections. The first five sections present each separate method in the model and the sixth section concludes the chapter.

In the Finnish literature (Hotanen et al., 2001) there is a term "ryhmäbenchmarking" which can be translated as group benchmarking. Its content differs from the model that will be presented in this chapter. Hotanen et al. (2001) present a method in which the group formed by several companies decide together about a common best practice performing a so-called "club model" of a process. After that the whole group searches for a best practice target company for comparison. The group makes a visit to the target company, learns a new best practice and updates a better club model together.

Bendell et al. (1993) refer to internal benchmarking widening it from same organization to other departments, other sites, and other companies within the same group or between work teams even within the same departments. They go on by discussing about exploiting benchmarking within a group of companies and making comparisons between and within departments, and at mechanisms for benchmarking of work team and individual performance. According to Bendell et al. (1993), most Western Groups do not succeed in bringing together the experience and the best practices within the group to assist the performance and development of all parts of the group organization. The example of this kind of "group benchmarking" describes a case of one company performing internal benchmarking against other parts of the corporation. (Bendell et al., 1993)

The new construction, Group Benchmarking model is developed for assistance in some of the problematically faced stages in the commonly known benchmarking process as well as nowadays so necessary for companies being networking tendency. It aims to offer companies a road map to better competitive advantage through continuous improvement by auditing their

current positions of the surrounding networks, showing their strengths and weaknesses as well as pointing out the best practices to learn; which is to adopt and adapt them by utilizing the cooperative group effectiveness, and further to develop the operations toward the previously set targets. The model is especially aimed at small and medium sized companies with limited resources. The model aims to take into consideration the aspects of transferring and creating knowledge in and between organizations including the challenging tacit knowledge.

The following aspects are seen problematic in the existing benchmarking methods. They are handled also in the previously published articles (Kleemola et al., 2001; Kleemola et al., 2002; Kleemola, 2002a; Kleemola, 2002b).

- The deficiency of the companies about the present situation in the network surrounding it.
- An ability to illustrate the situation in network and set a target for the future network by means of a generally acceptable criterion as well as examine the progress of development.
- A way to handle both quantitative and qualitative information in spite of differences in organization's measures.
- A means to find the best practices among the possible organizations for all processes to be improved.

The model consists of several well-known methods in the literature. Traditionally there has been no connection between the methods but they have been used separately on different fields and projects. Now they are combined together to form a model (Figure 6.1), which is relatively easy to use and understand without knowing complex mathematical methods or a need to procure a hardware/software system for gathering and illustrating the measures. However, spreadsheet computation and a possibility to have graphical presentations are helpful like Excel software.

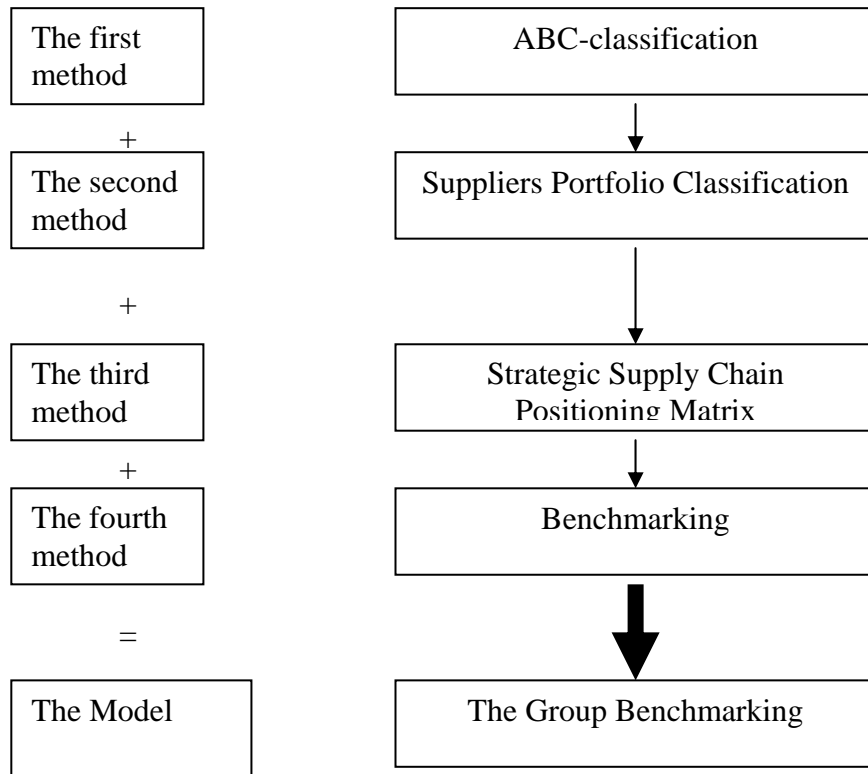


Fig. 6.1 The new model consisting four separate methods

Because the new model is called Group Benchmarking, it means that the process is performed among a group of companies. Therefore, the whole process starts by forming a group of companies that will take part in the benchmarking project. The companies may know each other beforehand or they may be totally strange to each other. The guidelines given in Section 5.4 may be considered but it is also possible to gather together companies that are interested in benchmarking as a learning method and like to learn new things.

This study follows the principle that all companies are operating in the same kind of industry e.g. assembly industry. The main idea is that the companies perform the similar kind of processes in their operations. The products that they manufacture may be totally different as will be seen later in the empirical part of the study. Also the companies operate with the tiered structure of suppliers forming a network. Are the companies of single or multiple products is not relevant as well as the intense of labor and/or investment in the organization. Future research may be useful in giving evidence about the applicability of this model to the companies operating in different industrial fields. Any knowledge about the performance of companies is not necessary i.e. if there is the best-in-the-world or the best-in-class companies in the group. Only the willingness to participate is necessary. The number of companies in the group is not limited but the examples assume that there are four companies participating the project.

However, the bigger the group the more complicated it is to control best performances. Also closeness of business fields of the participating companies may be a problem due to competitiveness between the companies. Geographical closeness of companies is naturally a benefit in performing benchmarking visits. To start this development project an initiating company is a requirement. In the following sections the company that initiates the Group Benchmarking project will be called as a benchmarking company, an initiating company or a case company. The other companies in the group are participating companies, comparative companies, target companies or “best practice” companies. The whole process is illustrated in Appendix 1.

The model has already been published partly in the following theses and publications:

- Kleemola, A., 2000: Toimittajaverkoston kehittäminen keittiökalusteteollisuudessa (Developing of supplier network in the industry of kitchen furniture). Master of Science Thesis. Tampere University of Technology, Pori. (Kleemola, 2000)
- Kandelin, N., 2001: Hankintatoiminnan kehittäminen kokoonpanoteollisuudessa (Developing the procurement function in the assembling industry). Master of Science Thesis. Tampere University of Technology, Pori. (Kandelin, 2001)
- Kleemola, A. and Vanharanta, H. 2001: A New Method for Developing Networks through Benchmarking. In Proceedings of ISPIM Conference, Lappeenranta. (Kleemola et al., 2001)
- Kleemola, A., Kandelin, N. and Vanharanta, H., 2002: Group Benchmarking – A Methodology toward More Effective Supply Networking. In Proceedings of IPSERA Conference, The Netherlands. (Kleemola et al., 2002)
- Kleemola, A., 2002a: Developing Supply Networks Through Group Benchmarking – How to find the best practices. In Proceeding of Working Seminar on Production Economics, Austria. (Kleemola, 2002a)
- Kleemola, A. 2002b: Managing Networks through Continuous Group Benchmarking. In Proceedings of EURAM Conference, Stockholm. (Kleemola, 2002b)

Section 6.1 will present the first method of the model. It belongs to the supply field and its role in the new construction is to assist in choosing suppliers to be co-developed toward network sourcing in the supply network. Also the section after that has the same meaning in this study.

6.1 ABC-classification Method

ABC-classification is a name of method in which products are classified in separate groups called A, B and C. ABC-classification or ABC-analysis categorizes products based on importance (e.g. Bloomberg et al., 2002; Sakki, 1999; Karrus, 2001). Importance may come from cash flow, lead-time, stock outs, stock out costs, sales volume, or profitability. Once the ranking factor is chosen, break points are chosen for classes A, B, C, and so on. ABC analysis applies to Pareto's law, which separates the "trivial many" from the "vital few". A classic example is that the majority of sales originate from a small portion of suppliers. The "80-20" rule means that 80 percent of the orders come from 20 percent of the customers.

Once a ranking factor is chosen, products are placed in descending order of importance. The first, for example 50% of sales and 10% of items, represent class A. The group of products being between 50 and 75 cumulative percent of sales and between 10 and 20 cumulative percent of items represent class B. Class C might be for example the products between 75 and 91,7 cumulative percent of sales and between 20 and 50 cumulative percent of items. The rest of the products belong to the class D. Classifying items is somewhat arbitrary (Bloomberg et al., 2002), and the classification may depend on who is performing the ranking. All products are important although often B and C products are considered less important than A products.

The ABC classification is not obligatory method in the Group Benchmarking, but very useful if the organization has not analyzed its products and/or suppliers earlier. However, this classification is commonly used at least in industrial companies and therefore the organization might have already knowledge about the structure of its product distribution and the costs it causes. In this method the classification is not made traditionally according to purchased products but according to suppliers supplying those products. The information received from the classification helps the organization to realize the suppliers that cause the most of the purchasing costs and also the suppliers that deliver a big volume of products causing only a small portion of the costs. The meaning of different suppliers for the buying organizations varies according to the classes in the classification. The distribution of suppliers in the ABC-classification gives one positioning of the network companies surrounding the organization. This classification should be done in all the participating companies of the Group Benchmarking project. ABC-classification is the *first* method in the Group Benchmarking model.

6.2 Supplier's Portfolio Classification Method

When designing purchasing strategies, the approach originally suggested by Kraljic (1983), who presented in his article a useful portfolio-technique, is commonly used. The idea is that

since suppliers represent a different interest to the company, purchasing managers need to develop differentiated strategies towards their supply markets. (van Weele, 2002)

Key in developing purchasing and supply strategies is the issue of influencing the balance of power between the company and its key suppliers. Also in this method the 20-80 rule is applied: 20% of the products and suppliers will represent about 80% of purchasing turnover. This refers to the ABC analysis and is the reason for the first step of identifying the company's strategic commodities and suppliers. It reveals the often huge number of small expense items and small suppliers, who in general are responsible for 80% of the company's internal handling costs. So, after the ABC analysis, it can be refined using the Kraljic's (1983) purchasing product portfolio-approach. (Figure. 6.2)

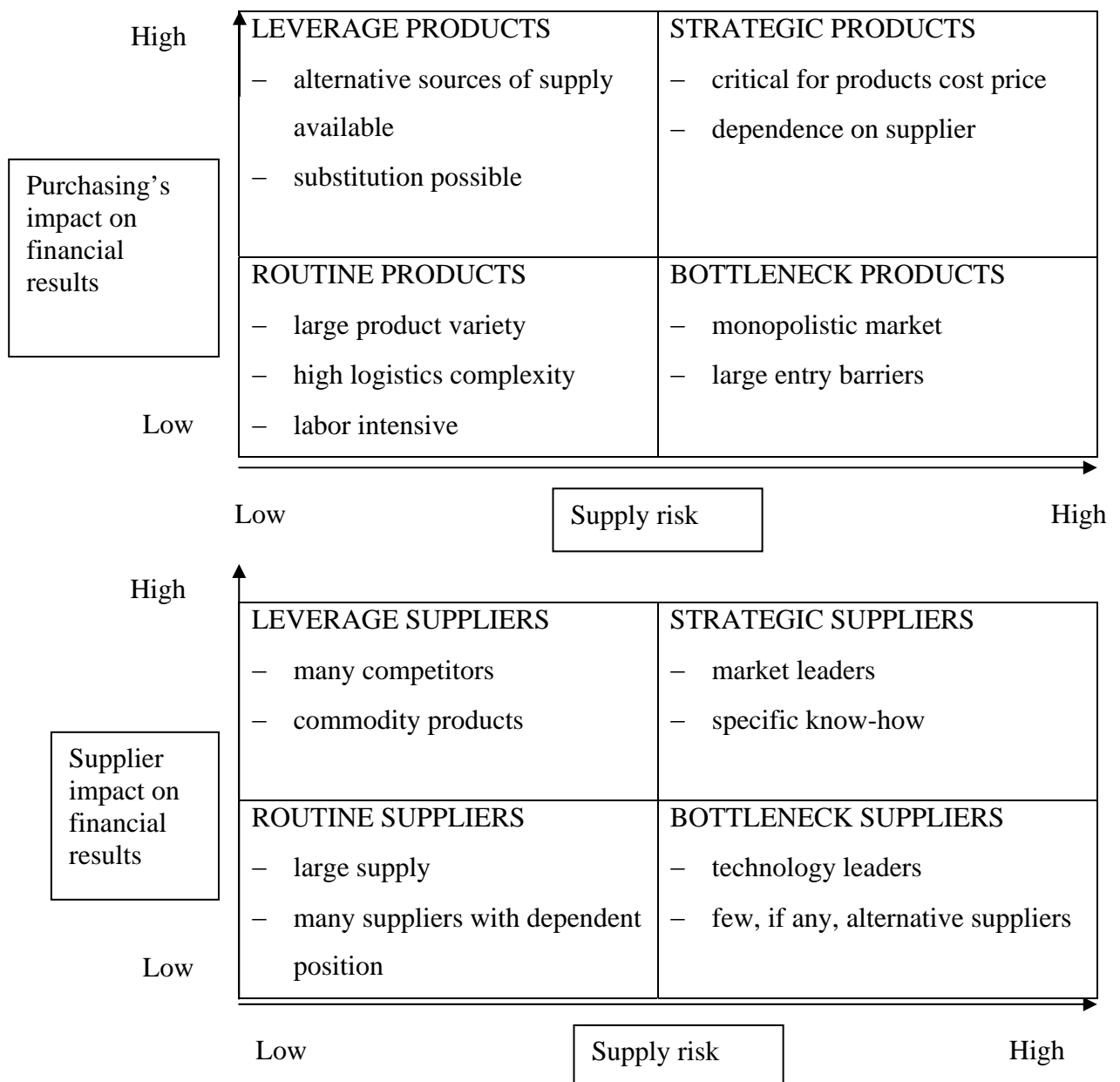


Fig. 6.2 Purchasing product portfolio and supplier portfolio (van Weele, 2002, p.147)

In this approach the purchasing turnover and the supplier base are analyzed based on two variables: purchasing's impact on the bottom line to the company and, on the other hand, the supply risk. Combination of these variables yields a two-dimensional matrix with four quadrants; these represent the product groups or suppliers (Figure 6.2), each offering different interests to the company. For every segment of the portfolio a different strategy is possible. The strategies are partnership, competitive bidding, securing continuity of supply, and systems contracting.

In the Group Benchmarking model, supplier's portfolio classification accomplishes the previous ABC-classification giving the idea of the importance of different suppliers for the company. ABC-classification gives a picture of the suppliers supplying big amounts of products as well as causing most of the expenses. However, knowledge about the importance of the products and therefore also the suppliers may be something different. Very cheap and small volume product may be a bottleneck for the production of the organization. That is why also the supply risks i.e. criticality of the products or, in this method, suppliers must be considered. It is done according to supplier's portfolio classification. Also this method of the model needs to be done in all participating companies concerning at least most of the suppliers. The portfolio gives the organization a possibility to focus only on some of the classes in the portfolio if necessary because, as a result of the portfolio, it receives a list of suppliers on each class. Supplier's portfolio classification is the *second* method in the Group Benchmarking model.

In Section 6.3 a method, which is new both in supply context as well as in benchmarking process will be presented. It plays an essential role in the new model, because it offers an important method for *recognizing the strengths and weaknesses* of the participating companies, a basis for *illustrating the state of the companies* in networking process, *subjects for the learning* discussions during the benchmarking process and a *measure for evaluating* the progress of networking in companies.

6.3 A Form as a Boundary Object

Generally speaking benchmarking is seen as a method of sharing knowledge of the best practices. To be able to share knowledge people need to communicate. In benchmarking process there are usually two or more different organizations sharing knowledge. Very often the organizations act on different fields with different products, processes, employees, management and especially, different perceptions of what matters as well as different vocabulary, concepts and constructs. When the worlds of these organizations intersect a difficulty may appear.

However, the learning and creation of common as well as new knowledge, which is the case in benchmarking, depend on communication as well as creating new findings (Star et al., 1989).

Boundary objects (Star, 1989) are artefacts, documents and even vocabulary that can help people from different organizations to build a shared understanding. They are objects, which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. Boundary objects will be interpreted differently by different organizations, and it is an acknowledgement and discussion of these differences that enable a shared understanding to be formed.

Star et al. (1989) define four types of boundary objects. In the context of benchmarking, the most appropriate boundary object would be a standardized form. It is a boundary object devised as methods of common communication across dispersed work groups (Star, 1989). The Group Benchmarking Form (boundary object) that is produced in meetings of people translates consultations of these people into a common understanding that can be processed. In practice a kind of standardization of concepts and vocabulary happens. This Form serves as a kind of coordinating mechanism between people and therefore, as well, their different viewpoints and opinions. Furthermore, the production of the Form is helpful to the sharing of tacit knowledge, which is a part of competence transfer in a benchmarking process. The Form brings together multiple perspectives, interests, and interpretations that people entail (Kleemola et al., 2003a, 2003b; Koskinen, 2003).

The Form (see Appendix 2), which is used in the Group Benchmarking process for development of a supplier network within several companies, consists of 20 activities (from Hines's matrix), which describe the characteristics of different relationships between buyer and supplier. The Form is completed in all participating companies by groups of people who work in different duties, like as buyers, product developers, and staff in production departments. The people in the groups evaluate systematically companies' activities by discussing, describing ideas, telling experiences, and asking questions in order to gain a better understanding of each others' points of view. The Form includes two separate points of time to be evaluated; the present and the future. In this way all the participating companies are forced to realize their present situation and to set directions for their future activities. In practice the people who work together constitute a common opinion of the present situation of the company by discussing and then finally making a common decision regarding direction to where they want the company to strive in the future. The management of the company in their strategies naturally determines the final future targets.

In addition to the companies themselves completing the *Form*, the Group Benchmarking procedure is built to utilize the information in the Forms of all participating companies. First, the meaning of the Form is to *co-ordinate perspectives* of various constituencies for a purpose to *inspire discussion* and to *enable people* in the group to *articulate their knowledge*, which very often is in the tacit form. Second, the same effect of the Form is achieved among the whole group of companies in benchmarking process when performing the benchmarking visits. Third, the Form acts as *collecting data for evaluation* of progress in each company. Fourth, the data collected in Forms is further *illustrated as graphs* to help recognizing the performance gaps and comparing the situations of companies. These effects will be discussed later when presenting the rest of the model.

Section 6.4 will present the way that Hines's Strategic Supply Chain Positioning Matrix is utilized in the Group Benchmarking model.

6.4 Strategic Supply Chain Positioning Matrix Method

Strategic supply chain positioning matrix method, or shorter positioning matrix, is the *third* method in the model. The idea of the matrix is to determine the level of suppliers in the network they act in surrounding the benchmarking organization. In this method all the suppliers may be considered or only a chosen part of them according to supplier's portfolio classification. To be able to perform this method, a matrix Form from the Hines's (1994) positioning matrix (Appendix 2) will be presented. It acts as a kind of boundary object in the process (see previous section). The Form is built to contain a percentage of suppliers on each networking stage at a current moment and also for the future target. In addition to two temporal aspects the Form includes all the 20 characteristics determining the nature of supplier network (Hines, 1994). When completing the Form companies participating the benchmarking project answer the important questions in benchmarking process: Where are we now? and Where do we want to be? The question still need to be answered later is What do we need to do to get from here to there?

It is important for the organization to perform this method in a group of those people who work on the area, which is a target for improvement in the benchmarking project. When supply network is the subject in the project, the employees making the evaluation of the situation in the network should be buyers, purchasing managers, warehouse employees, quality controllers, quality managers, and process and production people. In fact, this method concerns all the people co-operating with suppliers. The positioning matrix Form is filled together in the group in each participating organization separately. The Form will contain an estimation of supplier

percentage on each networking stage (Figure 6.3). The estimation is made by discussing and considering all the opinions in the group. This is important from the knowledge creation point of view. The positioning matrix Form is completed in all the companies of the benchmarking project.

What happens in this method is that qualitative attributes of buyer/supplier relationships are discussed and transformed into quantitative format. This method combines metrics and practices. It also acts as a measure of progress because the estimations of supplier percentages at consecutive benchmarking projects describe the tendency in development.

When the positioning matrix Form is completed, the percentages are processed to graphical format so that each of the four network stages in the positioning matrix is illustrated separately but the present situation and the future target of each stage are at the same graph. Comparison of the present and the future positions pose the biggest problems i.e. the performance gaps in operations. The x-axis describes the 20 activities of the positioning matrix and y-axis is the percentage of suppliers at the stage concerned.

Impact on Supplier	Percentage of suppliers at present	Percentage of suppliers in future (target value)
1. Buying criteria		
1. Lowest price	40	5
2. Lowest cost	30	10
3. Maximum mutual benefit	20	60
4. Maximum network benefit	10	25
2. Purpose of supplier		
1. To supply goods the customer does not make	15	10
2. To supply goods the customer cannot make	45	20
3. To provide possible benefits & advantages	20	50
4. To provide mutual competitive advantage	20	20

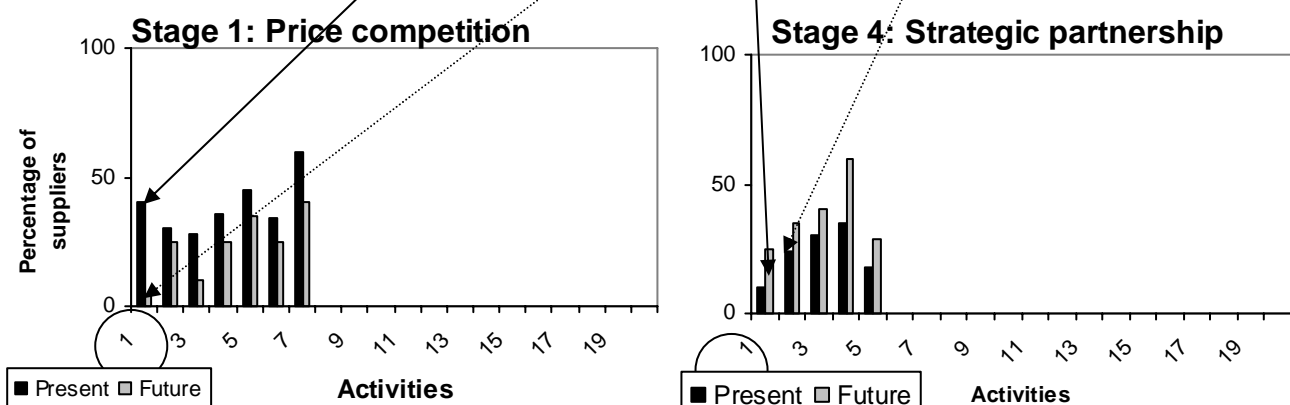


Fig. 6.3 The process from the positioning matrix Form to graphical format

During the next method of this model, the graphs of the benchmarking organization are combined to the graphs of other participating companies. This is for illustrating the activities from which each company can find another company in the group for a learning target.

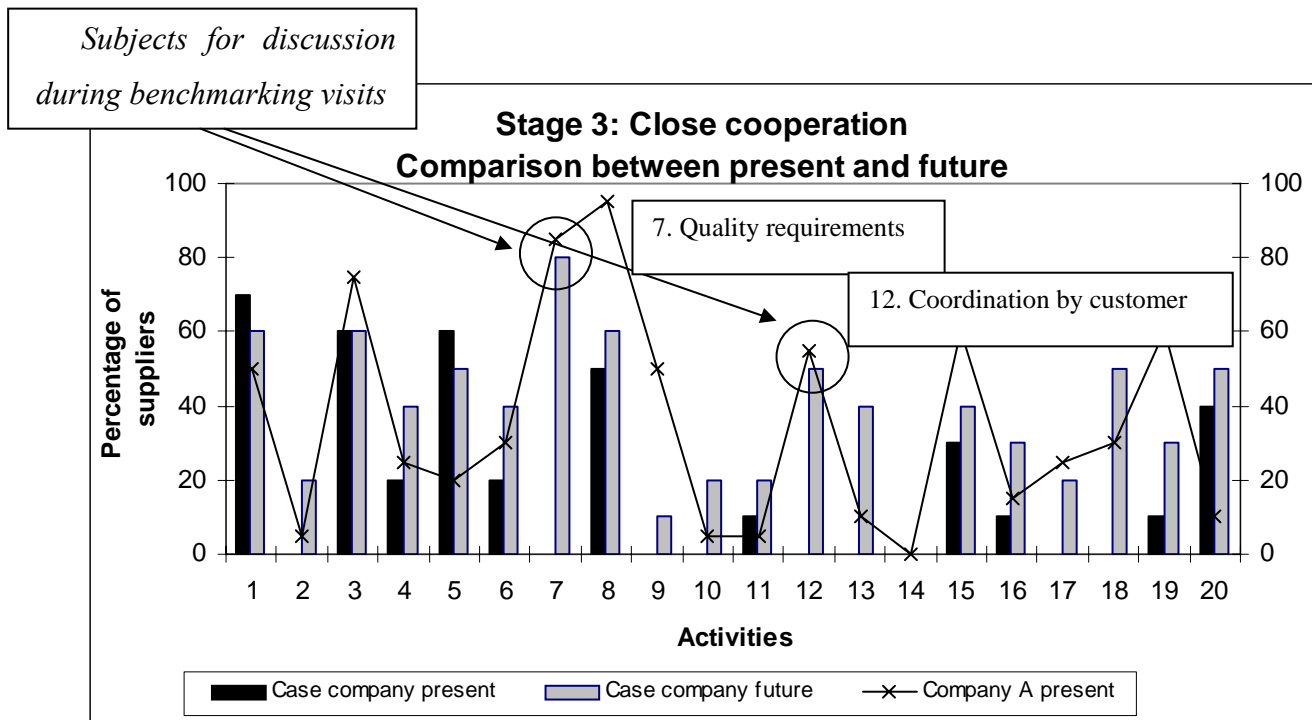


Fig. 6.4 An example of illustrating the situation of present and future performance of a company as well as comparing them to the present performance of another company

In the example of Figure 6.4, there are the present and the future performance of the case company illustrated on the Stage 3, which represents Close cooperation according to Hines (1994). In the same graph there is also a present performance of another company, called company A. When comparing the bars and lines, it is possible to notice the tendency of development efforts of the case company (the bars) as well as the activities in which the company A has achieved or exceeded (the line) the level of the target in the case company. These kinds of activities for the case company to learn are for example activities number 7 and 12.

There are several alternatives to make graphs and comparisons among the existing data:

- The benchmarking company with each of the other companies in the group,
- every participating company separately with each of the other companies,
- each company comparing its own present situation between the future target,
- present situations of all companies,
- future targets of all companies.

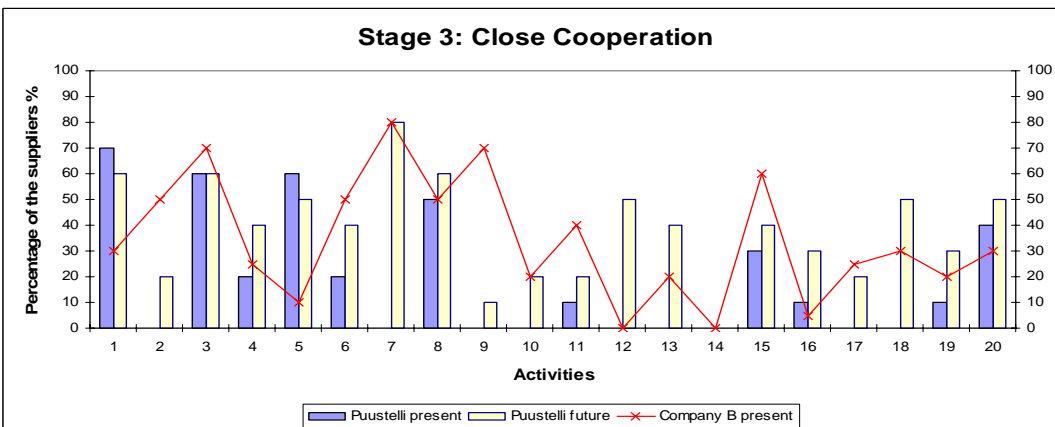
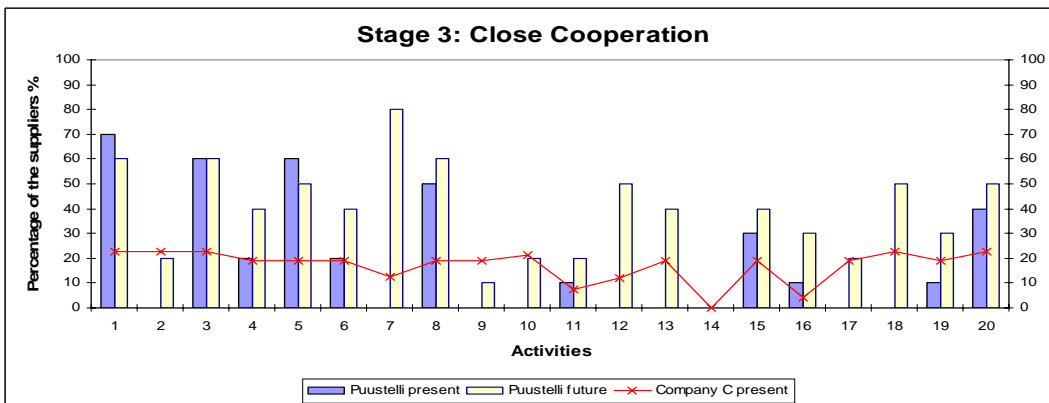
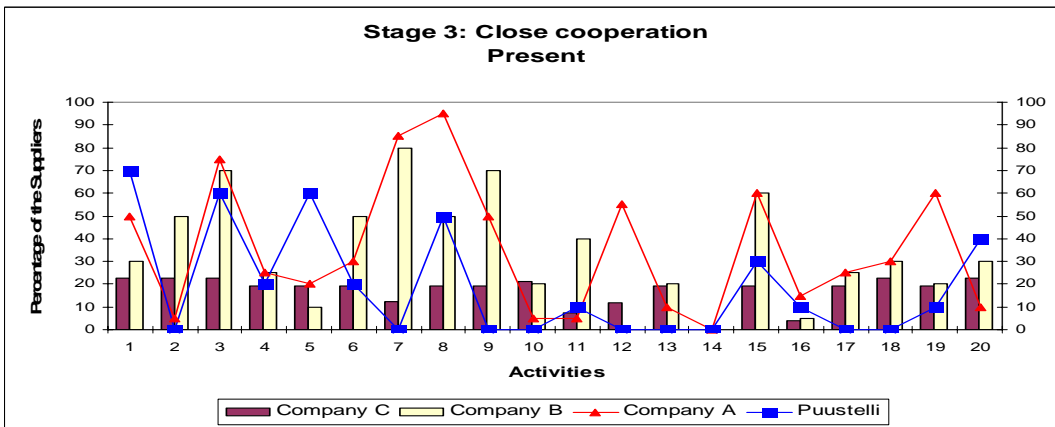
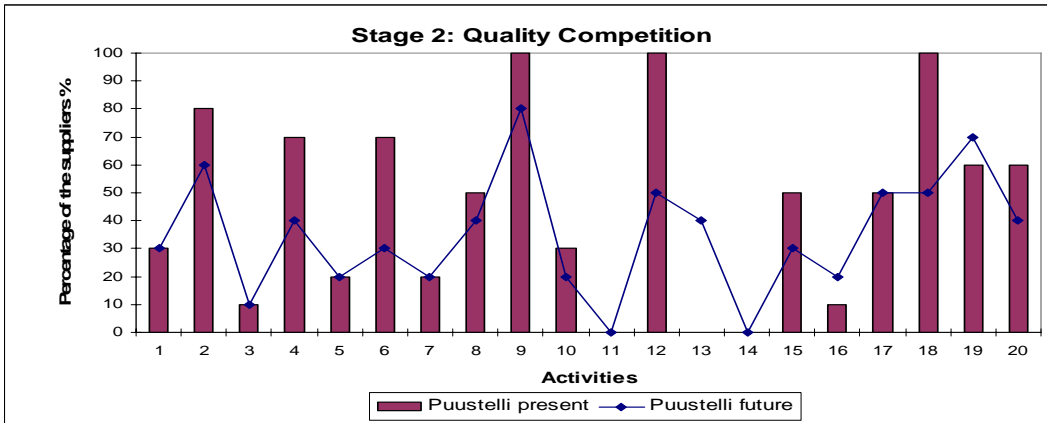


Fig. 6.5 Examples of different comparison alternatives obtained from positioning matrix material

Figure 6.5 gives some examples of the alternatives. The first graph illustrates the present situation and future target of benchmarking company at stage two. The second graph illustrates all participating companies at Stage 3. The third graph illustrates present situation and future target of benchmarking company and one of the comparison companies (C). The fourth graph gives an idea of present situation and future target of benchmarking company and another of the comparison companies (B).

The gaps between bars and lines illustrate the differences on the performance levels of separate companies on each of the 20 activities. For example the last graph: Present situation and future target of benchmarking company and the comparison company B, shows that some of the activities like No.6 and No.15 are on higher percentage of suppliers at the company B than at benchmarking company's present estimation nor future target. The chosen activities describe the overall relationship between buyer/supplier (No.6) and the type of data interchange between buyer/supplier (No.15). This means that benchmarking company can learn from company B about how to achieve that kind of performance with such a percentage of suppliers on close cooperation level (Stage 3). Correspondingly, the same graph shows that company B may learn reciprocally from benchmarking company about activities No.1 and No.20.

In Section 6.5 the fourth method of new model will be presented. The graphs made in the third method are utilized in it.

6.5 Group Benchmarking

The *fourth* method in the model is a process of benchmarking. It has been divided into four different types of benchmarking process. The idea is to give alternatives for the companies in the group to utilize the knowledge of the other companies as diversified as possible. All the different types of benchmarking can be carried out individually without any need to participate in all of them. However, when a company performs all of them on a continuous basis, maximum amount of knowledge is created and, as well, great number of competencies can be improved. Different benchmarking types in the model are illustrated in Figure 6.6.

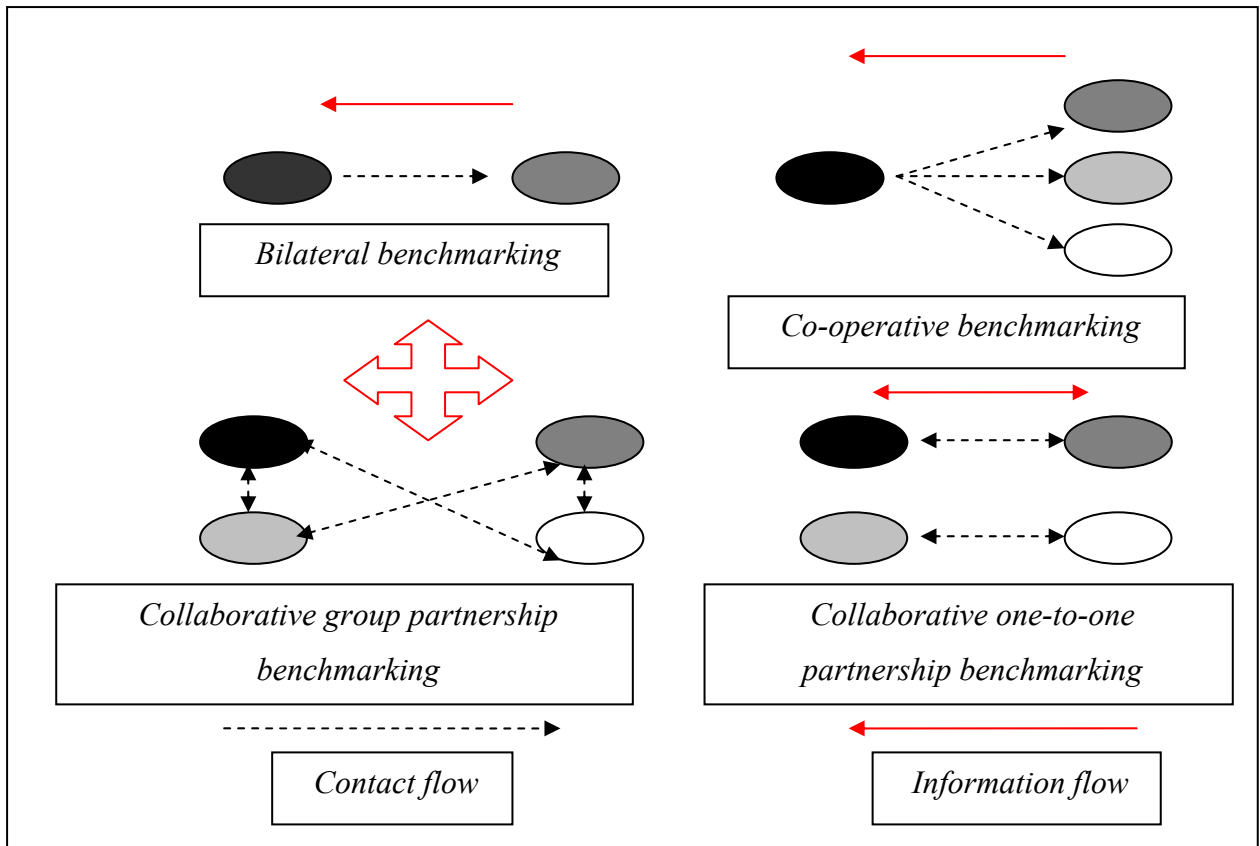


Fig. 6.6 The Group Benchmarking model

Figure 6.6 illustrates the Group Benchmarking model which includes four independent benchmarking types: bilateral, co-operative, collaborative group partnership and collaborative one-to-one partnership benchmarking. Figure 6.6 describes the direction of contact in the beginning of the benchmarking process and the direction of information flow during the process. The ellipses of different color shade represent the participating companies. The maximum number of companies in the group is four, but it is optional. The names of different benchmarking types in the model follow the terminology of previous definitions as far as they are applicable.

6.5.1 Bilateral Benchmarking

The process is started with the traditional bilateral benchmarking, which means that the communication happens between two companies. One of the companies is interested in developing a certain activity in its organization. It benchmarks one company from the group, which, according to the graph drawn from the positioning matrix form, has the best performance in this particular activity. The idea is that only the initiating company learns the best practice from another company. The same process can happen several times within the group of companies.

6.5.2 Cooperative Benchmarking

Secondly, one company, which wants to improve its certain activities, chooses several companies of the group as targets for benchmarking. The choice is made again according to the positioning matrix Form (the graphs). This is reasonable when there are several activities to be improved and different alternative procedures to make improvements in. When one company benchmarks, for instance, three companies instead of one company, it learns, in principle, at least three times more to solve problems and to adopt and apply to its own activities. This type is called co-operative benchmarking. The information flows from the best practice companies to the initiating company.

6.5.3 Collaborative Group Partnership Benchmarking

The process continues with the third, collaborative group partnership benchmarking. In this type all the participating companies sit down together with the purpose to discuss about a subject interesting for all the companies. The subject can be chosen according to the positioning matrix Form (the graphs) or it may be otherwise proven to be especially interesting or actual. The Form helps to start the discussion because it shows which company is strong in the chosen activity and which have problems on that area. This type is very useful because all the participating companies can learn something from other companies. The information flows between all participating companies.

6.5.4 Collaborative One-to-one Partnership Benchmarking

The fourth, collaborative one-to-one partnership benchmarking, is a very effective type. In this benchmarking type two companies discuss about a chosen activity, which is interesting for both of them. Then both companies learn from each other. One company may have a better performance on the activity concerned than the other one but as well, according to the form, the companies may have an equal performance on the activity. Companies usually have different procedures to operate although they may assess to perform equally when they complete the form. Even this kind of situation is worth learning something about each other. These discussions can be carried out unlimited times. Each company can find from the Form the best practice target for each of its activities.

6.6 Summary of the Chapter “A New Group Benchmarking Model”

The chapter presents *separate methods* that belong to the wholeness of the Group Benchmarking model. As an assisting method there is an *ABC-classification* for identifying the suppliers that cause the most of the purchasing costs and the suppliers that deliver a big volume of products causing only a small portion of the costs. This is important information for the company in order to create a right kind of purchasing strategy to each supplier group. Another assisting method is *supplier's portfolio classification*, which accomplishes ABC-classification by giving the idea of the importance of different suppliers for the company. The evaluation of supply risk as a function of supplier's impact on financial results reveals the criticality of each supplier to the company. As a result, the suppliers of the company are divided into four groups of the portfolio.

The third method of the model is *Strategic Supply Chain Positioning Matrix*, which utilizes a Form as a boundary object in order to enable people to communicate with a similar vocabulary bringing together multiple perspectives, interests, and interpretations. The idea of matrix is to evaluate the percentage of suppliers on each of the four networking stage representing the development level in supply networking process. The evaluation is made according to 20 activities describing characters of network kind of performance in company's supply chain. The evaluation is made on the present moment and target is set for the future.

The fourth method is *benchmarking*, which is now performed as a new kind of combination of existing benchmarking types. The idea of combining traditional bilateral benchmarking to cooperative benchmarking, collaborative group partnership benchmarking and collaborative one-to-one partnership benchmarking is to achieve a more effective method for small and medium sized companies, who can benefit the group method by decreasing costs of research (e.g. Ralston et al., 2001) and making easier to find the best practices. When the strategic supply chain positioning matrix is included in the Group Benchmarking process as a completed form, the focusing on the most problematic subjects i.e. the biggest gaps on the networking field is achieved as well as the most proper best practice targets are found. It can be concluded that the difficulties in general benchmarking process might be solved. The whole process is illustrated in Figure 6.7.

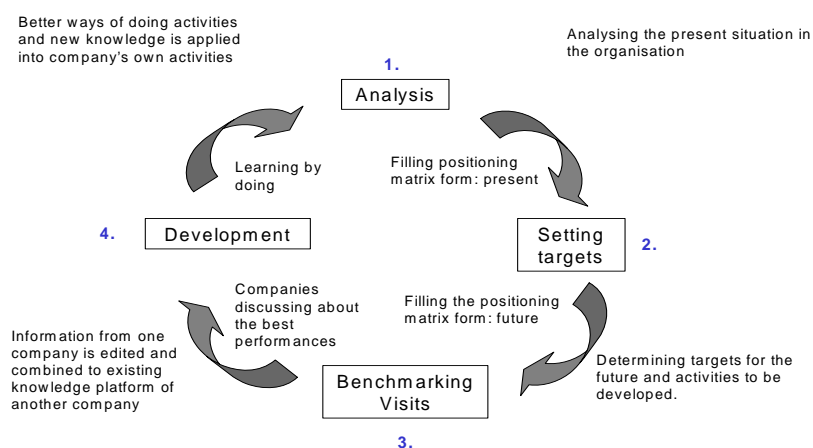


Fig. 6.7 Group Benchmarking as a continuous process

The Group Benchmarking model can be considered as functional benchmarking. It can as well be applied in other forms of benchmarking by designing the boundary object according to the need.

The new construction presented in this study gives an example of the way benchmarking can be successful also in the context of supply chain as a contrary to Cox's ideas presented in Section 5.5. The idea is to benchmark different activities among supply chain or network. The wholeness of those activities and the way they are performed, determine the success of the whole chain and network. In that case, the whole supply chain need not to be known and determined, but parts of it can be benchmarked and the best practices to perform activities within the chain can be learnt.

The main idea in benchmarking is to improve the company's own performance by learning from other best practices. In order to stay competitive, companies need to find new knowledge, technologies, techniques, products etc. as a continuous basis. This may be realized through the Group Benchmarking process by adopting the best practices innovatively, but additionally it needs purposeful development activities in the whole company.

Chapter 7 will present how the basis for the learning model i.e. knowledge management is strengthened by means of Group benchmarking. The theory of knowledge creation will be reflected as well as the enabling factors to the Group Benchmarking model. The indication of reflecting the knowledge management to the new construction is to show how the construction works and is applicable in supply chain context.

7 THE ROLE OF GROUP BENCHMARKING MODEL IN THE EXISTING KNOWLEDGE MANAGEMENT THEORIES

This chapter has been divided into four sections. The first section describes how the Group Benchmarking model follows the knowledge conversion spiral. The second section explores the knowledge enablers in the new model. The third section forms a Five-phase Model of the Organizational Knowledge Creation Process in Group Benchmarking in order to prove the functionality of the model. The fourth section summarizes the chapter.

7.1 The Knowledge Spiral in Group Benchmarking

In the past, especially tacit knowledge could not be accessed and its value could not be assessed. As a result, companies have largely neglected tacit knowledge. Current knowledge management prefers overlooking this limitation by focusing on the disposal of explicit knowledge. In contrast, multi-dynamic knowledge management realizes the importance of both explicit and tacit knowledge. The theory of knowledge creation and the model of knowledge spiral by Nonaka et al. (1995) are applied to the Group Benchmarking model to emphasize how the new model provides contextual and enabling conditions and means for the implementation for both explicit and tacit knowledge. The four modes of the knowledge conversion are described from the Group Benchmarking point of view in the following sections. The idea of explaining knowledge creation and transfer in the Group Benchmarking model has been published earlier in the following articles:

- Anne Kleemola and Kaj U. Koskinen: Creating and transferring knowledge in purchasing organizations. 12th Annual IPSERA Conference 14-16 April 2003, Budapest, Hungary (Kleemola et al., 2003a)
- Anne Kleemola and Kaj U. Koskinen: The Group Benchmarking Method as a New Tool in the Competence Transfer Process between Technology Companies. EUROMA 10th International Annual Conference, June 16-18th, 2003, Como Lake, Italy (Kleemola et al., 2003b)

7.1.1 Socialization

The conversions between tacit and explicit knowledge are the essence to knowledge and competence creation in organizations. The conversions are described with the help of the

metaphor “knowledge spiral” (Figure 3.2, Section 3.4.1), which can be thought to begin with the socialization. Socialization is the process of sharing tacit knowledge of individuals and it usually starts with building a “field” of interaction. The field is created in the Group Benchmarking process with comprising a group of members in organization to complete the positioning matrix Form working as a boundary object in the process. During completion of the Form the people share their knowledge and know-how with each others especially when determining the present network situation of the company. Before the members gather together to fill in the Form they have shared their knowledge with other people of the organization, (i.e. buyers, production staff, product developers, etc). For example, interactions between buyers and suppliers during the purchasing negotiations are a never-ending process of sharing tacit knowledge and creating ideas for better performances in relationships.

7.1.2 Externalization

Externalization is a process articulating tacit knowledge into explicit knowledge. It is often triggered by dialogue (Figure 3.2), which helps tacit knowledge to move out from a person. To be applied to the Group Benchmarking process this is the mode in which the people completing the positioning matrix Form discuss about the future target for the company. They dialogue when they speculate on a future situation in which they want their companies to be. This happens by using metaphors, analogies, concepts and different models as a help in their articulation. As a result, the members of the organization have reached a common idea about the target, in accordance with which they want to develop the company. In other words, they have determined the activities that need to be developed through benchmarking and also the activities in which the company is the best-in-the-group.

7.1.3 Combination

Combination takes place through editing and systemizing explicit knowledge. It also happens when different pieces of explicit knowledge are combined. The exchange and combination of explicit knowledge can happen through media like documents, meetings, telephone conversations, or computerized networks. Reconfiguration of existing information through sorting, adding, combining, and categorizing of explicit knowledge can lead to new knowledge. (Koskinen, 2001) This type of combination of explicit knowledge can also take place with the help of benchmarking process. During a benchmarking visit one company gives pieces of information to another company, which edits and combines it to its existing knowledge platform. This is a general mode happening in all benchmarking processes in spite of the

number of participating companies or the direction of the information flow. When applied to the Group Benchmarking model the effectiveness of combination of explicit knowledge is possible to be multiplied. The amount of explicit knowledge, which is possible to be adopted is huge when a company participates in different types of the Group Benchmarking model. For example, when a company A performs the traditional bilateral benchmarking it learns about an activity from company B. In the second type, the co-operative benchmarking, the company A discusses about an activity with several companies B, C and D. In the third type of Group Benchmarking the company A participates in the collaborative group partnership benchmarking sharing the knowledge with all the companies present. In this type the company A as also the other companies both gives and gets information to adopt. In the fourth type, the collaborative one-to-one partnership benchmarking, the company A first chooses one company (e.g. company B) to share the information concerning the activity No.1 and secondly it chooses another company (e.g. company C) to share the information about the activity No.2. The mentioned activities are the subjects for the common interests according to the positioning matrix form. When a company has conducted all of these types of Group Benchmarking, it has a lot of new knowledge and competencies to be combined to its existing knowledge platform.

7.1.4 Internalization

Internalization is a mode in which the newly created explicit knowledge is converted into the tacit knowledge of individuals. It is a natural part of the benchmarking process. After learning the better ways of doing activities in the best practice companies, the company applies the new knowledge into its own processes, products and organization. When first the individual and then the organization start working according to new knowledge, the explicit knowledge converts to tacit knowledge of individuals through “learning by doing”, training and simulations. This is an effective method especially when the people performing the job in practice have been present during the benchmarking visits and seen themselves how the knowledge is utilized in another companies. The modes cannot be limited to happen separately; when one ends, another begins, but there are several modes, which overlap.

7.1.5 The Process of Knowledge Creation and Transfer in the Group Benchmarking Model

Figure 7.1 illustrates the process of knowledge creation and transfer in the Group Benchmarking model. The four methods in the general benchmarking process are marked as numbers 1-4 containing analysis of present situation in the organization, setting targets for the

future, performing the benchmarking visits and, finally, learning the best practices and adopting them to own organization by developing own practices. As the figure illustrates, that it is important to start from the beginning again i.e. from the analysis method. The modes of knowledge conversion spiral are then added to the figure of benchmarking process as showing the methods in which they come true.

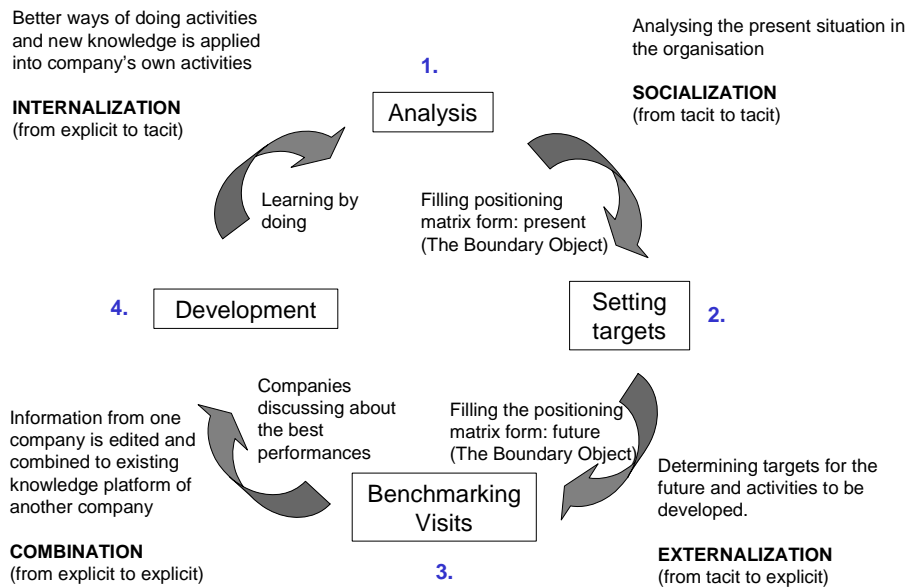


Fig. 7.1 Creating and transferring knowledge through the Group Benchmarking

The texts inside the circle describe the operations that are carried out during the benchmarking method. The numbers of the methods show beside the order of the methods normally done, also the starting point of the process being number one. This is usually the case, but when new ventures are concerned, the starting point is instead number two. That is because new ventures do not have a present situation to analyze. Instead they have a lot to learn from existing companies in order to avoid the mistakes typical at the beginning of business. After the first round of the process the new venture can continue from the beginning by analyzing the achieved situation and so on.

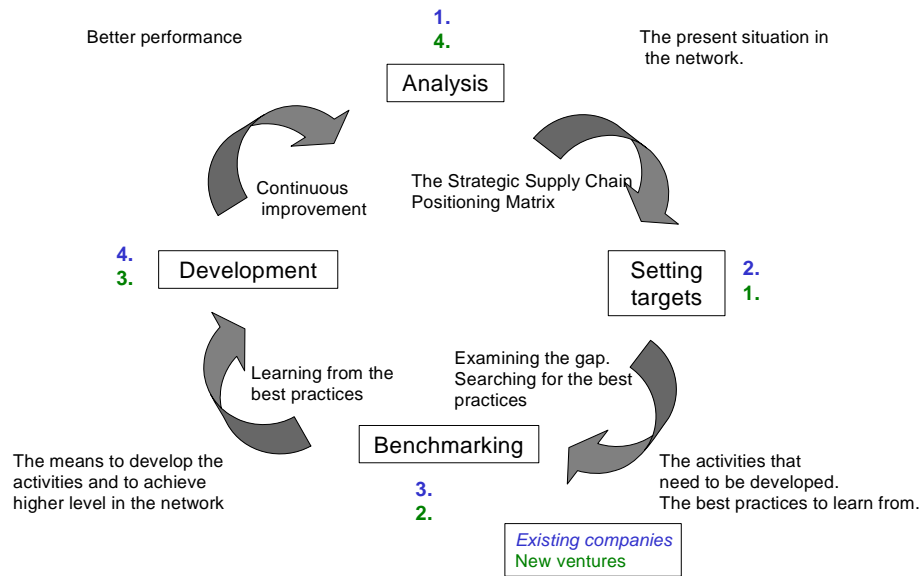


Fig. 7.2 Model for developing and managing supplier networks

Figure 7.2 illustrates development of supplier networks in both existing companies and new ventures separated only with the starting point in the benchmarking process.

7.2 Enablers in Group Benchmarking

Knowledge enablers have three significant roles. They stimulate individual knowledge development, protect knowledge development in organizations and facilitate sharing of individual knowledge and experience among organizational members so that individual knowledge will be transformed into organizational knowledge (Ichijo et al., 1998).

In Section 3.5 several knowledge enablers are defined according to several authors. When displaying to Ichijo et al. (1998), benchmarking in general applies the enablers of creating knowledge intent and developing organizational conversations. The Group Benchmarking model also brings the enablers of developing organizational structure facilitating knowledge development, managing care relationships and developing knowledge managers.

There are enabling factors, which are prerequisites for benchmarking processes in all cases and also affecting the success of knowledge creation. Motive is a natural factor in all development programs; also in benchmarking process. Openness is a key factor in the process in which the exchange of information is dependent on communication and willingness to share knowledge. Past experience is a basis in benchmarking process when all the learnt best practices

are applied to the existing knowledge platform. That is because the only way to learn is to produce new knowledge by using existing knowledge (c.f. autopoietic epistemology).

Knowledge creation is also dependent on the cultural factors like organization's co-operative and collaborative abilities. It requires the willingness of a group or individual to work with others and share knowledge to their mutual benefits. This is just what benchmarking and especially Group Benchmarking is about.

Nonaka et al. (1995, 2000) present enabling conditions, which are the driving forces for dynamic knowledge conversion; intention, autonomy, redundancy, creative chaos and fluctuation. Autonomy, redundancy, or chaos increases the variety of options and the complexity within an organization, whereas intention or requisite variety reduces complexity. From the Group Benchmarking point of view they all are present in the process primarily because they are connected to knowledge conversion spiral, which also the Group Benchmarking model complies with. In Section 7.3, it will be examined how the four modes of knowledge conversion and the five enabling conditions promote organizational knowledge as a five-phase model. At the same section Group Benchmarking will also be considered in relation to the model.

7.3 Five-Phase Model of the Organizational Knowledge Creation Process in Group Benchmarking

Nonaka and Takeuchi (1995) present an integrated, five-phase model of the organizational knowledge creation process, using the basic constructs presented earlier and incorporating the time dimension into their theory. The model consists of five phases: 1) sharing tacit knowledge; 2) creating concepts; 3) justifying concepts; 4) building an archetype; and 5) cross-leveling knowledge. (Figure 7.3)

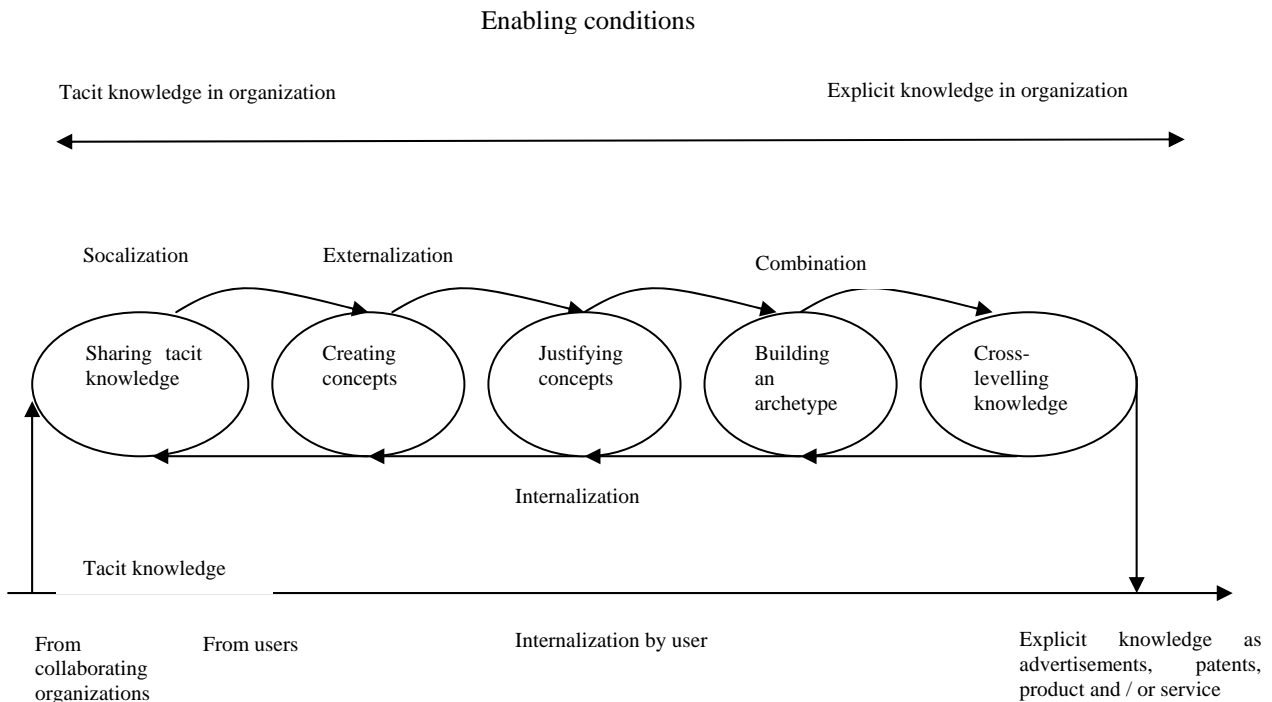


Fig. 7.3 Five-phase model of the organizational knowledge-creation process (Nonaka and Takeuchi, 1995, p.84, modified)

The First Phase: Sharing Tacit Knowledge

Tacit knowledge that is held by individuals is the basis of organizational knowledge creation. That is why it is natural to start the process by focusing on tacit knowledge. However, tacit knowledge cannot be communicated or passed onto others easily, since it is acquired primarily through experience and not easily expressible in words. The sharing of tacit knowledge among multiple individuals with different backgrounds, perspectives, and motivations becomes the critical step for organizational knowledge creation to take place. The individuals' emotions, feelings, and mental models have to be shared to build mutual trust.

To enable the sharing, a situation in which individuals can interact with each other through face-to-face dialogues is needed. During dialogues they share experiences and synchronize their mental rhythms. This phase of the organizational knowledge-creation process corresponds to socialization.

A self-organizing team is a typical field of interaction. The members of the team come from various functional departments working together for a common goal. This kind of team facilitates organizational knowledge creation through the multi aspect of the team members, who experience redundancy of information and share their interpretations of organizational intention. Management cause creative chaos by setting challenging goals and endowing team

members with autonomy. An autonomous team begins to interact with the external environment, accumulating both tacit and explicit knowledge.

In the Group Benchmarking process (Figure 7.1) the same phase is seen as analysis in which the group of people inside the organization, but from different duties, completes the Form concerning the present situation of networking in the organization. Each member of the group tries to express his/her feelings, attitudes and mental models with the help of face-to-face dialogue. A boundary object, i.e. the positioning matrix Form is used to offer the group members a common language; vocabulary, and subjects to focus in order to obtain a common understanding of the problem area that the management of the organization has seen well-founded from the strategic point of view. The autonomy of the group is visible when the group produces the filled Form and proceeds toward the next step of Group Benchmarking; setting targets. It is concluded that all the enabling factors of Nonaka and Takeuchi (1995) comes true in the Group Benchmarking at the same time with the first phase of organizational knowledge-creation process.

The Second Phase: Creating Concepts

The most intensive interaction between tacit and explicit knowledge occurs in the second phase when shared mental models are articulated through further continuous dialogue in the form of collective reflection. The shared tacit mental models are verbalized and finally crystallized into explicit concepts, which corresponds to externalization. This phase may be facilitated by the use of figurative language such as metaphors and analogies. Also dialectics is used to raise the quality of dialogue among team members.

In this phase concepts are created cooperatively through dialogue. Autonomy is needed in helping team members to diverge their thinking freely, with intention serving as a tool to converge their thinking in one direction. To create concepts, team members have to rethink their existing premises fundamentally. Requisite variety helps team members by providing different angles or perspectives for looking at a problem. Fluctuation and chaos also help members to change their way of thinking fundamentally. Redundancy of information enables team members to understand figurative language better and to crystallize their shared mental model.

In the Group Benchmarking process this phase is seen mainly as Setting targets (Figure 7.1). The group members inside the organization have expressed their idea of buyer/supplier relationships in the company based on their experiences and feelings. The next step is to set targets for the future relationships. The group members may have different thoughts about the future supply network. However, they need to end up a common idea of the target network. In

addition to metaphors and analogies that can be used, they have a boundary object, i.e. the positioning matrix Form again to help finding understanding of their tacit knowledge and expressing it as explicit knowledge. The completion of the Form happens with the help of dialogue and dialect perhaps. The group members are autonomous in their thinking and expressing ideas. Redundancy is a necessity when evaluating future needs of the organization. Fluctuation and chaos exist in a situation when future is affected by an environment and they give a freedom for the group members to consider different possibilities. Redundancy of information helps the group members to understand the expressions of each other's and come to the most probable future target. As a conclusion can be noticed that all the features of the second phase of creating concepts are present in the Group Benchmarking and externalization of tacit knowledge mostly happens in setting targets for future supply network.

The Third Phase: Justifying Concepts

According to commonly accepted idea, knowledge is defined as justified true beliefs. Therefore, new concepts created by individuals or team need to be justified at some point in the procedure. Justification means determining if the newly created concepts are truly worthwhile for the organization and society. In order to do that, the organization must conduct the justification in an explicit way to check if the organizational intention is still intact and to ascertain if the concepts being generated meet needs of society at large. Justification criteria can be both quantitative and qualitative. The criteria need to be strictly objective and factual; but also judgmental and value-laden.

The top management of the company is the one whose role it is to formulate the justification criteria in the form of organizational intention, which is expressed in terms of strategy or vision. However, autonomous organizational units can determine sub criteria. To avoid any misunderstanding about the company's intention, redundancy of information helps facilitate the justification process.

This phase of justification concepts can be found in the Group Benchmarking model in several steps. The strategy of the company set by top management should be seen in setting targets for future network. The supply network should fit to the policy of the company's business strategy. The targets set for the future need to support the vision and help to achieve it. This happens by choosing the subjects for benchmarking discussions according to the company strategies i.e. picking the activities of the matrix to discuss during the benchmarking visits by keeping in mind the most relevant subjects to develop. This choosing will be done autonomously by the participating group of people in benchmarking project. Justification of

concepts i.e. the operations to develop can be concluded to come true also in Group Benchmarking.

The Fourth Phase: Building an Archetype

In this phase the justified concept is converted into something tangible or concrete, i.e. an archetype. An archetype can be a prototype in the case of products, or a model of operating mechanism in the case of service or organizational innovation. It is built by combining newly created explicit knowledge with existing explicit knowledge. This phase corresponds to combination in knowledge conversion spiral. This phase is complex and demands various departments within an organization to cooperate. Both requisite variety and redundancy of information facilitate this process. Organizational intention also serves as a useful tool for converging the various kinds of know-how and technologies that reside within the organization, as well as for promoting interpersonal and interdepartmental cooperation. Autonomy and fluctuation are not relevant at this phase.

In the Group Benchmarking model this phase is seen when the learned best practices from the target company are adapted and applied to own company as models of operating mechanisms. The newly applied mechanisms are not necessarily the final operating methods, but the one learned and accommodated to own circumstances. This step is called development (Figure 7.1) in the Group Benchmarking process. To be able to apply new mechanisms the organization needs a lot of information from various contributors i.e. the members of the organization. This fulfils the conditions of redundancy and requisite variety.

The Fifth Phase: Cross-Leveling of Knowledge

Organizational knowledge creation is a never-ending process that upgrades itself continuously. The new concept, which has been created, justified, and modeled, moves on to a new cycle of knowledge creation at a different ontological level (Nonaka et al., 1995, p.57). This interactive and spiral process, which is called cross-leveling of knowledge, takes place both intra-organizationally and inter-organizationally.

An enabling condition that is valid in this phase is autonomy of each organizational unit to take the knowledge developed somewhere else and applies it freely across different levels and boundaries. Internal fluctuation will facilitate knowledge transfer as will redundancy of information and requisite variety. Organizational intention will act as a control mechanism on whether or not knowledge should be cross-fertilized within the company.

Group Benchmarking is a continuous process as well. Intra-organizationally, knowledge that is made real or that takes form as an archetype can trigger a new cycle of knowledge creation, expanding horizontally or vertically across the organization. Inter-organizationally, knowledge created by the organization can mobilize knowledge of affiliated companies, customers, suppliers, competitors, and others outside the company through dynamic interaction. The last mentioned is especially important when the aim of the company is to develop together with its suppliers.

The epistemological dimension is the first dimension of the organizational knowledge creation. In that dimension knowledge conversion takes place between tacit and explicit knowledge. The ontological dimension, in which knowledge is created by individuals and transformed into knowledge at the group and organizational levels, forms another dimension. Both dimensions form a spiral when time is introduced as the third dimension. In Group Benchmarking the same spiral form can be noticed when the process starts from the beginning after previous activities have been applied and an organization has developed one step toward the target network. The next round may be performed on the higher ontological level or on the higher level of the network e.g. with the suppliers. However high ontological level the process will reach, each round of the Group Benchmarking starts from the tacit knowledge of individual.

7.4 Summary of the Chapter “The Role of Group Benchmarking Model in the Existing Knowledge Management Theories”

The chapter demonstrates how the knowledge creation in the Group Benchmarking process relates to the four modes of knowledge creation. The enabling factors of knowledge creation are reflected to benchmarking process. Finally the model of Nonaka and Takeuchi has been expressed with the help of five phases forming another spiral of organizational knowledge creation process. The five phases are explained from the viewpoint of Group Benchmarking. The explanation gives the final justification for the new construction. *The Group Benchmarking model follows the modes of knowledge conversion model enabling companies to utilize existing knowledge of other companies as well as their own knowledge platform.*

8 TESTING THE FEASIBILITY OF THE GROUP BENCHMARKING MODEL

This chapter has been divided into two main sections, which present the empirical cases in which the new Group Benchmarking model has been tested. The companies for the cases are chosen based on the interest that they have addressed for developing supplier network with benchmarking process. The companies are not special in any viewpoint relevant for the study. Their size according to the number of employees is below the limit of 750.

8.1 CASE 1: Developing Networks Through Benchmarking in the Joinery Industry

The first case study was performed in the year 2000 and it was published as a Master of Science Thesis (Kleemola, 2000). It was published also in the proceedings of ISPIM conference in 2001 in Lappeenranta, Finland by Anne Kleemola and Hannu Vanharanta as an article A New Method for Developing Networks through Benchmarking (Kleemola et al., 2001).

The aim of the study was to analyze and develop the supplier network of the company but also to test the model developed for the purpose. Because the model consists of different known methods combined in a new way, it was important to demonstrate the functionality of the model. There were two companies that participated the first case study; the initiating company that started the benchmarking project in order to learn best practices from another company and the target company that gave information during the benchmarking project. The research followed the methods of the new model using, however, only one of the benchmarking types in the construction.

8.1.1 The Case Company – Harjavalta Oy, Puustelli-keittiöt Oy

The first case study was performed in the company operating in the joinery assembly industry. The main company is Harjavalta Oy and it has four subsidiaries; Puustelli-keittiöt Oy manufacturing kitchen furniture, Puustelli Toimistot Oy manufacturing office furniture and house manufacturer Kastelli-Keskus Oy. The above-mentioned subsidiaries locate in Finland but the fourth one, Svenska Harjavalta Ab, a sales company, locates in Sweden. In this study the subsidiary Puustelli-keittiöt Oy was concentrated on. Its turnover in the year 1999 was 265 MFIM and the number of personnel was 260. The annual growth rate in kitchen business was about 10% covering three sectors; new buildings 30-40%, export 10% and rebuilding 50-60%. Puustelli-keittiöt Oy is a market leader in rebuilding sector in Finland. The success is based on sales network through which the customized kitchen solutions are planned, sold and installed

including the furniture, accessories and domestic appliances while the old furniture is removed whenever the customer wants. Also the financing may be arranged for customer. The kitchen network consists of over 100 part suppliers, one transportation company with more than 10 subcontractors and about 40 domestic franchising sales companies and 13 export offices. The whole kitchen network employs more than 1000 people in Finland.

8.1.2 The Order-delivery –process

The production in Puustelli-keittiöt Oy is based on customer orders and customized assemblies. It is synchronized with the supplier deliveries. The suppliers are divided into three groups according to the products they deliver. In this study supplier groups are called as Group 1: part suppliers, Group 2: intermediate products and Group 3: materials. Because the aim in this study was to analyze and develop the supplier network, the focus was in the order-delivery process. The process is presented in Figure 8.1.

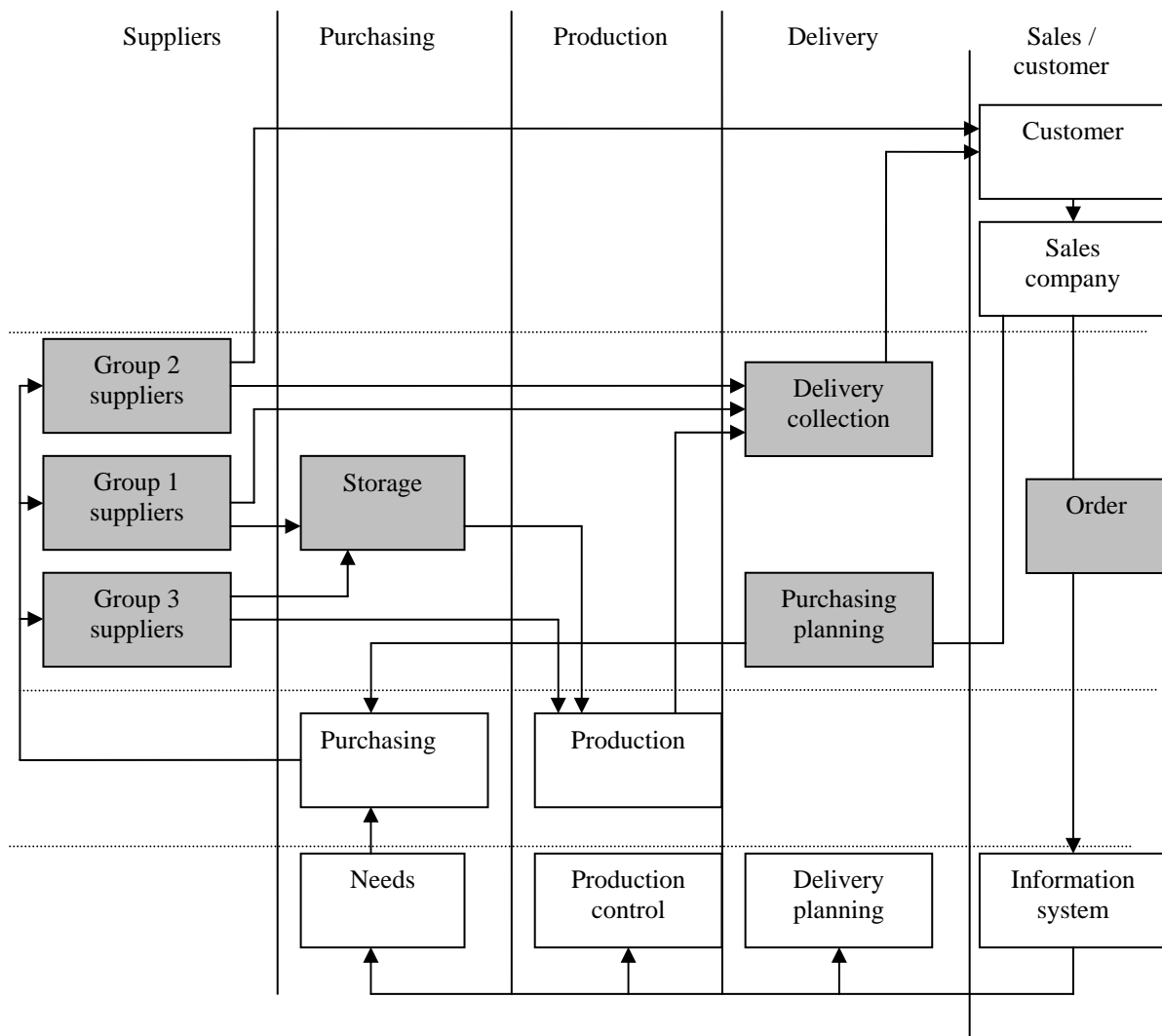


Fig. 8.1 Process map of Puustelli-keittiöt Oy main processes

The whole supply chain is complicated because there are many different suppliers supplying different products with both high and low importance to several places in the process. The supplies are delivered straight to the production, to the production through the storage, straight to the delivery collection, or straight to the customer. Controlling all the deliveries, their performance and timing is a complicated task to do. The problematic area among the processes is concentrated on the suppliers. Therefore, this study is limited to the operations and relationships between the principal and the suppliers i.e. to the supplier end of the supply chain.

8.1.3 Analyzing the Supplier Network

To be able to control the supply chain and its performance it is important to find the best possible working methods for the whole supplier network. In order to find those methods the case study started by performing *ABC-analysis* for the products and their suppliers (the first method of the model). As a supplement a *supplier's portfolio classification* was made with four optional groups in which the possibilities to replace the product with another and the purchase volume of the product vary (the second method of the model). In the case company a group of four people with different tasks in the organization determined the class for each supplier using a special form.

In the third method of the study *the strategic supply chain positioning matrix* was made for all the suppliers. In the matrix there are four network stages. The lowest stage is the traditional competitive stage when the supplier is mainly chosen according to the product price and the highest stage describes the features of a perfect co-operative network. In the case company the same group of people determined the percentages of the suppliers operating at all four stages according to the 20 activities using a special Form (a boundary object). In the matrix the present position of the suppliers in the network was determined, as well as the aim of the future network. The comparison of the present and the future positions exposes the biggest challenges in operations.

In the fourth method the means to reach future aims in the network were determined by *benchmarking* the case company to another company representing assembly industry, too. Benchmarking covered two visits to the “best practice” company. The people making the analysis of the suppliers in previous methods of the study also participated the benchmarking visits.

The “best practice” company produces automatic paint tinting systems on a customized basis. The company, Corob Oy, is a Finnish company owned by Swisslog Holding AG and Tikkurila CPS Oy. Its turnover was about 60 MFIM in a year 1999 and the number of personnel

was about 55. The size of the company is clearly smaller than the size of the case company, but the number of suppliers is about the same. In addition, the “best practice” company was familiar with the benchmarking method and very interested in learning about the operations of the case company, Puustelli-keittiöt Oy.

During the first benchmarking visit the practices of the “best practice” company were gone through and the main principles in management and operations were explained to visitors, i.e. the representatives of the case company. After that the representatives from the purchasing department of the “best practice” company filled out the strategic positioning matrix Form concerning their own suppliers and operations. Also they analyzed the present situation in the supplier network as well as designed the future vision for the network. The matrix of the future position is very useful for the development of the supply chain in the “best practice” company, too. In addition, the matrix of present position was compared with the corresponding matrix of the case company to highlight the differences between companies. During the second benchmarking visit the differences in the matrixes were analyzed and the practices causing the differences were discussed especially in the cases when the present network stage of the “best practice” company was near to the future aim of network stage in the case company.

The developing of the supplier network happens through developing the performance of all the activities affecting the performance of the whole network i.e. the activities in the supply chain positioning matrix. What and how to develop? are the questions which got the answers during the benchmarking visits. What to develop is seen in the differences of matrixes between the two companies. How to develop is discussed when comparing the differences in operations and the performance stages caused by the differences.

8.1.4 The Results in the Case Study

As the first result of the study the suppliers of the case company were classified according to the products they deliver. The results of the ABC-classification were quite typical: two biggest suppliers representing 35% of the total purchase volume. The rest of the suppliers were quite evenly distributed following the principle of 25% of the suppliers representing 75% of the purchase volume. With these results it was very difficult to determine any individual ways of action for each supplier to optimize the operations with them. The results of the supplier’s portfolio classification are shown in Figure 8.2 as percentages and as a number of suppliers in each class.

<p>Class 1: Bottleneck products Small purchase volume, difficult to get or replace</p> <p>Purchase volume Euros: 1 112 824 5,2% Suppliers pcs: 7 6,7%</p>	<p>Class 2: Strategic products Big purchase volume, difficult to get or replace</p> <p>Purchase volume Euros: 10705154 49,8% Suppliers pcs: 24 23,0%</p>
<p>Class 3: Ordinary products Small purchase volume, easy to get or replace</p> <p>Purchase volume Euros: 6638758 30,9% Suppliers pcs: 63 60,6%</p>	<p>Class 4: Volume products Big purchase volume, easy to get or replace</p> <p>Purchase volume Euros: 3052501 14,2% Suppliers pcs: 10 9,6%</p>

Fig. 8.2 The supplier's portfolio classification in the case company

There are two classes in which the most of the suppliers are located. The suppliers delivering strategic products (Class 2) represent 23% whereas the suppliers delivering ordinary products (Class 3) represent up to 60,6% of the total amount of suppliers. The result is opposite when the purchase volume is concerned: 50% in the class of strategic products and 31% in the class of ordinary products. The classes bottleneck products (Class 1) and volume products (Class 4) are both quite small according to purchase volume and the amount of suppliers. The case company does not totally follow the literature in the typical distribution of purchase volume but the tendency is very similar.

After classifying the suppliers, the case company knew the situation of purchases among its suppliers, but it did not know what to develop in order to improve its performance in cooperation with the suppliers. For that purpose it filled the Form of strategic supply chain positioning matrix. The results of the matrix are shown in Figure 8.3. The case company also did not know how to develop the operations. In order to find out the ways for better performance it started the benchmarking process. The "best practice" company filled the supply chain positioning matrix Form as well and the results are also shown in Figure 8.3. The representatives in the companies filling the matrix estimated the percentage of the suppliers acting on each of the four network stage according to the 20 activities in the matrix. The bars and lines are the average percentages of suppliers locating in one of the four network stages at each of the 20 activities. The present situation of both companies and the future situation of the case companies are illustrated on each network stage.

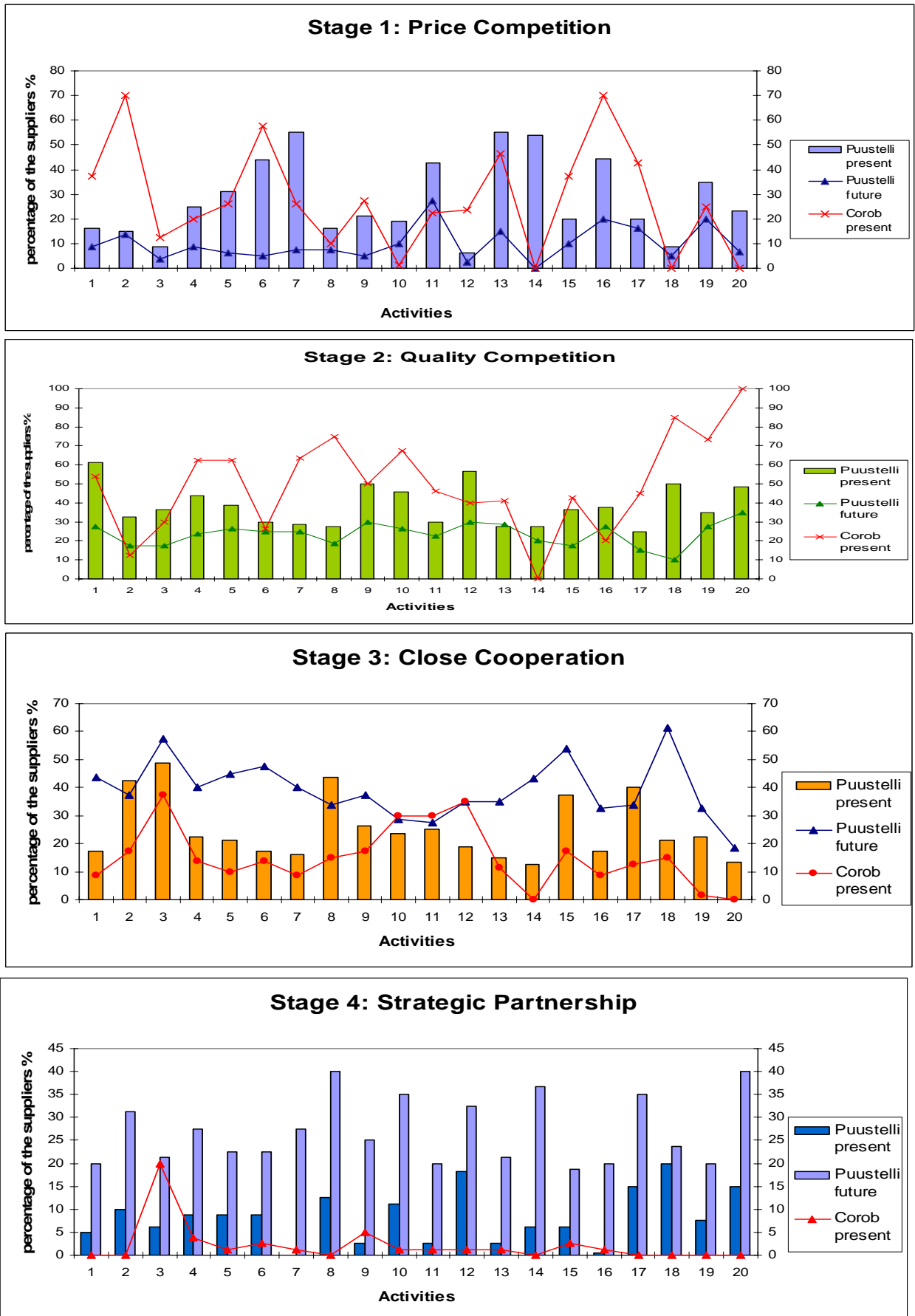


Fig. 8.3 The strategic supply chain matrixes.

Figure 8.3 illustrates the strategic supply chain matrixes in the graphs as a function of the 20 activities. The label text is as follows: Puustelli present = the present stage of the network in the case company, Puustelli future = the future goal for the network in the case company, Corob Oy present = the present stage of the network in the best practice company.

These graphs were drawn after the first meeting between the companies. During the second meeting the means by which the “best practice” company (Corob Oy) achieved the present stage of the network of interesting activities were discussed. The activities discussed were chosen according to the common points in the graphs of the future goal of the case company (Puustelli-keittiöt Oy) and the present stage of the “best practice” company. Such points were found e.g. at stage three in activities 10, 11 and 12 (the third graph). The case company learned the means by which the “best practice” company had achieved the present stage. Now the case company was able to apply the same means to itself on its own conditions on its way toward better performance in buyer/supplier relationships.

The example is the activity Number 10, which describes the design requirements that the customer set to the supplier in the cooperation. On the stage one (the first graph), which illustrates the traditional price competition way of relationship between buyer and supplier, there is no design requirements set for supplier. The percentage of suppliers is 20 in Puustelli-keittiöt Oy, whereas the corresponding figure in Corob Oy is near zero. The target in Puustelli-keittiöt Oy is to decrease the percentage to 10 at this stage. The same activity, design requirements on the stage two (the second graph) means that there are some limited requirement set for suppliers. In practice this means that the supplier is able to follow the buyer’s design. Most of the Puustelli-keittiöt Oy suppliers operate on that stage. The present percentage is 45 and the future target is 25 which mean that the tendency is to decrease the percentage of suppliers also on this stage. This stage is the one in which also most of the Corob Oy suppliers operate. On network stage three (the third graph) design requirements mean ability for design together with a supplier and a customer. Corob Oy is operating that way with 30% of the suppliers, which is also a goal for Puustelli-keittiöt Oy. This is the stage in which Puustelli-keittiöt Oy is aiming to increase the percentage of suppliers. The stage three represents quite advanced but also relatively realistic relationship between buyer and supplier. When discussing about the means for achieving the level of 30% and the operational ways of acting on that activity in Corob Oy (best practice) Puustelli-keittiöt Oy (case company) learned a way to increase the percentage of its suppliers on this certain activity. This is one of the key principles in the operations of Corob Oy. It has chosen not to perform the activities the supplier can do

better. Designing the component that the supplier delivers is the core competence of the supplier. That is why Corob Oy uses the knowledge of suppliers by giving the specifications and other requirements for the supplier and letting him make the design in assistance of Corob Oy. This is something that Puustelli-keittiöt Oy should learn to do by choosing the appropriate suppliers (especially in Classes 1 and 2 in portfolio) very carefully and developing the cooperation with them toward the more beneficial common utility of competence in the relationship. The discussions consisted many details that are helpful for Puustelli-keittiöt Oy in developing the mentioned activities.

The stage four (the fourth graph) offers no useful information for Puustelli-keittiöt concerning the activity No.10. Instead, Corob Oy might learn from Puustelli-keittiöt how to increase the percentage of suppliers on the relationship which is based on integrated design with buyer and suppliers.

As can be seen in the graphs there are many activities to discuss and for the case company to learn. There is also a possibility to turn the whole picture upside down. Also the “best practice” company can learn from the case company and in real situations the information transfer happens to both directions in each discussion causing new knowledge creation. There can be found the activities in which the case company has achieved higher percentage of the suppliers than the “best practice” company, which is willing to develop its activities and learn from the case company. Such an activity may be for example at stage three Number 8, which is delivery requirements that the customer sets for its suppliers. At stage three it means pseudo JIT requirements, which are quite a tough requirement for suppliers. How to achieve the way of deliveries is an important knowledge for the companies developing their operations in the hectic business environment.

8.1.5 Conclusions of the Case 1

In the first case study the focus in testing the model was on the *quantitative methods* and the *usability of graphs*. That is why only bilateral type of benchmarking was performed. The ABC-analysis as well as the supplier’s portfolio classification were found to be very good tools in dividing suppliers into different groups for further operations. The case company as well as the “best practice” company got lists of suppliers belonging to each of the four classes. The classes represent different importance for the company causing different development pressure in networking purposes.

In need of getting information of the *present situation in network* as well as *setting future target*, the suppliers positioning *Form* provides a good tool as a boundary object. It *focuses the*

development to the most problematic areas on the network. It also *points out the gaps* between the case company and the “best practice” company in the activities belonging to the critical characteristics for networking. In this case the most obvious learning targets were discovered at stage three, where the target of the case company and the present situation of the “best practice” company clearly meet each other. The following *benchmarking* visits then proved to be successful in *clarifying the reasons for the gaps* and also *offering methods* for the case company to develop its performance on the activities concerned. The intended bilateral benchmarking process proved to function in both directions.

The typical problem of benchmarking being too general and trivial, and not digging itself in the real problems seem to be solved with the model. The model being both *qualitative* (activities in the form) and *quantitative* (figures in graphical format) exhibit the activities being in need of development and further assisting the benchmarking method in concentrating those activities.

The interview of both participating companies revealed that the experience of the new model was very good especially in comparison to the previous experiences of benchmarking. The study proved that the *model* is well *applicable* to developing the performance of networking companies. With the help of the model a company is able to concretize actions needed for better performance.

8.2 CASE 2: Group Benchmarking – a Model Toward Effective Supply Networking

The purpose of the second case was to test the new model as a whole by increasing the types of benchmarking to cover all the different benchmarking types in addition to the bilateral type. The model will thus be even more useful, versatile and effective in developing networks. The idea in the second case study was also to illustrate the suitability of the model in different kind of companies as well as its benefits in continual usage. Because the model was tested once in the first case, the second case was an excellent opportunity to develop it further and to monitor its characters in different point of views. A part of this study has been published as a Master of Science Thesis (Kandelin, 2002). Parts of the study have been published also in the following articles:

- Anne Kleemola: Developing Supply Networks through Group Benchmarking – How to find the best practices. Working Seminar on Production Economics, 18-22 February 2002, Austria. (Kleemola, 2002a)
- Anne Kleemola, Niko Kandelin and Hannu Vanharanta: Group Benchmarking – A Methodology toward More Effective Supply Networking. IPSERA, 25-27 March 2002. The Netherlands. (Kleemola et al., 2002)

- Anne Kleemola: Managing Networks through Continuous Group Benchmarking. EURAM, 9-11May 2002. Stockholm. (Kleemola, 2002b)

The second case followed the methods of the Group Benchmarking model excluding the helpful quantitative measurement, the ABC-classification. It was not necessary any longer because the case company is the same and the results of the classification were already known.

8.2.1 The Companies in the Case Study

In the second case study the actual case company was the same than in the first case; Puustelli-keittiöt Oy. This made it possible for us to also make a longitudinal research between these two cases. Instead of one “best practice” company, this time there were three companies to compare the performances with.

The situation in Puustelli-keittiöt Oy had changed a little from the time of the first case study. Harjavalta Oy has created a subsidiary called Puustelli Group Oy which included both kitchen and bathroom furniture. Below that company there is Puustelli Toimistot Oy manufacturing office furniture and Kastelli-Talot Oy manufacturing houses. Svenska Harjavalta Ab operates still in Sweden. So in the second case Puustelli Group Oy was concentrated on. It is later called only Puustelli. The turnover was 52 MEUR (310 MFIM) in year 2000. The number of personnel was 260. The number of suppliers about 150. The transportation of supplies and deliveries was still outsourced like in the previous case study and the amount of sales offices has increased to 50 domestic and 13 export offices. The number of sales orders is about 6000 per year.

The first “best practice” company was ABB Control Oy – Small Power Supplies Division. Later on it is called company A. It belongs to the ABB concern, locates in Vaasa and employs about 400 persons. Its turnover was about 88 MEUR, which is more than 520 MFIM. The percentage of export was 38%. It has received certifications of ISO 9001, ISO 14001 and BS 8800. Its products are mostly different switching power supplies. The number of purchased items is 17000, of which 7000-8000 are active items. The number of delivery rows in a year is about 150000, which makes about 600 delivery rows per day. The company has 115 suppliers, of which about 10 are so called shelf suppliers supplying straight to shelves of ABB Control Oy. 20% of the products are customized and the rest, 80%, are standard products. Production is totally based on customer orders; no production to warehouse is made.

The second “best practice” company was Valtra Oy, which is later called Company B. Valtra Oy manufactures tractors being a part of the Partek concern and locating in Suolahti. In Valtra Oy there are 600 employees and turnover was 671,1 MEUR in year 2000. It also has certificates

of ISO 9000 and ISO 14001. The number of tractors produced in the year 2000 was 8900, which means 42 tractors per day. 70% of the production is exported. Valtra Oy has about 240 suppliers, of which one third are Finnish. The number of purchased items is 4500. The production is based on customer orders and highly customized.

The third “best practice” company was Sandvik Tamrock, which is a part of Sandvik Mining and Construction business unit located in Tampere. Later on called Company C. It employs about 700 persons and its turnover was about 1000 MFIM in the year 2000. Sandvik Mining and Construction (SMC) is the world's leading supplier of drilling, excavation, crushing and screening machinery, equipment and tools for the mining and construction industries (<http://www.smc.sandvik.com/>). Tamrock divides its purchasing into strategic and operative activities. The strategic purchasing consists of managing suppliers, costs and negotiations, developing expertise in purchasing and controlling the quality of suppliers. Operative activities concentrate on minimizing the time of purchasing. In practice this means decreasing the time that materials are in the warehouse and developing processes. The number of suppliers is about 200. In a year Tamrock delivers 46 products, which are manufactured according to customer orders. The number of purchased items is 20000.

8.2.2 Analyzing the Suppliers in the Companies

At first, the supplier’s portfolio classification (Table 8.1) with four optional groups (classes) in which the possibilities to replace the product with another and the purchase volume of the product vary was made. The classification in Company C was made in a different way because of their own procedure used as a standard method. The idea in this portfolio classification was to find the suppliers, which belong to the Classes 1 and 2. Those classes were focused in the second case study due to the results in the first study. It became evident that the Classes 1 and 2 are critical in developing suppliers toward partnership relationships, which are essential in networking efforts. The resulting portfolio is in Table 8.1.

Table 8.1 The supplier’s portfolio classification in the companies. The Figures are numbers of suppliers in each class

	Puustelli	Company A	Company B	Company C
Class 1	27	28	54	?
Class 2	30	24	23	?
Class 3	63	52	129	?
Class 4	15	10	32	?

Although Company C was not able to present the corresponding figures to the table, it was aware of the suppliers belonging to each group in the company. This knowledge was used later when doing the positioning matrix. The case company as well as Companies A, B and C concentrated on the suppliers in Classes 1 and 2 in the following methods of the study.

8.2.3 Positioning Suppliers in the Strategic Supply Chain Matrix

In each company there was a chosen group of people first making the portfolio classification and now positioning suppliers in the matrix. Both the portfolio classification form and positioning Form were filled independently in each company after instruction by the researcher. Later the same groups were present in the benchmarking process. The strategic supply chain positioning matrix was filled in each company concerning now only the suppliers belonging to the supplier's portfolio Classes 1 and 2. Like in the first case study the Form designed to the purpose was used as a boundary object (Section 6.3). Also in this case the companies determined their present position as well as the future aim. As results, the graphs describing the situation in each company on each four stages of networking were formed. With these graphs the benchmarking process in a wide version was started. It is called Group Benchmarking.

8.2.4 Performing Group Benchmarking

The idea in the Group Benchmarking was to take advantage of knowledge of all the companies in the group as widely as possible in a continuous basis. Although Puustelli was an initiating company in the case study, the reason for the “best practice” companies to participate in the study was justified as a possibility to learn and improve the own performance at the same time. For that purpose all the participating companies performed the same methods in the study.

Before starting the benchmarking process, the collective graphs by combining the results of positioning matrixes from the graphs of Puustelli and each of the “best practice” companies were prepared.

Co-operative benchmarking

The first step of the benchmarking process was the traditional benchmarking in which one company aims to learn from another company and information is thought to flow only in one direction. The form of benchmarking is co-operative instead of bilateral because the amount of “best practice” companies is more than one. In the case study this means that Puustelli made benchmarking visits to Companies A, B and C separately. The same groups of people, which

made the supplier's portfolios and positioning matrixes, performed visits. The prepared graphs of matrixes (Figure 8.4) were used as a basis of discussions in a similar way than in the first case study. The present situation of Companies A, B and C was compared to the future aim of Puustelli.

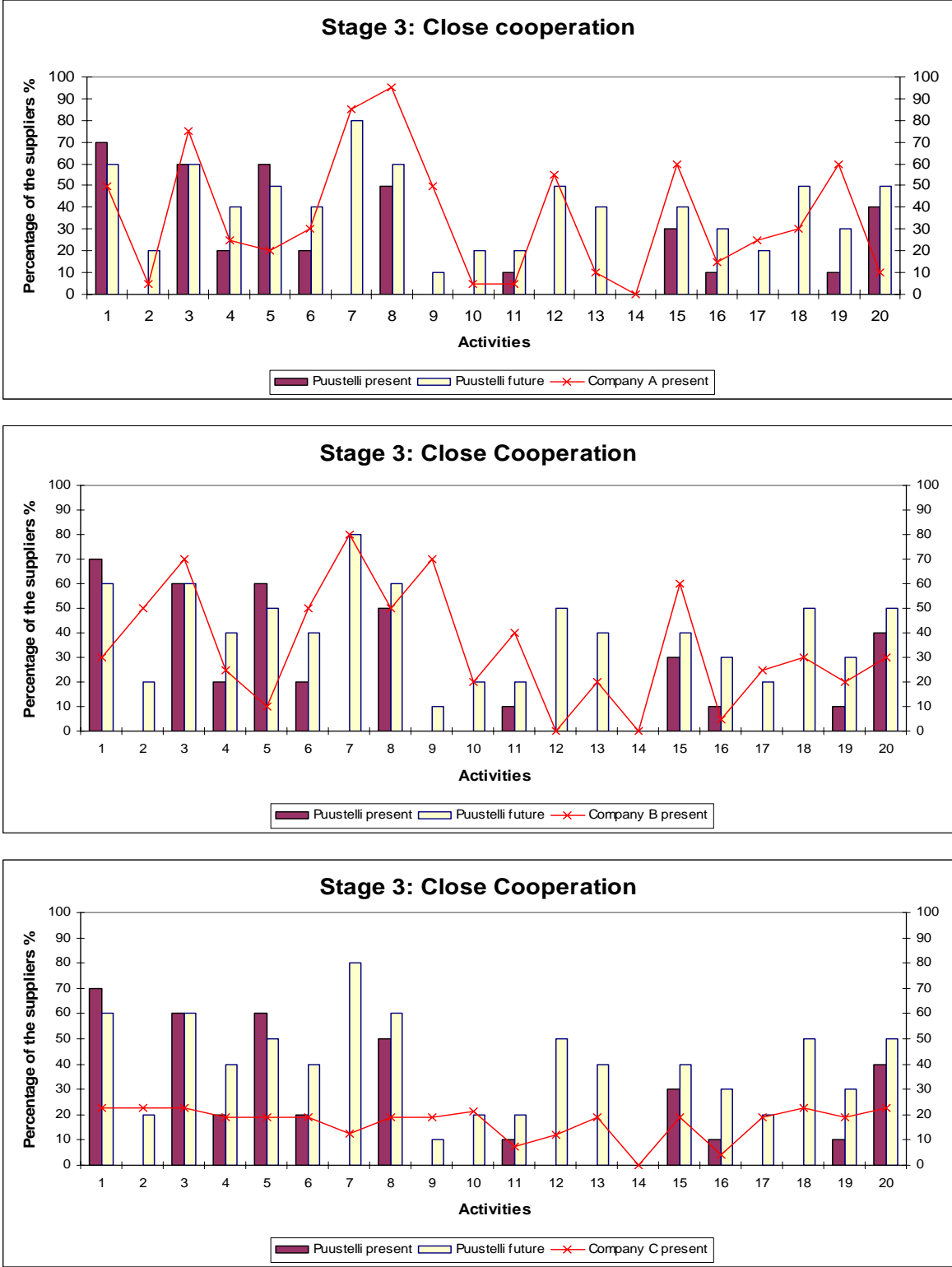


Fig. 8.4 The supplier positioning matrixes as graphs.

In Figure 8.4. the present and future situation of the case company (Puustelli) are illustrated as bars and each of the “best practice” companies on the networking Stage 3: Close cooperation is illustrated as line. According to the graphs (Figure 8.4), it was possible to find the activities that the “best practice” companies were having more suppliers than Puustelli. With Company A activities numbers 7, 12 and 15 were picked to discuss during the visit. With Company B the discussed activities were numbers 6, 15 and 18. From the graph of the Company C activities of Numbers 9, 13 and 16 were picked to discuss deeply. Before starting the discussion of the chosen activities, the companies familiarized each other’s company and business principles in order to know to what extent the comparison can be done. All the companies represented the assembly industry, which seemed to make the comparison quite easy in spite of the size differences between some companies. The deep discussions between Puustelli and each of the “best practice” company highlighted the reasons of the “best practice” companies having been able to achieve such a high networking stage on the chosen activities with the suppliers of bottleneck and strategic products. During the discussions Puustelli learnt means to apply to its own activities in order to improve its performance of especially the chosen activities but also the whole supplier network including suppliers and the personnel in the Puustelli organization. In other words, the meaning of traditional benchmarking came true three times in an effectively focused way.

Collaborative group partnership benchmarking

The collaborative benchmarking type aims at an improvement in particular performances of all participating companies. In practice this means that all the companies in the group gather together for a common discussion. In this form of benchmarking the information flows in all directions between the four companies. Before discussion the group needs to know what is the particular activity that all companies are interested in improving. In the case study the companies did not know each other excluding the previous benchmarking relationship between Puustelli and each “best practice” company separately. To be able to decide about the activity for common interest, the group needed somebody to interpret the graphs that are drawn according to positioning matrixes. Puustelli might have acted as an interpreter, but because there was a researcher in this study, she made the illustrations and chaired the benchmarking discussion. The Stages 2 and 3 are examples in Figure 8.5, which represent quality competition and close cooperation between the principal and suppliers, respectively.

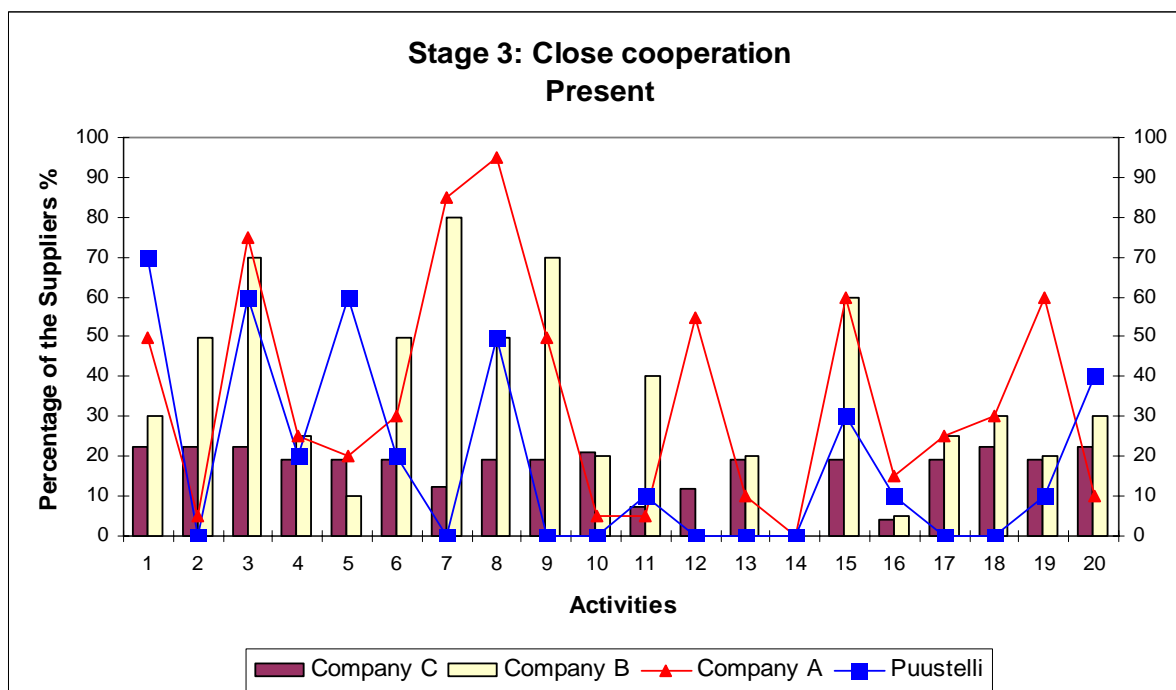
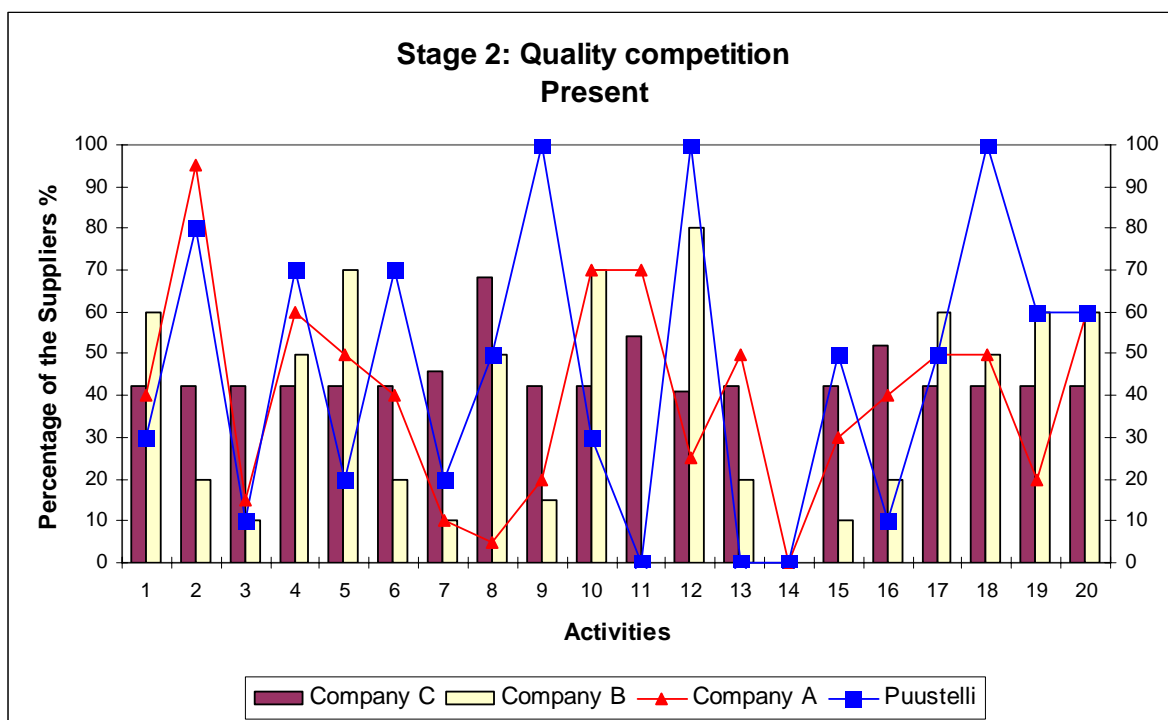


Fig. 8.5 The present network situation in all participating companies on Stages 2 and 3

The graphs give an idea about the situation at networking Stages 2 and 3 in all the participating companies. For example at Stage 3 the activity Number 7, which describes quality requirements, is a very interesting topic due to the big differences between companies. On the other hand at Stage 2, activity Number 4, which describes principal's involvement in supplier, the percentages are very similar in all the participating companies. Why is that? How has each company

achieved the stage? How does each company operate with this activity in comparison with other companies? These and many other questions were asked and answered during the collaborative group partnership benchmarking discussion in which the graphs were very useful. When each company participates the discussion about the particular chosen activity, they can all learn from all the other companies and adopt useful procedures to apply in own organizations. They can also create valuable contacts for later communication and information exchange. They became aware of different organization cultures and learn to proportion their own strengths and weaknesses to the business outside the company.

Collaborative one-to one partnership benchmarking

In collaborative one-to-one partnership benchmarking every one of the companies acted as a benchmarking company and as a “best practice” company to be compared with. The idea is that every company can choose an activity to develop, then pick up the suitable “best practice” target for learning and perform the discussion with the help of positioning graphs. In this benchmarking the sharing of information is a two-way process and the dialogue is of benefit to both companies.

The graphs in Figure 8.6 were used when searching for partners in collaborative one-to-one partnership based benchmarking. Both graphs describe the present networking stages of the companies excluding one, which describes the future networking target of Company A or Company B.

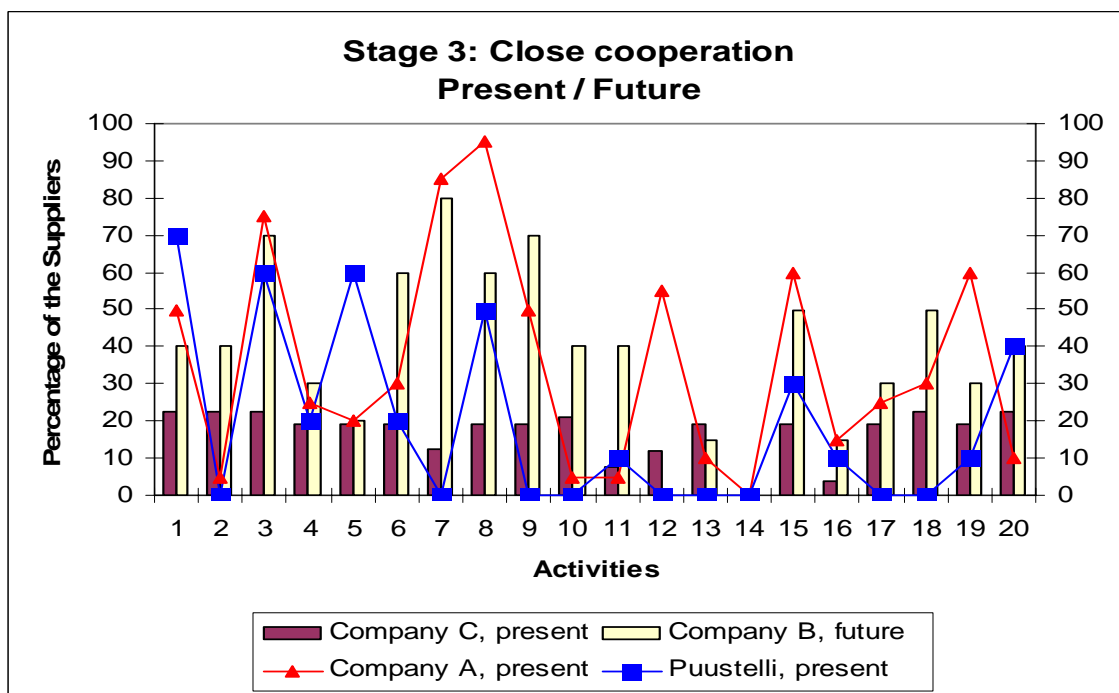
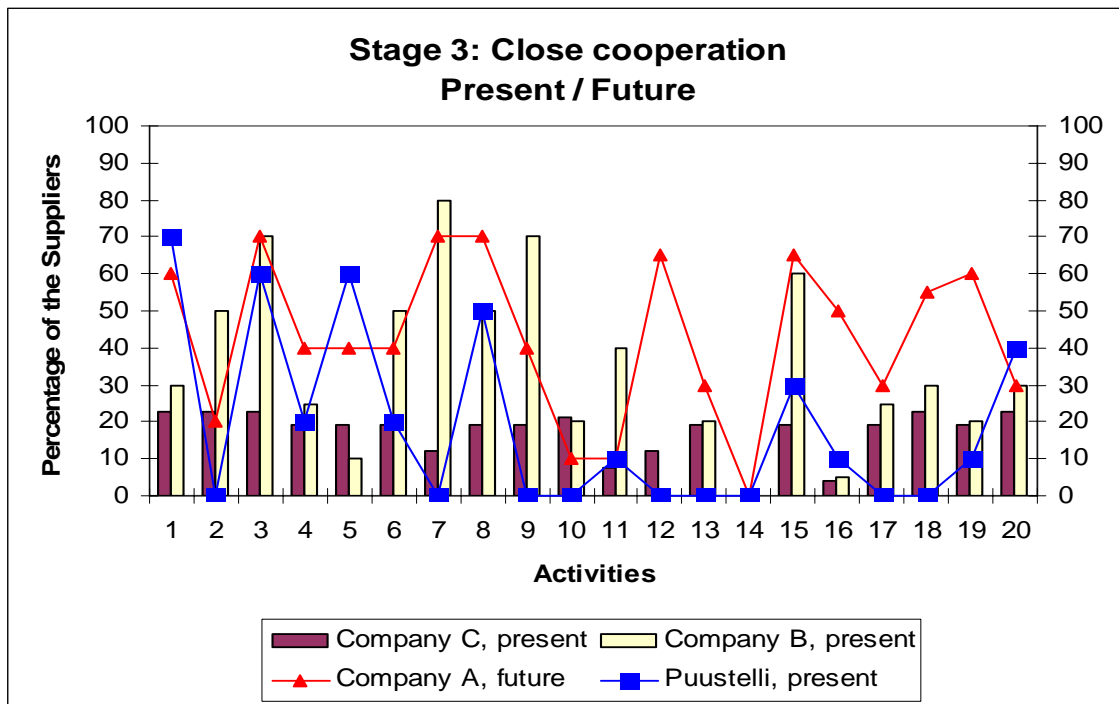


Fig. 8.6 Examples of using positioning matrixes for collaborative one-to-one partnership benchmarking.

Figure 8.6 illustrates the present stage of all the participating companies and a comparison between the present stage of three companies and the future aim of one company. With the help of these graphs Companies A and B are able to find the best suitable comparison company/ies for improving the performance of chosen activities. For example company A in the upper graph can learn much from Company B when it wants to develop activity Number 6 (overall

relationship) on the Stage 3 which is concerned in these graphs. This is because Company A has the same kind of percentage of suppliers as a target value on that activity than Company B has already achieved. From the networking point of view it means that Company A learns how to increase the percentage of suppliers on the close cooperation stage (Stage 3) by improving the chosen activity or at least how Company B has reached that stage with present number of suppliers.

Another example can be found from the graph on below. Company B has set a target percentage of suppliers on the same figure as Puustelli has the present stage concerning the activity number 20 (tiering structure). The tiering structure gives a good picture of the stage of networking in the company. How to achieve a certain kind of structure and how the achieved structure works are good subjects to learn from another company.

The graphs are helpful when deciding which activities to develop and from who to learn. These graphs are examples of the several possibilities to study when looking for objects from which to learn when developing activities on the road of networking. The graphs were prepared with all different alternative combinations of present and future stages of networking. The graphs were then given to the companies to be used later when performing development programs of different activities.

When analyzing the graphs, making comparisons between companies and between the present situation and the future target, the participating companies need to decide what the decisive difference between performances is. They need to keep in mind the most important activities for their own competitive position and to take bearings the company strategy to the results of the graphs. After that they are to decide what activities to improve by benchmarking process.

During the study all the benchmarking company – “best practice” company combinations were not possible to test, but the graphs can be used outside this study for a long time when searching for the learning partner among the group of companies. This is one benefit in creating the long-term contacts with other companies in the group. The benefit is also in knowledge of the model that all the companies now have.

8.2.5 The Longitudinal Study

The first and the second case study offered a good possibility to make also longitudinal research about the opportunities of the model. Because the initial benchmarking company was the same, i.e. Puustelli keittiöt Oy in both studies and there were one and a half years between the studies, the networking situation in the company at both periods of time was able to be

compared. The aim was to find out if the model has caused some development, which could be seen in graphs or otherwise realized when discussing with people in the company.

The group of people filling the positioning matrix Form was not exactly the same in both studies. There were four members in the group and one of them was replaced with a new member between the cases. The way of filling the Form also changed between the studies. In the first case every member in the group filled the Form independently and the results in the graphs were counted average values from individual opinions of the group members. In the second study the members filled one common Form by discussing together and ending to a mutual understanding. The change in filling the Form was due to discovered different understanding of the questions in the form.

The longitudinal research used the graphs prepared in the first and two studies. The profiles of present networking stage of the first study and the second study are now combined in the same graph. Figure 8.7 presents examples from two networking stages in which there are the present situation and the future target from the first study and the present situation from the second study. With the help of these graphs it is easy to notice the activities, which have developed during the time between the studies. The line in the graphs shows the target tendency of networking and the bars represent the present stages of the sequential studies. For example, activity Number 3 at Stage 2 shows some progress due to decrease in percentage of suppliers, which is seen as a desirable trend according to the future line in the first study. The same result is seen in activities 5, 7, 10, and 16. The activities concerned are relationship type and length, interaction with suppliers, quality requirements, design requirements, and cost transparency, respectively. The decrease of certain activities at Stage 2 and increase of the same activities at Stage 3 mean higher networking stage as a consequence.

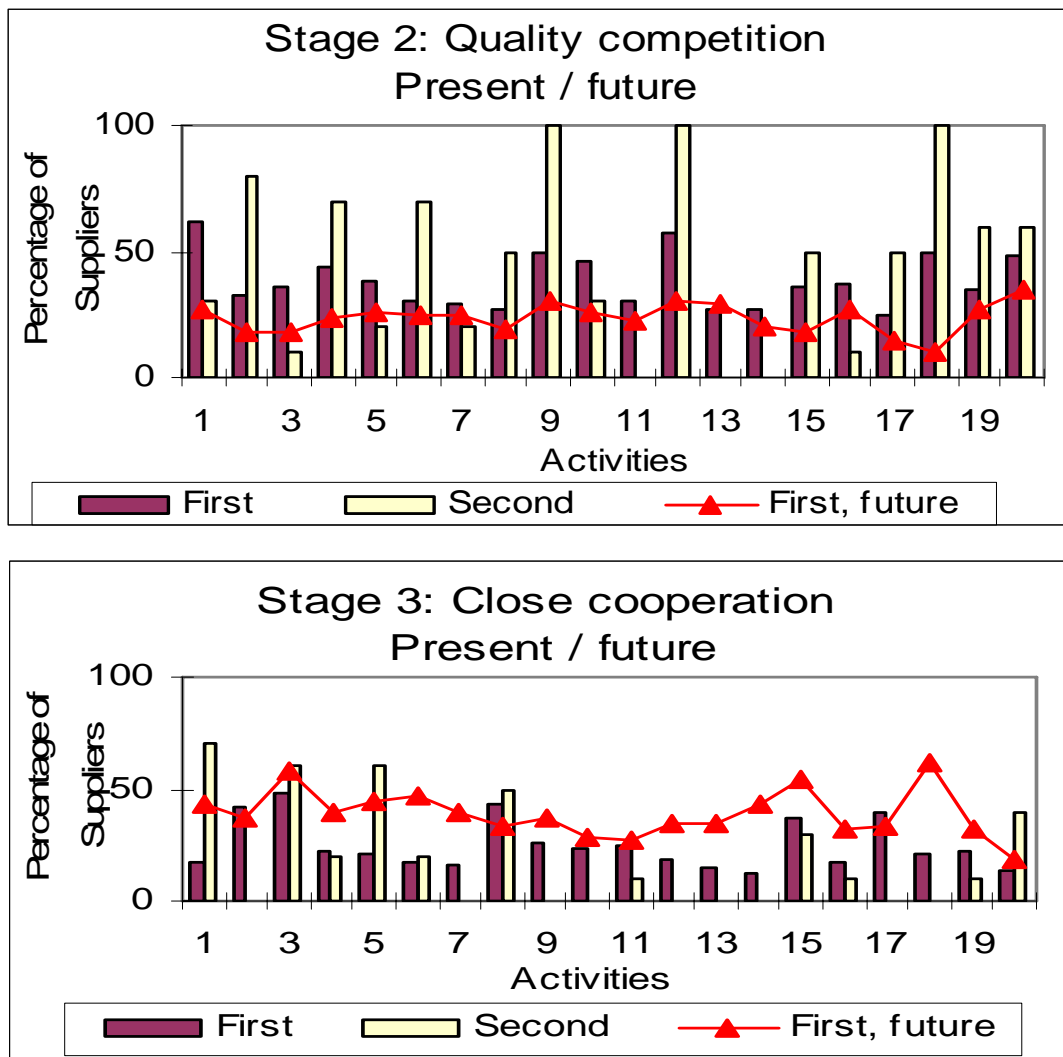


Fig. 8.7 Examples of comparison between the first and second studies

As a continuous basis the model can be seen as a measure to evaluate the success of the company in each activity as a function of time. The development in activities is achieved when the tendency of percentages in suppliers on each stage follows the trend of future target of percentages.

In the first case all four portfolio classes of suppliers were examined but in the second case only on the Classes 1 and 2 were focused, which might cause some inaccuracy. This was done because the need for development turned to be the biggest in those classes i.e. they are the most critical classes to production and costs, and it would be easier to concentrate only on fewer suppliers at a time. Also the change in the method of filling the Form may have caused some deviation to results, but in general, the progress is seen in the activities that really have been the objects of efforts in the company.

8.2.6 Conclusions of the Case 2

The focus in the second case study was in *combination of different benchmarking types* forming the whole benchmarking process in the new model. The second case study raises multiple possibilities to utilize the model. When the quantitative analyzes have once been done and the graphs are drawn, they can be used several times to find new information again and again to be used as an advantage for all the participating companies. According to the interview of the companies, the benefit of the model in comparison to previous benchmarking experiences is the *knowledge of several practices concerning each activity*. It makes it easier for the companies to *select and apply the best practices* and gives various possibilities to *solve problems and develop performance of the networks*. It also gives *perspective* concerning the own strengths and weaknesses in relation to industry in general.

The second case study gave us a possibility to make a longitudinal research of the model. According to the results, it seems to be possible to use the model both as a measure and as a means.

9 DISCUSSION AND CONCLUSIONS

9.1 Theoretical Contributions

This study constructed a model called “Group Benchmarking” which is a set of methods for companies to search for a competitive advantage for the supplier networks. The model is based on an idea of benchmarking as a learning environment, and its construction is based on the supply chain management as a theoretical framework together with the theories of knowledge management.

This field of knowledge management is popular among scientific researchers, and several theories of knowledge creation as well as knowledge transfer have been proposed during the last decade. The spiral model of knowledge creation by Nonaka and Takeuchi (1995) has been widely accepted and used as a basis for further researches. The transfer from theoretical level to practical use is still quite limited. This study mirrors the spiral model to the practical model by showing how the knowledge is created in an organization during the certain learning situations.

The learning context in the benchmarking model is on the supply chain management field because of the considerable need for relevant methods. The successful business is based on the whole supply chain instead of the separate companies. The supply chains are working efficiently as a network basis. Companies are aware of the needs but unable to find means to develop their own buyer/supplier relationships toward the functional network format. This study has constructed one, obviously functional model to be used in that context.

The contribution shown in this study is diverse. There is the way to use several theories from different fields of science together in the same model. The supply chain management and the benchmarking theories are combined creating a new justified model. The existing knowledge management is used to demonstrate how the knowledge is created in the new model. Thus the existing theories are strengthened with the new construction. The method of building supply networks is used and developed further by combining with benchmarking in order to get a useful model for companies. Without benchmarking the method gives a company targets but not the means to develop itself together with the surrounding network. The benchmarking theory is contributed by developing a benchmarking model in which the useful features of existing benchmarking types are picked up and combined into a new model: “Group Benchmarking”. As a helpful method in the model there is a boundary object. It focuses the development project into the area concerned; the supply chain management. This offers researchers new challenges to

show how the model functions on different fields of science with the help of suitable boundary object.

It is concluded that this research has contributed existing theories by combining them together in a new way and creating a new theoretical model at the same time. The combined theories; supply chain management and benchmarking reinforce each other in the ambition of developing competitiveness of supply network. In addition, it is concluded that the new model gives strong support to existing learning and knowledge creation theories while at the same time giving a new managerial tool for companies.

9.2 Practical Contributions

The practical contribution is achieved when by using the model a company learns practical, concrete means to develop its activities and is able to perform a new, better way to cooperate with its suppliers. The practical means are possible to adopt after seeing them in action in the “best practice” company and getting information about the effectiveness of them. With the help of graphs a company can determine the activities that it wants to develop and also the target stage of those activities. The focus during the benchmarking discussions is aimed at the activities to be developed with the help of graphs, too.

Literature offers empirical evidence of different benchmarking types but it is limited to the world-class companies having plenty of resources and multiple techniques to process a huge amount of data and information. The easy, effective and resource saving methods for benchmarking are still missing. The empirical contribution of this study is seen in the applicability of the new model being well focused and versatile at the same time. It does not need expensive hardware/software systems or laborious data gathering projects. It also works among the companies operating in the different industry areas, which is often a necessity because of a competing arrangement among small and medium sized companies in the same industry.

The model is general when benchmarking and knowledge creation are concerned. The limits for its application are determined by the content of the boundary object i.e. the Form. In this study the context is supply chain management and network of suppliers concerning especially small and medium sized enterprises with limited resources. Supply chain management concerns companies among different industries widely. Therefore, the model can be applied also to many other business areas.

9.3 Discussion of the Results

9.3.1 The Main Objectives

The results of the study can be divided into the following three main categories according to the objectives of the study. *The first objective* was to show that a new model for developing supply network with the help of benchmarking method can be constructed and it is feasible. The target was achieved first by examining literature of supply chain, supply chain management and benchmarking. Based on this literature, the weaknesses of existing methods in the fields were explored and a new construction was formed combining the appropriate methods of both fields. The methods of the new construction are: *ABC-classification*, *Supplier's portfolio classification*, *Strategic Supply Chain Positioning Matrix* and *Benchmarking*, which consists of four types of different benchmarking methods. The empirical case studies seemed to give an evidence of the model feasibility on two separate researches. The first one showed that the methods could be performed in the same development project forming a useful combination. The second case study proved that each of the benchmarking types in the model is possible to go through among the group of organizations and they form a workable wholeness giving benefit for all the participants in the group.

The second objective aimed at exploring the connection between the benchmarking concept and especially the new construction; Group Benchmarking and knowledge creation concept as a learning environment. Benchmarking is a method for efficient learning and to be functional, it needs to be compatible with learning theories i.e. knowledge creation. In the study the *autopoietic epistemology* was chosen being the most appropriate basis for learning in benchmarking processes. In order to explore the connection, the literature study of knowledge management was conducted. The study revealed the main principles of creating knowledge. The knowledge conversion spiral was presented as a famous theory of the field. The theory was then reflected to the new construction and the tendencies of similar processes during both operations were revealed. *The knowledge creation in Group Benchmarking happens via socialization, externalization, combination and internalization.*

The third objective was to explore network context related to supply chain management and the methods for developing buyer/supplier relationships in the context. It was more like a sub-objective to the first objective. The conceptual analysis explores the features that are relevant when supply operations are developed from chain format toward network format. In order to do that, the specific methods are needed. In this research the literature study of supply chain management includes these subjects resulting to the review of both the *relationships of*

buyer/suppliers and the developmental methods for them. In the study one of the methods for analyzing the relationships was chosen for the new construction. In addition to analyzing the relationships, the new construction offers a model for developing them further.

9.3.2 The Minor Objectives

During the study while examining the conceptual background some minor objectives for this study were realized. It seemed that there are no *general and simple methods* to apply in every buyer/supplier relationship in order to make it work as an effective partnership in which both partners benefit. It is also understandable that different suppliers need to be operated within a different way. The supplier of strategic bottleneck component is more important to a company than the supplier of ordinary volume product. In order to develop the best possible relationship with each supplier, the company needs a lot of the *right kind of information and a good insight of its own situation*.

Benchmarking is a common development method also in Finnish industry. There are experiences of companies participating benchmarking processes in which the visitors have spent a few hours in another company i.e. best practice company. They have drunk nice cups of coffee and eaten sandwiches. They have also made a tour on the plant. They have gone home and continued working in a similar way as before. They have learnt very little, if anything. This study revealed *features that seem to cause problems* in learning during benchmarking process.

- Metrics and practices are difficult to gather, combine and illustrate. Available tools and techniques are demanding.
- The gaps between present and the target are difficult to evaluate, analyze and determine. The special tools and techniques are laborious and difficult.
- The target of the better performance is set by best practice. Is it relevant and suitable for the strategy of the benchmarking company?
- Finding the appropriate best practice target is difficult. The given guideline is very ambitious and not necessarily useful.
- Knowing who is better and how much better is difficult.

The new construction considers the problems and offers solutions for them. *Practices are transformed into metrics and illustrated in the graphical format*. The measures of practices are used as *metrics* in longitudinal development projects. The *performance gaps* are determined by setting targets for development and analyzed from graphs. A company itself according to business strategies sets the *targets*. The *best practice companies* are found among the co-

operative group according to the graphs. The graphs also reveal the *superiority* of companies in the group.

It is concluded that the Form as a boundary object and the graphs drawn according to the Form *decrease essentially the general problems of benchmarking process*. Therefore, the first objective of this study, the constructed model is successful especially because it focuses on the chosen activities helping the companies get into the subject and create the needed trust to each other. It, efficiently, guides the members of the project to discuss about the right things to learn and even solve the problems together while creating new knowledge. Utilizing the experience of each other seems to be possible.

It is concluded that more and more especially small and medium sized companies with limited resources need to cooperate also in research field. To do so, they need applicable methods. The developed model may seem to be quite theoretical in nature. When introduced to people in companies, they may be a little suspicious. The most important thing is to engage the people to the project who will be most in touch with the changes that the project will cause. Fortunately, “if it ain’t invented here, it can’t be any good”, is no longer valid.

9.4 Evaluations of the Methodology

The research was both theoretical and empirical in nature. The research used both conceptual and constructive approaches as well as features of action-oriented approach. The main goal of the study was to show that a model for developing a supply network with the help of benchmarking is possible to construct and that such a construction is feasible. In this context the connection between knowledge creation and benchmarking concept was explored.

The conceptual foundation in the second part of the study was based on concepts of supply chain, its management, knowledge management, and benchmarking. By means of this conceptual foundation a new theoretical construction of Group Benchmarking was created. Moreover, the knowledge creation concept was used to show how this new theory strengthens the existing theories of knowledge management.

In hermeneutic research approach the verification of results is based on the understanding of the result of the study and the way it has been achieved so that its validity is convincing (Olkkonen, 1994). To the standard truth claims based on the correspondence theory of truth, the constructive research approach adds the theory of truth advocated by pragmatism, fundamentally arguing, “what works is true” (Lukka, 2003). Lukka (2003) adds that the test of pragmatic truthfulness is going through provided that the developed new construction is attempted to be implemented, and should be regarded as rather demanding one. It is argued that

in order to increase the probability of being practically feasible, the constructive researcher should try to make the innovated construction relevant, simple and easy to use (Kasanen et al., 1991, 1993). According to pragmatism, the validity of construction should be searched from the practical functionality of the constructions (Kasanen et al., 1991). In this research two empirical case studies were performed in order to show the workability of the construction.

9.4.1 Validity of the Research

In quantitative research the question of validity concerns often merely the choices in the use of parameters and the question of the representativeness of the sample. In qualitative research the question of validity is theoretical and varied. It is related to the locating the target group, and to the researcher's ability to create a functional setting for research. The question of validity is related to the truthfulness of the interpretation in the research. (Lukka, 2003) Kasanen et al. (1991) present two market tests for validation of the construction. The weak test sets a question about if there is a manager of a company willing to use the construction in his/her decision-making. The strong test asks whether financial results of business units have improved after using the construction. Are the financial results better in the comparable companies using the construction?

The validation of the construction according to the weak market test is evident. A company has decided to use the new construction twice in order to validate the model both as a unit case study as well as a longitudinal study. The validation according to the strong market test is difficult to make because the financial results of the development made through the construction are not measurable unambiguous. There might be many other variables causing the improvement in financial results as well as variables overturning the positive effects of the construction. However, the improvement in networking ambitions is shown in the longitudinal research.

9.4.2 Reliability of the Research

Reliability is usually considered as a concept belonging to quantitative research in which it means the capability of the research method to give non-random results. In qualitative research the term reliability refers to the reliability of processing and analyzing of the data. While writing the research report two criteria related to reliability of a qualitative research should be taken into consideration: the credibility of the analysis and the possibility for evaluation it. The possibility for evaluation of the analysis means that the reader has an opportunity to follow the researcher's reasoning process and to evaluate it. Credibility refers to the fact that after reading the report the

reader is convinced that the presented interpretations were actually done as described. (Lukka, 2003)

Also a criterion of repetitiveness has been proposed for a qualitative research. Especially in case studies the requirement of reliability is often understood as a requirement for repetitiveness of analysis. (Lukka, 2003)

In this research the reliability can be evaluated from the research itself and the case studies separately. The two above mentioned criteria of research report; credibility of the analysis and the possibility to evaluate it, are considered as well. The result of this research is a construction which is based on theoretical studies of existing literature. The construction is built stage by stage during its development. The descriptions of the separate methods of the model together with the examples of interpreting the graphs (Figures 6.3 and 6.4) are to follow the construction of the model. The examples of interpreting the graphs and discussing about their results in case studies are for analyzing the credibility of the interpretations done in the research.

Some information about the repetitiveness of the construction has been obtained while testing it twice. Although the case studies have not been identical, there have been the same unit methods used and the same kind of interpretation of analysis. This proves that the unit methods are repetitive as well as the results of qualitative measures in model are possible to transfer as quantitative measures for further analysis repeatedly. The longitudinal study is an evaluation of the consequences of the usage of the construction. Although the usage of the construction may be affected by many other things in the company and its environment as well, they are, however, consistent with the actions caused by the first case study and noticed during the second study. Therefore, we can assume that the analyses are repetitive in the construction and in the cases.

As often is the case in researching human behavior, some random mistakes may occur in understanding questions and answers, writing down the answers or saving the information to computer. In this research the understanding of the questions in Form was secured by the researcher who explained them during the examination and offered the people filling the Form an opportunity to ask when necessary.

9.5 Future research

The studied construction is mainly planned for companies in the assembly industry as a co-operative tool. Further studies may be widened to different industries, different sized companies and even bigger cooperative groups. The research so far presents a possibility to also perform longitudinal analysis of development using the model. The researcher would find it interesting to follow the tendency of companies' development with this model even for decades.

Another possibility to widen the model would be in investigating totally different industrial operation like marketing, accounting, human resources etc. Also widening the research to cover a whole supply chain would be challenging. In these cases the model needs to have a new boundary object to focus the investigation to the decided subject. Otherwise the model would follow the guidelines of Group Benchmarking process.

This study did not consider the consequences of using the model. It would be very interesting to examine how the model affects for example the productivity and/or profitability of the company using this model as a continuous basis. The follow-up of the company performance would take this model to the next level of developmental tools.

There are also possibilities to develop computer software for the new model. With the computer application it would be easier and faster to count and illustrate the data and graphics in the supply positioning matrixes.

REFERENCES

- Aadne, J. H., von Krogh, G. and Roos, J., 1996: "Representationism: the Traditional Approach to Cooperative Strategies". In *Managing Knowledge* by Von Krogh, G and Roos, J. (Eds.). London, Sage Publications Ltd. pp.9-31.
- Advanced Manufacturing Research, 1995: *The Supply Chain Primer*. Boston, MA.
- Ahmed, P. K. and Rafiq, M., 1998: "Integrated Benchmarking: a Holistic Examination of Selected Techniques for Benchmarking Analysis". *Benchmarking for Quality Management & Technology*. Vol. 5, No. 3, 225-242.
- Alstete, W. J., 1995: "Benchmarking in Higher Education: Adapting Best Practices to Improve Quality". *ASHE-ERIC, Higher Education Report* No. 5. Washington, DC, The George Washington University. pp.26-31.
- Andersen, B., Fagerhaug, T., Ranmæl, S., Schuldmaier, J. and Prenninger, J., 1999: "Benchmarking supply chain management: finding best practices". *The Journal of Business & industrial Marketing*, Vol. 14, No. 5/6, 378-389.
- Ansari, S. L. and Bell, J. E., 1997: *Target costing*. USA, Irwin Publishing.
- APQC, 1993: *Basics of Benchmarking*. American Productivity and Quality Center. Houston.
- Badaracco, J. L., 1991: *The Knowledge Link. How Firms Compete Through Strategic Alliances*. Boston, Harvard Business School Press.
- Barney, J. B., 1991: "Firm Resources and Sustained Competitive Advantage". *Journal of Management*, 17: 99-120.
- Bendell, T., Boulter, L. and Kelly, J., 1993: *Benchmarking for Competitive Advantage*. London, Pitman Publishing.
- Bhutta, K. S. and Hug, F., 1999: "Benchmarking – Best Practices: an Integrated Approach". *Benchmarking: An International Journal*. Vol. 6, No. 3, 254-268.
- Bloomberg, D. J., LeMay, S. and Hanna, J. B., 2002: *Logistics*. New Jersey, Prentice Hall.
- Bogan, C. E. and English M. J., 1994: *Benchmarking for Best Practices. Winning Through Innovative Adaptation*. New York, McGraw-Hill.
- Boxwell, R. J. Jr., 1994: *Benchmarking for Competitive Advantage*. New York, McGraw-Hill, Inc.
- Breite, R., 2003: *Managing Supply and Value Chains in a Dynamic Business Environment*. Doctoral Dissertation. Tampere, Tampere University of Technology.

- Brennan, R., 1997: "Buyer/supplier Partnering in British Industry: The Automotive and Telecommunications Sector". *Journal of Marketing Management*. Vol. 13, No. 8, 759-75.
- Brown, J. E. and Hendry, C., 1997: "Industrial Districts and Supply Chains as Vehicles for Managerial and Organizational Learning". *International Studies of Management & Organization*, White Plains. Vol. 27, No. 4, 127-58.
- Büyüközkan, G. and Maire, J., 1998: "Benchmarking process formalization and a case study". *Benchmarking for Quality Management & Technology*. Vol. 5, No. 2, 101-25.
- Camp, R., 1989: *Benchmarking: The Search for Industry Best Practices that Lead to Superior Performance*. Milwaukee, ASQ Quality Press.
- Camp, R., 1995: *Business Process Benchmarking. Finding and Implementing Best Practices*. Milwaukee, ASQ Quality Press.
- Campbell, A. J. and Wilson, D., 1996: "Managed Networks: Creating Strategic Advantage". In *Networks in Marketing* by Iacobucci, D., London, Sage, pp.125-143.
- Carpinetti, L. C. R. and de Melo, A. M., 2002: "What to Benchmark? A Systematic Approach and Cases". *Benchmarking: An International Journal*. Vol. 9, No. 3, 244-255.
- Chandra, C. and Kumar, S., 2000: "Supply Chain Management in Theory and Practice: a Passing Fad or a Fundamental Change?" *Industrial Management & Data Systems*. Vol. 100, No. 3, 100-114.
- Chase, R. B., Aquilano, N. J. and Jacobs, R., 2000: *Operations Management for Competitive Advantage*. Boston, MA, Irwin/McGraw-Hill.
- Choo, C. W., 2000. "Working with knowledge: How information professionals help organizations manage what they know". *Library Management Journal* 21(8), 395-403.
- Christopher, M., 1998: *Logistics and Supply Chain Management*. London, Financial Times, Pitman.
- Cohen, M. and Levinthal, D., 1990: "Absorptive Capacity: A Perspective on Learning and Innovation". *Administrative Science Quarterly*. Vol. 35, 128-52.
- Coffin, K., Szejcowski, M. and New, C., 1997: "Managing Suppliers: When Fewer can Mean More". *International Journal of Physical Distribution & Logistics Management*. Vol. 27, No. 7-8, 422-7.
- Copacino, W. C. 1997: *Supply Chain Management: The Basics and Beyond*. Boca Raton, FL, St. Lucie Press.

- Copacino, W. C., 1996: "Why You Should Synchronize Logistics and Manufacturing". *Logistics Management*. Vol. 35, No. 11, 63.
- Cox, J. F., Blackstone, J. H. and Spencer, M. S. (Eds), 1995: *APICS Dictionary, American Production and Inventory Control Society*. VA, Falls Church.
- Cox, A., 1996: "Relational Competence and Strategic Procurement Management. Towards and Entrepreneurial and Contractual Theory of the Firm". *European Journal of Purchasing & Supply Management*. Vol. 2, No. 1, 57-70.
- Cox, A. 1997: *Business Success*. Boston, UK, Earlsgate Press.
- Cox, A. and Thompson, I., 1998: "On the Appropriateness of Benchmarking". *Journal of General Management*. Vol. 23, No. 3, 1-20.
- Cox, A., 1999: "A Research Agenda for Supply Chain and Business Management Thinking". *Supply Chain Management: An International Journal*. Vol. 4, No. 4, 209-212.
- Cox, A., 2001: "Effective Outsourcing and Supply Chain Management". *Global Purchasing and Supply Strategies*. London, pp.105-107.
- Coyle, J. J. and Langley, C. J., 1996: *The Management of Business Logistics*. St Paul, MN, West Publishing Company.
- Cravens, D. W., Piercy, N. F. and Shipp, S. H., 1996: "New Organizational Forms for Competing in Highly Dynamic Environments; the Network Paradigm". *British Journal of Management*, Vol. 7, 203-18.
- Crossan, M. M. and Inkpen, A. C., 1992: *Believing is Seeing: an Exploration of the Organizational Learning Concept and Evidence from the Case of Joint Venture Learning*. Working Paper. Western Business School. Canada, The University of Western Ontario.
- Daft, R. L. and Weick, K. E., 1984: "Towards a Model of Organizations as Interpretative Systems". *Academy of Management Review*. Vol. 9, No. 2, 284-95.
- Davis, T., 1993: "Effective Supply Chain Management". *Sloan Management Review*, 35-46.
- Deming, W. E., 2000: *Out of the Crisis*. Cambridge, MIT Press.
- Dion, P., Banting, P., Picard, S and Blenkhorn, D., 1992: "JIT Implementation: a Growth Opportunity for Purchasing". *International Journal of Purchasing and Materials Management*, Vol. 28, No. 4, 33.
- Drucker, P. F., 1993: *Post-Capitalist Society*. Oxford, Butterworth Heinemann.
- Duclos, L. K., Vokurka, R. J. and Lummus, R. R., 2003: "A Conceptual Model of Supply Chain Flexibility". *Industrial Management & Data Systems*. Vol. 103, No. 6, 446-456.

- Ellram, L. M., 1991: "A Managerial Guideline for the Development and Implementation of Purchasing Partnerships". *International Journal of Purchasing and Materials Management*. Summer, 10-16.
- Ellram, L. and Cooper, M., 1993: "Characteristics of Supply Chain Management and the Implications for Purchasing and Logistics Strategy". *International Journal of Logistics Management*. Vol. 2, No. 2, 1-10.
- Ellram, L. M., 1995: "Partnering Pitfalls and Success Factors". *International Journal of Purchasing and Materials Management*, 33-44.
- Ellram, L. M. and Hendrick, T. E., 1995: "Partnering Characteristics: a Dyadic Perspective". *Journal of Business Logistics*. Vol. 16, No. 1, 41-64.
- Fitz-enz, J., 1993: "How to Make Benchmarking Work for You". *HRMagazine*, Vol. 38, No. 12, 40-6.
- Fong, S. W., Cheng, E. W. L and Ho, D. C. K., 1998: "Benchmarking: a General Reading for Management Practitioners". *Management Decision*. Vol. 36, No. 6, 407-418.
- Forsyth, G., 2001: "Collaboration is Coming - Just not Overnight". *American Shipper*. Vol. 43, No. 3, 36-8.
- Fretty, P. 2001: "Partnering Pays". *Industrial Distribution*, Vol. 90, No. 5, 13.
- Friedlander, F. 1983: "Patterns of Individual and Organizational Learning". In *The Executive Mind: New Insights on Managerial Thought and Action* by Shrivastava, S. and Associates (Eds.). San Francisco, Jossey-Bass, pp.192-220.
- Gentry, J. J., 1996: "Carrier Involvement in Buyer-supplier Strategic Partnerships". *International Journal of Physical Distribution & Logistics Management*. Vol. 26, No. 3, 14-25.
- Goh, S. C., 2002: "Managing Effective Knowledge Transfer: an Integrative Framework and Some Practice Implications". *Journal of Knowledge Management*. Vol. 6, No. 1, 23-30.
- Grandori, A. and Soda, G., 1995: "Inter-firm Networks: Antecedents, Mechanisms and Forms". *Organization Studies*. Vol. 16, No. 2, 183-214.
- Gulati, R., 1995: "Does Familiarity Breed Trust? The Implications of Repeated Ties of Contractual Choice in Alliances". *Academy of Management Journal*. Vol. 38, 85-112.
- Gummesson, E., 2000: *Qualitative Methods in Management Research*. California, Sage Publications.

- Hahn, C., Watts, C. and Kim, K., 1990: "The Supplier Development Program: a Conceptual Model". *Journal of Purchasing and Materials Management*. Vol. 26. No. 2, 2-7.
- Hamel, G., 1991: "Competition for Competence and Interpartner Learning Within International Strategic Alliances". *Strategic Management Journal*. Vol. 12, 83-104.
- Hamel, G. and Prahalad, C. K., 1994: *Competing for the future*. Cambridge, Harvard Business School Press.
- Hamel, G., 2000: *Leading the Revolution*. Harvard Business School Press, Boston, MA.
- Handfield, R. B. and Nichols, jr. E. L., 1999: *Introduction to Supply Chain Management*. New Jersey, Prentice Hall.
- Hannus, J., 1994: *Prosessijohtaminen. Ydinprosessien uudistaminen ja yrityksen suorituskyky*. Jyväskylä, Gummerus.
- Harland, C. M., 1996: "Supply Chain Management: Relationships, Chains and Networks". *British Journal of Management*. Vol.7, 63-80.
- Harland, C. M. and Clark, J., 1990: "Effectiveness Framework for Supply Chain Management". *Computer Integrated Manufacturing Systems*. Vol. 3, No. 4, 196-207.
- Hill, T., 1995: *Manufacturing strategy*. London, Macmillan.
- Hines, P., 1994: *Creating World Class Suppliers. Unlocking Mutual Competitive Advantage*. London, Pitman Publishing.
- Hines, P., 1996: "Network Sourcing. A Discussion of Causality Within the Buyer-supplier Relationship". *European Journal of Purchasing & Supply Management*. Vol. 2, No.1, 7-20.
- Hinterhuber, H. H. and Levin, B. M., 1994: "Strategic Networks – the Organization of the Future". *Long Range Planning*. Vol. 27, No. 3. 43-53.
- Holma, A., Lappalainen, K. and Pilkevaara, S., 1997: *Näkymätön näkyväksi – tieto, osaaminen ja Knowledge Management*. (From Invisible to Visible – Knowledge, Know-how and Knowledge Management). Espoo, Helsinki University of Technology.
- Hotanen, J., Laine, R. O. and Pietiläinen, S., 2001: *Benchmarking-opas. Opi hyviltä esikuvilta*. Helsinki, Suomen Laatu keskus Koulutuspalvelut Oy.
- Houlihan, J. B., 1984: "Supply Chain Management". In *Proceedings of the 19th International Technical Conference*, BPICS, 101-10.
- Huber, G. P. 1991: "Organizational Learning: the Contributing Processes and the Literatures". *Organization Science*, Vol. 2, No.1, 88-115.
- Hughes, J., Ralf, M. and Michels, B., 1998: *Transform Your Supply Chain: Releasing Value in Business*. UK, International Thomson Business Press.

- Ichijo, K., von Krogh, G. and Nonaka, I., 1998: "Knowledge Enablers". In *Knowing in Firms. Understanding, Managing and Measuring Knowledge* by von Krogh, G, Roos, J. and Kleine, D. (Eds.), London, Sage Publications Ltd, pp.173-203.
- Jackson, N. J., 1998: "Benchmarking Assessment Practice in UK HE: a Commentary". In *Pilot Studies in Benchmarking Assessment Practice in UK Higher Education* by Jackson N.J. (Ed.), Gloucester, Quality Assurance Agency.
- Jackson, N. and Lund, H., 2000a: "Introduction to Benchmarking". In *Benchmarking for Higher Education* by Jackson, N. and Lund, H. (Eds.), Buckingham, Society for Research into Higher education & Open University Press.
- Jackson, N. J. and Lund, H., 2000b: "Benchmarking for Higher Education: Taking Stock". In *Benchmarking for Higher Education* by Jackson, N.J. and Lund, H., Buckingham, Open University Press.
- Jackson, N. J., 2001: "Benchmarking in UK HE: an Overview". *Quality Assurance in Education*. Vol. 9, No. 4, 218-235.
- Karlöf, B., 1995: *Johtamisen käsitteet ja mallit*. Ekonomia-sarja, Porvoo, WSOY.
- Kandelin, N., 2001: *Hankintatoiminnan kehittäminen kokoonpanoteollisuudessa* (Developing the Procurement Function in the Assembling Industry). Master of Science Thesis. Pori, Tampere University of Technology.
- Karrus, K. E., 2001: *Logistiikka*, Helsinki, WSOY.
- Kasanen, E., Lukka, K. and Siitonen, A., 1991: "Konstrukttiivinen tutkimusote liiketaloustieteessä". *Liiketaloudellinen Aikakauskirja*, No. 3, 301-329.
- Kasanen, E., Lukka, K. and Siitonen, A., 1993: "The constructive Approach in Management Accounting Research". *Journal of Management Accounting Research*. Vol. 5, 241-264.
- Keller, E. L. 1995: *Creating Concurrent Business Processes across the Supply Chain*. Stamford, CT, Gartner Group.
- Kerns, C. D., 2000: "Strengthen Your Business Partnership: a Framework and Application". *Business Horizons*. Vol. 43, No. 4, 17-22.
- Kleemola, A., 2000: *Toimittajaverkoston kehittäminen keittiökalusteteollisuudessa* (Developing of Supplier Network in the Industry of Kitchen Furniture). Master of Science Thesis. Pori, Tampere University of Technology.
- Kleemola, A. and Vanharanta, H. 2001: "A New Method for Developing Networks through Benchmarking". In *Proceedings of ISPIM Conference*, Lappeenranta.

- Kleemola, A., Kandelin, N. and Vanharanta, H., 2002: "Group Benchmarking – A Methodology toward More Effective Supply Networking". In *Proceedings of IPSERA Conference*, The Netherlands.
- Kleemola, A., 2002a: "Developing Supply Networks Through Group Benchmarking – How to Find the Best Practices". In *Proceeding of Working Seminar on Production Economics*, Austria.
- Kleemola, A. 2002b: "Managing Networks through Continuous Group Benchmarking". In *Proceedings of EURAM Conference*, Stockholm.
- Kleemola, A. and Koskinen, K.U., 2003a: "Creating and Transferring Knowledge in Purchasing Organizations". In *Proceedings of 12th Annual IPSERA Conference*, Budapest.
- Kleemola, A. and Koskinen, K.U.: 2003b: "The Group Benchmarking Method as a New Tool in the Competence Transfer Process between Technology Companies". In *Proceedings of EUROMA 10th International Annual Conference*, Como Lake.
- Kogut, B., 1988: "Joint Ventures: Theoretical and Empirical Perspectives". *Strategic Management Review*. Vol. 9, 319-32.
- Koskinen, K. U., 2001: *Management of Tacit Knowledge in a Project Work Context*. Doctoral Dissertation. Espoo, Tampere University of Technology.
- Koskinen, K. U., 2003: "The Role of Boundary Objects in Tacit Knowledge Communication". In *Proceedings of 3rd International Conference on Researching Work and Learning*, Tampere.
- Koskinen, K. U. and Pihlanto, P., 2003: "Trust in a Project Work Context". In *Proceedings of Project management: dreams, nightmares and realities*. Nordnet 2003, Oslo.
- Kuitunen, K., Räsänen, P., Mikkola, M. and Kuivanen, R., 1999: *Kehittyvä yritysverkosto. Toimittajaverkostot kilpailukyvyyn ja osaamisen lähteenä*. Tiedotteita 1976, Espoo, VTT.
- Kraljic, P., 1983: "Purchasing must become Supply Management". *Harvard Business Review*, September/October, 109-117.
- Lamming, R., 1993: *Beyond Partnership: Strategies for Innovation and Lean Supply*. New Jersey, Prentice Hall.
- Lamming, R., Johnsen, T., Zeng, J. and Harland, C., 2000: "An Initial Classification of Supply Networks". *International Journal of Operations & Production Management*. Vol. 20, No. 6, 675-691.

- Landeros, R, Reck, R. and Plank, R. E., 1995: "Maintaining Buyer-supplier Partnerships". *International Journal of Purchasing and Materials Management*. Vol. 31, No. 3, 3-11.
- Lee, H. and Billington, C., 1992: "Managing Supply Chain Inventories: Pitfalls and Opportunities". *Sloan Management review*, 65-73.
- Lehtinen, U., 2001: *Changing Subcontracting. A Study on the Evolution of Supply Chains*. Doctoral Dissertation. Oulu, University of Oulu.
- Lemke, F., Goffin, K. and Szejczewski, M., 2003: "Investigating the Meaning of Supplier-manufacturer Partnership". *International Journal of Physical Distribution & Logistics Management*. Vol. 33, No. 1, 12-35.
- Lewicki, R. J., McAllister, D. J. and Bies, R. J., 1998: "Trust and Distrust: New Relationships and Realities". *Academy of Management Review*. Vol. 23, No. 3, 438-59.
- Lindsay, P. H. and Norman, D. A., 1977: *Human Information Processing*. Orlando, Academic Press.
- Lukka, K. and Tuomela, T-S., 1998: "Testattuja ratkaisuja liikkeenjohdollisiin ongelmiin: konstrukttiivinen tutkimusote". *Yritystalous*, No. 4, 1998, 23-29.
- Lukka, K., 2000: "The Key Issues of Applying the Constructive Approach to Field Research". In *Management Expertise for the New Millenium* by Reponen, T. (Ed), 2000. In Commemoration of the 50th Anniversary of the Turku School of Economics and Business Administration. Publications of the Turku School of Economics and Business Administration, A-1:2000, 113-128.
- Lukka, K., 2003: "The Constructive Research Approach".
<http://www.metodix.com/showres.dll/en/enindex>. 14.10.2003.
- Lummus, R. R. and Alber, K. L., 1997: *Supply Chain Management: Balancing the Supply Chain with Customer Demand*. The Educational and Resource Foundation of APICS, VA, Falls Church.
- Lummus, R. R. and Vokurka, R. J., 1999: "Defining Supply Chain Management: a Historical Perspective and Practical Guidelines". *Industrial Management & Data Systems*. Vol. 99, No. 1, 11-17.
- Lyles, M., von Krogh, G. and Roos, J., 1996: "The Impact of Individual and Organizational Learning on Formation and Management of Organizational Cooperation". In *Managing Knowledge* by Von Krogh, G and Roos, J. (Eds.). London, Sage Publications Ltd., pp.82-99.

- MacBeth, D., Baxter, L., Neil, G. C. and Baxter, L. F., 1989: "Not Purchasing but Supply Chain Management". *Purchasing and Supply Management*, Nov., 30-2.
- Marchand, D. A., 1998: "Competing with Intellectual Capital". In *Knowing in Firms. Understanding, Managing and Measuring Knowledge* by von Krogh, G, Roos, J. and Kleine, D. (Eds.). London, Sage Publications Ltd., pp.253-268.
- Matthews, P., 1998: "What Lies Beyond Knowledge Management: Wisdom Creation and Versatility". *Journal of Knowledge Management*. Vol. 1. No. 3, 207-214.
- Maturana, H. and Varela, F. J., 1992: *The tree of Knowledge*. Boston, MA, Shambhala.
- McHugh, P. Merli, G. and Wheeler III, W. A., 1995: *Beyond Business Process Reengineering. Towards the Holonic Enterprise*. New York, Wiley.
- Monczka, R. M. and Morgan, J., 1997: "What's Wrong with Supply Chain Management?" *Purchasing*. Vol. 122, No. 1, 69-73.
- Morgan, G., 1986: *Images of Organization*. Beverly Hills, CA, Sage.
- Morgan, R. M. and Hunt, S. D., 1994: "The Commitment-trust Theory of Relationship Marketing". *Journal of Marketing*. Vol. 59, No. 3, 20-38.
- Neilimo, K. and Näsi, J., 1980: *Nomoteettinen tutkimusote ja suomalainen yrityksen taloustiede. Tutkimus positivismiin soveltamisesta*. Tampereen Yliopisto, Yrityksen taloustieteen ja yksityisoikeuden laitoksen julkaisuja, A: 2-12).
- Nickols, F., 2000: *The Knowledge in Knowledge Management*. In *The Knowledge Management Yearbook 2000-2001* by Cortada J.W. and Woods, J.A. (Eds.). Oxford, Butterworth-Heinenmann.
- Nonaka, I., 1991: "The Knowledge-creating Company". *Harvard Business Review*, November-December, 96-104.
- Nonaka, I., 1994: "A Dynamic Theory of Organizational Knowledge Creation". *Organization Science*, 5:23-34.
- Nonaka, I. and Takeuchi, H., 1995: *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. New York, Oxford University Press.
- Nonaka, I., Umemoto, K. and Sasaki, K., 1998: "Three Tales of Knowledge-Creating Companies. In *Knowledge in Firms. Understanding, Managing and Measuring Knowledge* by von Krogh, G, Roos, J. and Kleine, D. (Eds.) London, Sage Publications Ltd., pp.146-172.

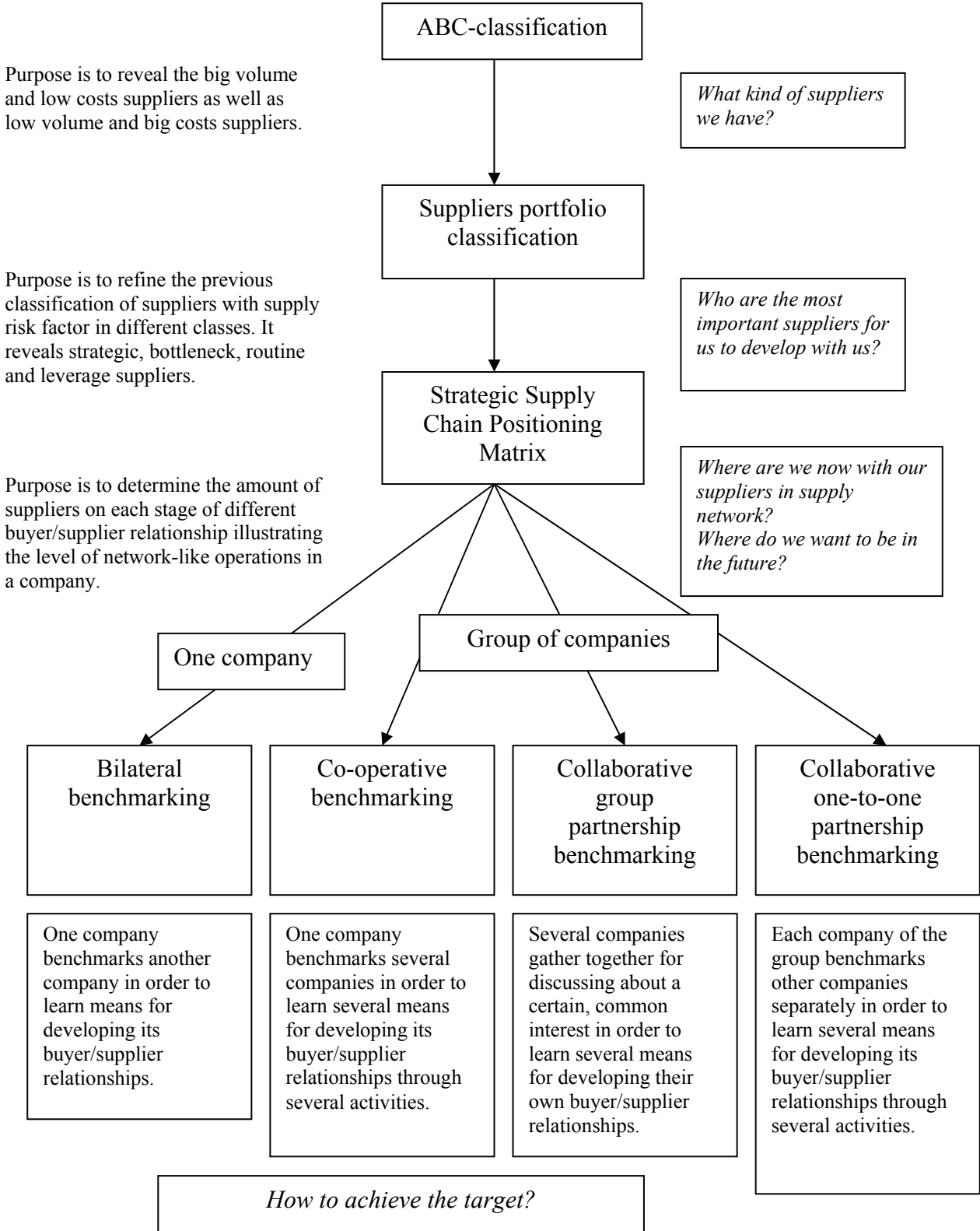
- Nonaka, I., Reinmoeller, P. and Senoo, D., 2000: "Integrated IT Systems to Capitalize on Market Knowledge". In *Knowledge Creation. A Source of Value* by von Krogh, G., Nonaka, I. and Nishiguchi, T. (Eds.). New York, Palgrave, pp.89-109.
- Oliver, R. K. and Webber, M. D., 1992: "Supply Chain Management : Logistics Catches up with Strategy". In *Logistics: The Strategic Issues* by Christopher, M.G., London, Chapman & Hall, 63-75.
- Olkkonen, T., 1994: *Johdatus teollisuustalouden tutkimustyöhön*. Espoo, Teknillinen Korkeakoulu, Tuotantotalouden laitos.
- Partovi, F. Y., 1994: "Determining What to Benchmark an Analytic Hierarchy Process Approach". *International Journal of Operations & Production Management*. Vol. 14, No. 6, 25-39.
- Pihlanto, P., 2002: "Rationaalisen toimijan oletus, subjektivismi ja konstrukttiivinen tutkimusote". In *Eero Kasanen 50 vuotta. Opinnäytekerhon onnittelet* by Malaska, P. (Ed.). Publications of the Turku School of Economics and Business Administration. C-1:2002, 49-70.
- Poirier, C. C. and Reiter, S. E., 1996: *Supply Chain Optimization*. San Francisco, CA, Berrett-Koehler Publisher.
- Polanyi, M., 1966: *The Tacit Dimension*. New York, Doubleday & Co.
- Porter, M., 1980: *Competitive strategy*. New York, The Free Press.
- Porter, M. E., 1985: *Competitive Advantage. Creating and Sustaining Superior Performance*. New York, The Free Press.
- Quinn, F. J., 1997: "What's the Buzz?" *Logistics Management*, Vol. 36, No. 2, 43-47.
- Rackham, N., 2001: "The Pitfalls of Partnering. *Sales & Marketing Management*. Vol. 153, No. 4, 32.
- Ralston, D., Wright, A. and Kumar, J. 2001: "Process Benchmarking as a Market Research Tool for Strategic Planning". *Marketing Intelligence and Planning*. 19/4, 273-281.
- Reider, R., 2000: *Benchmarking Strategies: A Tool for Profit Improvement*. New York, Wiley.
- Robertson, P. L. and Langlois R. N., 1995: "Innovation, Networks, and Vertical Integration". *Research Policy*. Vol. 24, 543-62.
- Rosenfeld, S. A., 1996: "Does Cooperation Enhance Competitiveness? Assessing the Impacts of Inter-firm Collaboration". *Research Policy*. Vol. 25, No. 2, 247-63.
- Sadler, I. and Hines, P., 2002: "Strategic Operations Planning Process for Manufacturers with a Supply Chain Focus: Concepts and a Meat Processing Application". *Supply Chain Management: An International Journal*. Vol. 7, No. 4, 225-241.

- Sakki, J., 1999: *Logistinen prosessi. Tilaus-toimitusketjun hallinta*. Jouni Sakki Oy, Espoo.
- Sako, M., 1992: *Prices, Quality and Trust. Inter-firm Relations in Britain and Japan*. UK, Cambridge University Press.
- Saunders, M., 1997: *Strategic purchasing and supply chain management*. London, Pitman.
- Scharmer, C. O., 2000: "Organizing Around Not-Yet-Embodied Knowledge". In *Knowledge Creation. A Source of Value* by von Krogh, G., Nonaka, I. and Nishciguchi, T. (Eds.). Hampshire, Palgrave, pp.36-60.
- Schofield, A. (Ed.), 1998: *Benchmarking in Higher Education: An International Review*. London, CHEMS and Paris, UNESCO.
- Schüppel, J., Müller-Stevens, G. and Gomez, P., 1998: "The Knowledge Spiral. Knowing in Firms". In *Knowing in Firms. Understanding, Managing and Measuring Knowledge* by von Krogh, G, Roos, J. and Kleine, D. (Eds.). London, Sage Publications Ltd., pp.223-239.
- Shewhart, W. A., 1986: *Statistical Method from the Viewpoint of Quality Control*. Edited and with a new foreword by Deming, E. W., New York, Dover.
- Senge, P. M., 1990: *The Fifth Discipline: The Art and Practice of the Learning Organization*. London, Century Business.
- Seufert, A., von Krogh, G. and Bach, A., 1999: "Toward Knowledge Networking". *Journal of Knowledge Management*. Vol. 3, No. 3, 180-190.
- Snow, C. C., Miles, R. E. and Coleman, H. J. Jr., 1992: "Managing 21st Century Network Organizations". *Organizational Dynamics*. (Winter), 5-20.
- Spekman, R. E., 1988: "Strategic Supplier Selection: Understanding Long-Term Buyer Relationships". *Business Horizons*. July-August, 75-81.
- Spekman, R. E., Kamauff; J. W. and Myhr, N., 1998: "An Empirical Investigation into Supply Chain Management: a Perspective on Partnerships". *Supply Chain Management*. Vol. 3, No. 2, 53-67.
- Spekman, R. E., Spear, J. and Kamauff, J., 2002: "Supply Chain Competency: Learning as a Key Component". *Supply Chain Management: An International Journal*. Vol. 7, No. 1, 41-55.
- Spendolini, M. J., 1992: *The Benchmarking Book*. New York, Amacon.
- Star, S. L. and Griesemer, J. R., 1989: "Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39". *Social Studies of Science*. Vol. 19, 387-420.

- Star, S. L., 1989: "The structure of Ill-structured Solutions: Boundary Objects and Heterogeneous Distributed Problem Solving". In *Readings in Distributed Artificial Intelligence 3* by Huhs, M. and Gasser, L. (Eds.) Morgan Kaufman, Menlo Park, 37-53.
- Sullivan, L. P., 1986: "Quality Function Deployment". *Quality Progress*. Vol. 19, No. 6, 39-50.
- Swaminathan, J. M., Smith, S. F. and Sadeh, N. M., 1996: "A Multi-agent Framework for Modelling Supply Chain Dynamics". In *Proceedings of the Artificial Intelligence and Manufacturing Research Planning Workshop*, Albuquerque, NM. 210-18.
- The Supply Chain Council, 1997. <http://www.supply-chain.com/info/faq.html>.
- The Supply Chain Council, 2005: <http://supply-chain.org/public/home.asp>
- Tissen, R., Andriessen, D. and Deprez, F.L., 2000. *The Knowledge Dividend. Creating high-performance companies through value-based knowledge management*. Great Britain, Prentice Hall.
- Tuimala, J., Torkkeli, M., Virolainen, V-M. and Tuominen, M., 2000: "AHP Supported Purchasing Process Benchmarking". In *Proceedings of the Ninth International Annual IPSERA Conference*, Kanada.
- Tuominen, K., 1993: *Benchmarking – yhteenveto yritysjohdolle*. Tampere, Metalliteollisuuden kustannus Oy.
- Tuominen, K., 1997: *Muutoshallinnan mestari. Kuinka toteuttaa strategiset suunnitelmat kilpailijoita nopeammin?* Helsinki, Suomen laatuyhdistys ry..
- Turbide, D., 1997: "The New World of Procurement". *Midrange ERP*, 12-16.
- van Weele, A., 2002: *Purchasing and Supply Chain Management. Analysis, Planning and Practice*. London, Thomson Learning.
- Vaziri, H. K., 1992: "Using Competitive Benchmarking to Set Goals". *Quality Progress*. 81-5.
- Vicari, S., von Krogh, G., Roos, J. and Mahnke, V., 1996: "Knowledge Creation through Cooperative Experimentation". In *Managing Knowledge* by Von Krogh, G and Roos, J. (Eds.). London, Sage Publications Ltd., pp.185-202.
- Vicari, S. and Troilo, G., 2000: "Organizational Creativity: A New Perspective from Cognitive Systems Theory". In *Knowledge Creation. A Source of Value* by von Krogh, G., Nonaka, I. and Nischiguchi, T. (Eds.). New York, Palgrave, pp.63-88.
- Virolainen, V-M., 1998: *Motives, Circumstances, and Success Factors in Partnership Sourcing*. Doctoral Dissertation. Lappeenranta University of Technology.
- von Krogh, G. and Roos, J. (Eds.), 1995: *Organizational epistemology*. London, MacMillan.

- von Krogh, G. and Roos, J. (Eds.), 1996: *Managing Knowledge: Perspectives on Cooperation and competition*. London, Sage.
- Walker, G., 1985: "Network Position and Cognition in a Computer Software Firm". *Administrative Science Quarterly*. Vol. 30, 103-30.
- Watson, G. H., 1993: *Strategic Benchmarking: How to Rate Your Company's Performance against the World's Best*. New York, John Wiley and Sons Inc.
- Webster's Ninth New Collegiate Dictionary. 1991. Massachusetts, USA, Merriam-Webster Inc.
- Womack, J. P., Jones, D. T. and Roos, D., 1990: *The machine that changed the world*. New York, Rawson Associates.
- Womack, J. P. and Jones, D. T., 1994: "From Lean Production to the Lean Enterprise". *Harvard Business Review*. Vol. 72, 93-103.
- Womack, J. P. and Jones, D. T., 1996: *Lean Thinking: Banish Waste and Create Wealth in your Corporation*. New York, Simon & Schuster.
- Vonderembse, M. A. and White, G. P., 1996: *Operations Management. Concepts, Methods, and Strategies*. USA, West Publishing Company.
- Yasin, M. M., 2002: "The Theory and Practice of Benchmarking: Then and Now". *Benchmarking: An International Journal*. Vol. 9, No. 3, 217-233.
- Zairi, M., 1994: "Benchmarking: The Best Tool for Measuring Competitiveness". *Benchmarking for Quality Management & Technology*. Vol. 01, No. 1, 11-24.
- Zeng, J., Harland, C., Johnsen, T. and Lamming, R., 1999: "Initial Conceptual Framework for Creation and Operation of Supply Networks". In *Proceedings of IMP 14*. Annual Conference, Turku.
- Zeng, J., Johnsen T. E., Harland C. R. and Lamming, R. C., 2001: "A Taxometry of Supply Networks". In *Proceedings of the 10th International Annual IPSERA Conference*, Sweden.

The Group Benchmarking methodology



Source of the first column: Hines, 1994, p. 228-229

Impact on Supplier	Percentage of suppliers at present	Percentage of suppliers in future (target value)
1. Buying criteria <ol style="list-style-type: none"> 1. Lowest price 2. Lowest cost 3. Maximum mutual benefit 4. Maximum network benefit 		
2. Purpose of supplier <ol style="list-style-type: none"> 1. To supply goods the customer does not make 2. To supply goods the customer cannot make 3. To provide possible benefits & advantages 4. To provide mutual competitive advantage 		
3. Relationship type and length <ol style="list-style-type: none"> 1. Adversarial/short 2. Arms length/variable 3. Close/long 4. Strategic/lifetime 		
4. Customer involvement in supplier activities <ol style="list-style-type: none"> 1. Little or none, from purchasing 2. Sporadic, by purchasing and/or quality 3. Frequent from many functions 4. Often from many process improvement teams 		
5. Interaction with suppliers <ol style="list-style-type: none"> 1. One off or infrequently 2. Annual negotiation or quality audit 3. Frequent problem solving activities 4. Often seeking areas of competitive advantage 		
6. Overall relationship description <ol style="list-style-type: none"> 1. Traditional/reactive 2. Developing/reactive or proactive 3. Progressive/proactive 4. Network/interactive 		
7. Quality requirements <ol style="list-style-type: none"> 1. Minimal or none 2. Quality control 3. Quality assurance/TQM 4. TQM spread to own suppliers 		

<p>8. Delivery requirements</p> <ol style="list-style-type: none"> 1. Minimal 2. Timely 3. Pseudo JIT 4. True JIT spread to own suppliers 		
<p>9. Cost requirements</p> <ol style="list-style-type: none"> 1. Lowest price by tender 2. Lowest cost by negotiation 3. Stable/non inflationary 4. Target costing/Kaizen reductions 		
<p>10. Design requirements</p> <ol style="list-style-type: none"> 1. None 2. Limited (customer designs) 3. Design ability with customer 4. Integrated design with customer and suppliers 		
<p>11. Technological requirements</p> <ol style="list-style-type: none"> 1. None 2. Limited (customer technology) 3. High with joint sharing with customer 4. Essential with joint sharing with customer and suppliers 		
<p>12. Coordination by customer</p> <ol style="list-style-type: none"> 1. None 2. By occasional one-to-one meeting or standard letters 3. Yearly supplier conferences 4. Kyoryoku Kai (cascading down tiers) 		
<p>13. Development by customer</p> <ol style="list-style-type: none"> 1. None 2. Quality control instructions/audit feedback 3. One-to-one consultancy/audit problem solving 4. One-to-one and group activities with Kyoryoku Kai 		
<p>14. Reliance on grading</p> <ol style="list-style-type: none"> 1. None 2. Some reliance on reactive scores 3. Heavy reliance of reactive and predictive scores 4. Some reliance particularly on predictive scores 		

<p>15. Data interchange</p> <ol style="list-style-type: none"> 1. Little/infrequent at operational level only 2. Limited/sporadic at operational level only 3. Detailed and frequent at operational level, occasional at strategic level 4. Detailed and frequent at strategic and operational levels 		
<p>16. Cost transparency</p> <ol style="list-style-type: none"> 1. None 2. Occasional but very limited 3. Transparent at highest tier buyer – supplier level 4. Transparent throughout supplier network 		
<p>17. Level of pressure</p> <ol style="list-style-type: none"> 1. Low/medium 2. Medium/high 3. Very high 4. Very high and transmitted to own suppliers 		
<p>18. Number of suppliers</p> <ol style="list-style-type: none"> 1. Very high and unstable 2. High and relatively stable 3. Low and very stable 4. Very low and very stable 		
<p>19. Asset specificity</p> <ol style="list-style-type: none"> 1. None/very low 2. Low/medium 3. High 4. Very high and high/very high with own suppliers 		
<p>20. Tiering structure</p> <ol style="list-style-type: none"> 1. None 2. Flat pyramidal 3. Steep pyramidal 4. Network format 		

Tampereen teknillinen yliopisto
PL 527
33101 Tampere

Tampere University of Technology
P.O. Box 527
FIN-33101 Tampere, Finland