How Collaborative Logistics Management Increases Supply Chain Efficiency

Nazila Kaveh
Navid Khosravi Samani
How Collaborative Logistics Management Increases Supply Chain Efficiency

Nazila Kaveh, nazila_1054@yahoo.com
Navid Khosravi Samani, nkh.samani@gmail.com

Master thesis
Subject Category: Technology – Industrial Management

University College of Borås
School of Engineering
SE-501 90 BORÅS
Telephone +46 033 435 4640

Examiner: Håkan Torstensson
Supervisor, name: Håkan Torstensson
Supervisor, address: University of Borås

Client: University of Borås
Date: June 2009
Keywords: Supply chain, Logistics, Collaboration, complexity, Innovation
It is our pleasure to acknowledge all those who helped us during the writing of this thesis. First of all, we would like to express our appreciation to Professor Håkan Torstensson, our supervisor, for his continuous guidance and support during our research work. We also want to send our deepest thanks to Daniel Ekwall who has taken time to read the thesis and for his valuable opinions during the writing process.

We would also like to express our gratitude towards Abbas, Ali, and Arshuan for their great help on editing the thesis. Our appreciation also goes to Hans Karlsson, who has participated in the case study.

Finally we would like to dedicate this thesis to our parents, given that without their support, we would have never made it this far. They have always been a source of love and encouragement. You showed us the real face of parenthood and your kindness and gentleness cannot be compensated by anything in the world.

Borås, June 2009

Nazila Kaveh
Navid Samani
Abstract

Globalization, rapid technological change, shorter product life cycles, changing customer preferences, and hyper competition are just some characteristics of today’s business environment. As a result, organizations have become aware of the fact that working alone is almost impossible. Therefore, they began to understand that building relationships are keys to a successful business. In fact, as the business processes become more specialized, organizations prefer to focus on their core competencies and outsourcing becomes a relevant strategy. Consequently parts of the value adding processes are displaced outside the four walls of the firm which in turn, need a closer partnership (collaboration) between the partners.

In today’s world logistics which includes transportation, inventory, order processing, purchasing, warehousing, materials handling, packaging, and much more, must continuously be developed to meet those described challenges. In fact, an effective logistics system is a must in order to meet and satisfy the customer demand. These developments require a considerable effort and significant capital. Accordingly, outsourcing the logistics activities become common and many companies leave these tasks to those who have available resources and are competent to perform them. However, as mentioned, outsourcing without cooperation is inefficient.

The objective of this research project is to introduce and describe collaborative logistics management and investigate its consequence on the supply chain. This purpose necessitates a framework to support the collaboration between the entities in the chain especially in terms of logistics activities. Besides, the potential benefits (in terms of cost and services) in logistics collaboration are supported by a lot of literatures. Despite the identified needs and potential benefits, there are still barriers through which is not started or not successful enough. Therefore, while those barriers must be identified, possible enablers should be designed and implemented to attain desired benefits. This has been done through both a theoretical review and also a case study.

Keywords
Supply chain, Logistics, Collaboration, complexity, Innovation
# Table of content

1 Introduction ................................................................................................................. 1
   1.1 Background ............................................................................................................. 1
   1.2 Purpose of the thesis ............................................................................................... 3
   1.3 Research questions .................................................................................................. 3
   1.4 Outline of the thesis ................................................................................................. 4

2 Research Methodology .................................................................................................. 6
   2.1 Type of research ....................................................................................................... 6
      2.1.1 Type of research for this thesis ..................................................................... 6
   2.2 Methods of data collection ..................................................................................... 6
      2.2.2 Secondary data ............................................................................................. 7
      2.2.3 Primary data ................................................................................................. 7
   2.3 Validity ...................................................................................................................... 7
   2.4 Reliability .................................................................................................................. 8

3 Theoretical frame of reference ....................................................................................... 9
   3.1 Supply chain management, history and definition ..................................................... 9
   3.2 Why Supply Chain Management? ........................................................................... 10
      3.2.1 Concentrating in core business .................................................................. 10
      3.2.2 National and international competition ..................................................... 11
      3.2.3 Conflict in the different departments’ goals and performances ................. 11
      3.2.4 Minimizing the costs of production on a continuing basis ....................... 12
      3.2.5 Introducing new technologies ................................................................... 13
      3.2.6 Improving quality ...................................................................................... 13
   3.3 Supply Chain Risk ................................................................................................... 14
      3.3.1 Source of uncertainty ................................................................................. 14
   3.4 Logistics, history and definition ............................................................................. 15
   3.5 Why logistics management? ................................................................................... 16
   3.6 Collaboration .......................................................................................................... 18
   3.7 Collaborative planning, forecasting and replenishment (CPFR) ............................... 18

4 collaboration ................................................................................................................. 19
   4.1 Definition ............................................................................................................... 19
   4.2 Form of collaboration ............................................................................................. 20
      4.2.1 Vertical collaboration ................................................................................. 20
      4.2.2 Horizontal collaboration ............................................................................. 20
4.3 Type of collaboration ..................................................................................................... 21
  4.3.1 Example of collaborative strategy ............................................................. 22
4.4 A framework for collaboration....................................................................................... 23
4.5 Complexity ..................................................................................................................... 25
4.6 Supply chain complexity and collaboration ............................................................. 26
4.7 Collaboration and Innovation....................................................................................... 28
  4.7.1 On time introduction to the market............................................................ 31
  4.7.2 Taking opportunities; sharing threats ........................................................ 31
4.8 Collaboration and competency ....................................................................................... 32

5 Collaborative Logistics Management ........................................................................33
  5.1 Logistics excellence ....................................................................................................... 33
  5.2 Logistics fulfillment ....................................................................................................... 34
  5.3 Logistics management component ................................................................................. 35
  5.4 Flows in logistics ............................................................................................................ 35
    5.4.1 Material and resource flow ........................................................................ 36
    5.4.2 Information flow ........................................................................................ 39
    5.4.3 Monetary flow ........................................................................................... 43
  5.5 Collaborative logistics .................................................................................................... 43
    5.5.1 Forms of logistics collaboration ................................................................ 44
    5.5.2 Collaborative logistics intensity ................................................................ 44

6 Benefits, barriers, and bridges to effective collaboration .........................................47
  6.1 Driving forces ................................................................................................................. 47
  6.2 Benefits of logistics collaboration .................................................................................. 49
    6.2.1 Risk sharing ............................................................................................... 49
  6.3 Barriers ........................................................................................................................... 49
  6.4 Bridge to effective collaborative logistics management ................................................ 50
    6.4.1 Value of information – Prisoner’s dilemma .............................................. 51
  6.5 Case study ........................................................................................................................ 52
    6.5.1 Company’s history and business idea ......................................................... 52
    6.5.2 Business collaboration policy ............................................................... 53
    6.5.3 Information sharing policy ................................................................. 53
    6.5.4 Logistics collaboration policy ............................................................... 54
      6.5.4.1 Driving forces and benefits of collaboration .............................................. 54
      6.5.4.2 Barriers .............................................................................................. 54
7 Conclusions and Further Research .................................................................55
  7.1 Conclusion ................................................................................................. 55
  7.2 Further research ....................................................................................... 57
List of References ...........................................................................................58

Appendix I: Interview’s questionnaire
1 Introduction

This introduction includes a description of the background of the research project and the problem statement. Also, the objective and the research questions of the research are mentioned and described. The chapter ends with an outline of this thesis.

1.1 Background

Today’s global business is becoming more fierce and unpredictable as a result of volatile variables in the market environment. It becomes a basic fact that a company’s responsiveness is essential to its success in today’s unpredictable business environment. This, together with an increase in number of companies that are working in the same area which act as competitors and decrease the products’ life cycle, force companies to focus on their supply chain. These all emphasize that planning and working alone, no matter how sophisticated, are insufficient.

In the 1980’s companies discovered new manufacturing technologies and strategies that allowed them to reduce costs and better compete in different markets. Strategies such as just in time (JIT) manufacturing, kanban, lean manufacturing, total quality management (TQM), and others become very popular, and vast quantities of resources were invested in implementing these strategies. In the last few years, however, it has become clear that many companies have reduced manufacturing costs as much as is practically possible. In their belief, the next step they need to take, in order to increase profit and market share, lie in their supply chain. Actors participating in the same supply chain identify tradeoffs with their adjacent customers and suppliers and have started to realize the importance of integration in the chain in order to focus on what is offered to the end customer in terms of cost and service. Internal excellence is not enough anymore; there is also a need for external excellence in the whole supply chain. This management philosophy is called supply chain management (SCM), and has received considerable attention in research journals as well as in industry and consultancy firms (Christopher, 1998; Lambert & Cooper, 2000; Levi, 2003).

Keeping the importance of this trend “SCM” in mind, for a company to stay profitable as well as competitive in this kind of environment it has to focus on the drivers that help the specific company to be competitive. One major driver for most companies is cost. The cost reduction is overwhelming for the business’s competition. Christopher (2005), also introduces one more driver called value advantage which gives the product or offering a differential ‘plus’ over competitors and increasingly it is the case that markets are becoming more service sensitive. Successful companies either have a cost advantage or they have a value advantage, or a combination of both. It can be argued that these two factors are the most important drivers for being compatible. Therefore the challenge for a company is to seek the strategy that will take the business towards a secure position of strength in the market based upon differentiation and cost advantages. Similarly, by expanding this notion to the supply chain, the winning supply chains are those which are investigating the drivers more and try to acquire the cost and value advantage at the same time.
Within the supply chain, logistics has a profound impact both on cost and value drivers. That is, with effective logistics management a company and in general its supply chain could be able to gain cost and value advantage over the competitors. According to Lambert and Stock (2001), with rising interest rate, increasing fuel costs during the 1970’s, and globalization of industry, logistics received attention as a major cost driver. From the value advantage perspective, the shifting of channel power from manufacturer to retailers, wholesalers, and distributors, confirm the importance of effective logistics management. In fact, today’s sales are determined by what is in stock rather than by what particular brands are offered (ibid). This new trend shifts focus in the way that companies compete, from product to product’s availability.

As has already been mentioned, logistics has a key role in the supply chain. Its activities located everywhere in the chain, from the beginning, providing raw material, to the end, delivery of products to the final customer. Generally, the final goal of any logistics system is to satisfy the customer. In fact each component of the logistics system can effect whether a customer receives the right product, at the right place, in the right condition, for the right cost, at the right time (ibid). The term availability ‘right place at the right time’ is recently considered important when it comes to customer service. The companies can not retain the customer any more if they have not got the products in their stock. Of course there are other factors that have impact on this matter, but among them logistics and its effective management considered very important.

So far, supply chain and logistics are introduced as the two most important terms in today’s business world and importance of their effective management introduced. Simultaneously, tough competition is in place for any kind of trade and now customers have access to a verity of options both locally and internationally. Also new ways of commerce are started especially with the introduction of internet (e-commerce) as a quicker and simpler tool. These situations and so many others, which will be mentioned in the next chapters, can be summarized in a special term which is complexity. To challenge the complexity, companies do not rest and instead they seek new solutions (based on drivers) which then enable them to overcome that complexity. In fact, they should constantly redesign and restructure products (services) activities to increase their effectiveness and satisfy the final customer. Previously these developments are pursued in house, but as globalization, highly diverse workforces and new ways of competing reshape the business landscape it is become more obvious that using all available tangible and intangible resources through collaborative approaches is not just an advantage, it is a business imperative (Gadman et al., 2005).

According to Soosay et al. (2008), “Businesses with a supply chain strategy require integration, cooperation and collaboration, which in turn demand aligned objectives, open communication, sharing of resources, risks and rewards”. As has already been mentioned, it has been widely believed today that collaboration among supply chain members will lead to competitive advantage for all. But what exactly is collaboration and what enables it to take place? What are the obstacles that must be overcome? Is achieving supply chain collaboration really worth the effort? And how much collaboration is actually taking place today? Moreover, to have a successful collaborative network number of elements should be considered before companies in the chain enter to any kind of partnership (collaboration) strategy. Among them, questions on who to collaborate and where in the supply chain are the two most important factors which need to be thought.
1.2 Purpose of the thesis

In the context of logistics management, the main purpose of the research is to introduce and describe collaborative logistics management and investigate its consequence in the supply chain.

To attain this purpose, a number of matters should be considered. Initially, an introduction of the area where the study deals with “supply chain management and logistics” will be performed. Then the content of collaboration including definition, form, types, etc. will be considered. Based on the purpose of the study, the thesis will then focus on logistics as a part of supply chain management and investigate the collaborative logistics management. Finally, driving forces, benefits, barriers, and bridges to effective logistics collaboration will be introduced.

This study has both theoretical and practical relevance. While most part of the thesis is written based on the theoretical perspective, the very final purpose of the research have been fulfilled practically through a case study and interviews with some experts in the area of logistics and supply chain management. This was implemented in order to experience how the theories work in practices.

1.3 Research questions

To answer the objective of this research project the following three questions will be investigated during the next chapters of this study.

In different literature of supply chain and logistics management, different terms with a variety of levels and strength have been used for describing relationships between companies in the chain. Based on Lambert and Stock (2001), relationships between organizations in the supply chain can range from arm’s length relationship to partnership and finally to vertical integration. A partnership is not the same as a vertical integration, where a company owns all the operations in the chain, nor is it the same as arm’s length relationships, which involves a limited type of relationships. The term partnership is used when a closer, more integrated relationship is in place. The partnership itself has been divided to different types and levels. Here, in this thesis, we consider the classification state by Harrison et al. (2008). They use the term ‘strategic partner’ to refer to a supply partner with whom a focal firm has decided to develop a long term collaborative relationship. As it is represented in figure 1.1, “Collaboration may be the ultimate objective of a number of phases through which a supply relationship may evolve” (ibid).

![Figure 1.1 The transition from open market to collaboration.](source: Harrison et al., 2008)
Considering the discussion above and matters which will be mentioned in chapter 3 that identify logistics as a part of supply chain, a comprehensive study within the area of collaboration is required which will be investigated via the first research question:

*RQ1: What is collaboration and is this an issue in logistics activities?*

Properly executed, collaborative logistics can significantly reduce costs, increase supply chain efficiency, and make trading partners more flexible in addressing shifts in consumer demand (Czaplewski *et al.*, 2002). That is, both cost as well as service improvements are expected (drivers). While these expected effects could be considered as the strongest reason for why companies should collaborate, still a logical framework for collaboration is required to verify those expected effects.

Research has shown that surprisingly little SCM-based collaboration can be seen despite the many obvious advantages (Emmett, 2006; Mentzer *et al.*, 2000; House *et al.*, 2001; Min *et al.*, 2005; Czaplewski *et al.*, 2002). Each piece of literature in this area identifies several barriers. Although some of them are similar, a total number of these obstacles were not mentioned in a study. As a result it is of interest to investigate this issue as much as possible.

To explore the driving forces, benefits and barriers in collaboration research’s question number two was formulated as follows:

*RQ2: What are the driving forces, benefits and barriers of collaboration in logistics management which companies have experienced through their supply chain?*

Finally, as the barriers contributing to failed collaboration are identified, solutions can be developed and implemented to attain desired benefits. As driving forces and barriers, a number of solutions were presented in literature. A total list of these solutions will then be considered through the third question of this study:

*RQ3: Which solution could be proposed for these barriers?*

### 1.4 Outline of the thesis

Below an outline of the thesis will be described which clarifies a connection between the research questions and the following six chapters.

This thesis consists of seven chapters which are summarized as follows:

Chapter 1 describes the problem and the background of the research project. The objective of the research and the research questions are presented here.

Chapter 2 presents the methodology for this study. Methods in general, and then the chosen research methodology is presented and motivated. A discussion about validity and reliability is found in this chapter.

Chapter 3 presents the theoretical framework. Terminologies, definitions, themes and a brief history of the supply chain as well as logistics will be considered in this chapter. The purpose is to acquaint the reader with the research field; some relevant fields and notions are discussed here.
Chapter 4 introduces the concept of collaboration. Its forms and types will be mentioned and discussed. Based on the first research question, a framework for collaboration will be developed in this chapter.

Chapter 5 focuses on collaborative logistics management. The main purpose of this chapter is to clarify the importance of collaboration in the logistics activities based on the 4 flows of operation. A definition, forms, and intensity of collaborative logistics will be given in this chapter. This chapter will mainly consider the first part of question number two, driving forces and benefits.

Chapter 6 presents an in depth record for driving forces, benefits, and barriers to collaboration. Finally bridges to effective collaborative logistics management will be given which could be regarded as solutions on predefined barriers. Therefore this chapter will consider question number two and three of this research.

Chapter 7 is a conclusion and suggests further research. The discussions and conclusions from this research and the results of the three research questions are presented in this chapter. Future research is also discussed in this chapter.
Methodology refers to the overall approach to the research process, from the theoretical underpinning to the collection and analysis of data (Hussey et al., 1997). Therefore, it is essential to choose appropriate methodologies and data collection procedures when doing research to work out the answers from the formulated research questions.

2.1 Type of research

According to Hussey et al. (1997, pp 9-10), the many different type of research can be classified according to purpose, process, logic, and outcome of the research. The detailed classification is summarized in the table 1.

<table>
<thead>
<tr>
<th>Type of research</th>
<th>Basic of classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploratory, descriptive, analytical or predictive</td>
<td>Purpose of the research</td>
</tr>
<tr>
<td>Quantitative or qualitative research</td>
<td>Process of the research</td>
</tr>
<tr>
<td>Deductive or inductive research</td>
<td>Logic of the research</td>
</tr>
<tr>
<td>Applied or basic research</td>
<td>Outcome of the research</td>
</tr>
</tbody>
</table>

Table 2.1 Classification of main types of research

The important point is that one particular project may be described in number of ways as it will have purpose, process, logic and outcome (ibid).

2.1.1 Type of research for this thesis

The research carried out in this thesis can be characterized as deductive. Based on Hussey et al. (1997, pp 13-15) “deductive research is a study in which a conceptual and theoretical structure is developed and then tested by empirical observation; thus particular instances are deduced from general inferences. For this reason, the deductive method is referred to as moving from the general to the particular.” In the thesis we examined the theoretical and conceptual framework with a case study conducted during the project.

One case study was performed within this research project. The objective of the case study has been to answer the two last research questions within this project. The empirical data in the case study have mainly been collected by semi-structured interviews. Analysis has been performed after the case study. The base for the case study was literature reviews, which have been made continuously during the whole research project and also some findings during writing the reports.

2.2 Methods of data collection

In order to address the questions of the thesis related data need to be collected in a correct way. The data needed for the research can be collected either as secondary data or as primary data. Hussey et al. (1997), explain the difference between them as follows: primary data
which is data collected at source whereas secondary data is data which already exists. In this thesis both secondary and primary data were utilized.

2.2.2 Secondary data
Secondary data for our report are collected from literature (books, journals, articles, magazines, thesis, and power points), Internet, and databases. Furthermore, participating in seminars, exhibition and lectures were other source of data for this thesis.

2.2.3 Primary data
Primary data can be both qualitative and quantitative, where interviews and some observations fall under qualitative research methods, and other observations and surveys fall under quantitative research methods. In this thesis a suitable method to collect the primary data was interview. Since the purpose of this thesis is to describe logistics collaboration, i.e. to describe a situation, it is important that the chosen method can reach many potential respondents. One good way to find the relevant information is interview which was the main source of primary data for our thesis. Interviews can be divided to different types like: face-to-face interview, group interview, telephone interview and so on. Interviews conducted in relationship with this thesis were face-to-face and through the telephone.

To summary, during the thesis we have used different techniques for data collection. Table 2 represents the methods which were used during each chapter.

<table>
<thead>
<tr>
<th>Technique for data collection</th>
<th>Literature search</th>
<th>Interviews</th>
<th>Direct observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 3</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chapter 4</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Chapter 5</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Chapter 6</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

*Table 2.2 Techniques used for data collection in the different chapters.*

2.3 Validity
There are different tests of validity which are: construct validity, internal validity, and external validity (Yin, 1994). Construct validity is about establishing correct operational measures for the concepts being studied (ibid). As it was presented in table 2.2, construct validity in this thesis has been secured through using multiple sources of evidence and different methods of data collection. According to Yin (1994, p.35), “Internal validity is the extent to which we can establish a causal relationship; whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships”. Since internal validity is a concern only for causal (or explanatory) case studies (ibid), and in this research no explanatory study has been performed, therefore internal validity is not of immediate interest in this research project. External validity deals with the problem of knowing whether a research’s findings can be generalized beyond that typical study. In this research, external validity has sought to be secured through the research questions being answered by several relevant and academic literatures and complementing case study.
2.4 Reliability
Reliability is the extent to which a study’s operations can be repeated, with the same results (Yin 1994, p.36). This study was performed more in theoretical perspective, whereas a single case study was conducted in order to observe the concepts realized in literature. As most of the literatures used for this study were published in the well known journals in area of the study, therefore an acceptable level of reliability could be verified. In addition, the result of the case study was reviewed by some experts with a relevant background which it increases the reliability of the project. Nevertheless, as it indicated in the last chapter, future research, the results of this study could be investigated in more detail for more practical observation.
3 Theoretical frame of reference

The frame of reference in this thesis can be divided into two main parts. The first part deals with the term supply chain management, its history, and the importance of this concept in today’s business area. The second part handles about logistics management (a part of supply chain management as it will be explained), its history, and its contribution on customer satisfaction.

3.1 Supply chain management, history and definition

The origin of the supply chain management (SCM) seems a mystery compared to logistics which has a long antecedent in business history. As we understand from the literature, there has been an attempt to distinguish between the SCM from logistics, while there are many authors who have argued about the similarity of both concepts. Some say that it is a fulfillment of the activity integration promise implied in early definitions, while others think it is a new and bold concept (Ballou, 2007).

Considering the vast number of SCM and logistics management (LM) definitions, the ones made recently by the Council of Supply Chain Management Professionals (former Council of Logistics Management), are some of the most frequently cited sources. SCM is defined on their web sites as follows:

*Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies.*

Whereas, CSCMP defines logistics to be:

*Logistics management is that part of SCM that plans, implements, and controls the efficient forward and reverse flow and storage of goods, services, and related information between the point of origin and point of consumption in order to meet customers’ requirements.*

In these two definitions and from the SCM point of view, first note that procurement and conversion (i.e. production) are now clearly included in the definition. Second, emphasis is placed on coordination and collaboration among channel partners that are missing from logistics management. Furthermore, while the term supply chain management became common in the business area, several authors argued that it should be demand chain management concerning the fact that the chain is driven by the market, not by the suppliers.

Regardless of several discussions that could be found about the terms and their relationship, the important point is that effective logistics and supply chain management can provide a major source of competition. Martin Christopher (2005) points out that a position of enduring superiority over competitors in terms of customer preference may be achieved through better management of logistics and the supply chain.
3.2 Why Supply Chain Management?

Demand uncertainty, shortened lead time, close competition, and so forth, are just some characteristics of today’s business environment. Working and competing alone does not make sense any more since the tasks are being specialized, and each company tries to focus more on its core competencies. Firms can no longer effectively compete in isolation of their suppliers and other entities in the supply chain. Interest in the concept of supply chain management has steadily increased since the 1980s when companies saw the benefits of collaborative relationships within and beyond their own organization (Lummus, 1999).

In the 1980s companies discovered new manufacturing technologies and strategies that allowed them to reduce costs and better compete in different markets. Strategies such as just-in-time manufacturing, kanban, lean manufacturing, total quality management, and others become more popular, and vast quantities of resources were invested in implementing these strategies. In the last few years, however, it has become clear that many companies have reduced manufacturing costs as much as is practically possible (Levi et al., 2003). In order that manufacturing companies could increase their competitiveness and thus their market share and profitability, many of them are discovering that effective supply chain management is the next step they need to take in order to increase profit and market share.

Generally we can identify several logical motivations in order to illuminate the importance of the supply chain management. In the following subsection we will try to describe the most important one considered by the literatures and professionals in this area.

3.2.1 Concentrating in core business

Clearly companies have become more specialized and now search for suppliers who can provide low cost, quality materials rather than own their source of supply. In fact, SCM is not the same as vertical integration where the company possesses all of the operations in the chain. Previously, doing all the business from upstream suppliers to the very end downstream customers was done by one company; that is not an issue today. This idea that the relationship with the supplier, or even that the customer is risky is no longer admirable. On the contrary, the cooperation and collaboration with other companies in the chain, from the suppliers’ supplier to the customers’ customer is vital, and those who can create more value are the winners in the competition. In fact the most important concern in the business environment could be gathered in a word value. This is the exact philosophy of working; the effort of creating value for a product or service in the eyes of the customer.

Many professionals in the area of SCM expressed the idea of the value chain. Martin Christopher (2006) states the concept of value chain from Michael Porter’s work, the Harward Business School professor, as follow:

*Competitive advantage cannot be understood by looking at a firm as a whole. It stems from the many discrete activities a firm performs in designing, producing, marketing, delivering, and supporting its product. Each of these activities can contribute to a firm’s relative cost position and create a basis for differentiation. The value chain disaggregates a firm into its strategically relevant activities in order to understand the behavior of costs and the existing and potential sources of differentiation. A firm gains competitive advantage by performing these strategically important activities more cheaply or better than its competitors.*
The implication of Michael Porter’s thesis is that organization should look at each activity in their value chain and assess whether they have a real competitive advantage in the activity. If they do not, the argument goes, so perhaps they should consider outsourcing that activity to a partner who can provide that cost or value advantage (ibid).

Significantly, it becomes clear that in order to optimize overall performance, companies need to consider the entire network of supply. These organizations have realized that whenever one company deals with another company that performs the next phase of the supply chain, both stand to benefit from the other’s success (Lummus, 1999).

### 3.2.2 National and international competition

Customers’ buying habits are constantly changing, and competitors are continually adding and removing products. Especially in some markets where demand changes periodically and the essentiality of lead time reduction makes a difficult situation for the durability of the firms. Previously, the firms coped with this situation by holding an inventory. But this idea was abolished due to a variety of drawbacks and problems.

Furthermore, there are numerous sources in the market, both national and international, which customers can access to satisfy their needs at a minimum cost and best quality. Globalization is the term that is noticed everywhere in the world today business. However it presents both opportunities and challenges. Cost reduction and expansion in new markets have become possible. On the other hand, increasing competition, local regulations, and cultural adjustments cause additional difficulties. As a result the impact on many organizations has been predictable. They need to take the advantages of globalization and avoiding the existing risks if possible.

As a result, to cope with this fierce competition, firms need to consider their chain carefully. Every company has to clarify a variety of issues when entering a market, specially the international one, since the number of factors that should be considered is increasing. Based on Levi et al. (2003), there are many potential dangers that a firm must face as they expand their supply chain globally. Subjects such as exchange rate fluctuation, managing offshore facilities, government restrictions, and so forth may be harder to control as they appear. Availability of required resources such as skilled workers, efficient and compatible information systems, accessible and proper infrastructure, and so on, are other important matters that necessitate an efficient management of supply chain.

Thus the point is that companies should not only manage their supply chain carefully, they must also periodically reconsider their approach, based on changes caused by the aforementioned factors. Even the competitor’s behavior in the market should be traced frequently as they are adjusting their strategy repeatedly.

### 3.2.3 Conflict in the different departments’ goals and performances

A third reason for the shift in emphasis to the supply chain is due to a realization by most companies that maximizing performance of one department or function may lead to less than optimal performance for the whole company. Purchasing may negotiate a lower price on a component and receive a favorable purchase price variance, but the cost to produce the finished product may go up due to inefficiencies in the plant. Companies must look across the entire supply chain to gauge the impact of decisions in any one area (Lummus, 1999).

Furthermore, as it is described in figure 3.1, each department may desire to set up goals which are in direct conflict with other departments. For instance, when it comes to warehousing, sale
department’s goals which are more customers focused be quick to respond to a customer’s order. One quick decision would be to house the finished products as close as possible to the customer, which presents the decentralized warehousing method. Varieties of issues are playing a role in consideration of having centralized versus decentralized warehouse and each has its advantages and disadvantages. From the single company perspective, especially from the financial perspective, the decentralized method will need huge amounts of investment, and an increased level of inventory. The former, however, has its own downsides such as an increased risk of obsolescence, etc. Although this is difficult to implement, and risky for an individual firm, it might be seen as beneficial and efficient when it comes to the supply chain point of view.

![Conflict between different departments’ goals](image)

**Figure 3.1** Conflict between different departments’ goals

### 3.2.4 Minimizing the costs of production on a continuing basis

Consider a chain of companies working together for producing and selling some items. Typically each company thinks internally and tries to minimize its cost of production by shifting the costs to other parties in the chain. This is especially the situation where a firm forces its supplier to reduce the price of incoming material. But as it was examined in several case studies by some scholars and authors in this area (Levi *et al.*, 2003; Vollmann *et al.*, 2005) this kind and method of thinking while does not improve the company’s efficiency, may impose many additional costs both internally to the firm as well as externally to the other partners. According to Vollmann *et al.* (2005), supply chain management represents a major shift in classic manufacturing, planning and control (MPC) thinking. There has been a continuous evolution in MPC approaches, as a more integrated approach to company operations has developed. The shift from fairly simplified tools for inventory control to the
cross functional integration (ERP system), is an example for such these evaluations in MPC systems. But these evaluations primarily focused on improvements (and further integration) inside the firm.

In fact, now the major opportunity lies in more global improvements, that is, a system that achieve synergies through integration across business units from suppliers to customers. Examples include rationalization of the total company supplier base, reducing overall supply chain inventories, decreasing lead/response time, cutting chain obsolescence costs, reducing time to market, responding faster to marketplace realities, synchronizing cross firm scheduling, and reducing the hidden factory of the chain by eliminating transactions between firms (ibid).

3.2.5 Introducing new technologies

This factor could be described from two different perspectives. First as mentioned previously, due to rapid transformation and changing of the technology in every area and strong dependency of these days’ professions to particular tools, it is rather difficult to be an expert in various subjects since each expertise needs its typical technology. Both cost and quality of the work is important when a company wants to consider this issue. On the other hand this rapid shifting in the technology could be seen as a competitive advantage for firms if it was located at a correct supply chain. By effective managing the supply chain, all the entities can utilize one another capabilities in order to improve the over all system efficiency.

3.2.6 Improving quality

The term quality is always attached by the concept of customer satisfaction i.e., whenever we are talking about quality it is calculated or considered from the consumers’ point of view. This might be a product itself or other intangible features such as image or service. Martin Christopher (2006) states that: it has long been an axiom in marketing that ‘customers don’t by products, they buy benefits’. Put another way, the product is purchased not for itself but for the promise of what it will deliver.

This opening leads to this expression that how important customer satisfaction is for competitiveness. Also the fact that today consumers are more service sensitive rather than product sensitive in terms of quality. Furthermore, customers measuring this service by factors such as responsiveness i.e. responds better to customer expectation could lead to consumer satisfaction.

Indeed, in terms of product and process quality, several advantages can be gained from managing the whole flow of materials and information from suppliers' suppliers to customers' customers. Furthermore, the quality level delivered to the final customer is the result of the quality management practices of each link in the supply chain, thus each actor is responsible for the final result (Romano et al., 2001).

In an effective management of supply chain, the quality of the whole chain can improve since all the entity realize the customer order and could respond to that as effectively as possible. In the other hand, each partner in the chain knows what the final aims are in terms of the quality demanded by the final user. Moreover, feedback from the final customers increase and able to move far back in the chain. Therefore, this identical vision concerning the quality of the products leads to increase the overall quality of the product and the chain.
3.3 Supply Chain Risk

In recent decades, numerous events have shown the extent to which companies and subsequently their supply chains are open to attack to adverse events. Needless to say no supply chain or logistic system has resistance to any of these events that happen to them.

In today’s international world of economy you can not find a firm that working alone without any connection to other companies. Furthermore the increasing complexity that characterizes the actual supply chains determines an always increasing number of sources of uncertainty inside a network (Coachella et al., 2006). Each firm is linked to others and this form a supply chain. As we see there is no escape from the supply chain disruption, every mistake in the each part of the chain embrace the other partners.

Supply chain disruptions can have significant physical costs (e.g., damage to facilities, inventory, and electronic networks) and subsequent losses due to downtime. Research in North America suggests that when companies experience disruptions to their supply chains the impact on their share price once the problems becomes public knowledge can be significant (Christopher, 2006). The research continues that companies experiencing these sorts of problems saw their average operating income drop 107 percent, return on sales fall 144 percent, and return on assets decrease by 93 percent (ibid). Another recent study estimates the cost of downtime (in terms of lost revenue) for several on-line industries that cannot function if their computers are down (Lawrence, 2006). For example, the cost of one hour of downtime for ebay.com is estimated at $225,000, for Amazon.com, $180,000, and for brokerage companies $6,450,000 (ibid). Note that these numbers do not include the cost of paying employees who cannot work because of an outage or the cost of losing customers’ goodwill. Moreover, a company that experiences a supply chain disruption can expect to face significant declines in sales growth, stock returns, and shareholder wealth for two years or more following the incident (ibid).

3.3.1 Source of uncertainty

To understand and succeed the supply chain risks first it is vital to identify and undertake the main sources of risks across the chain.

![Figure 3.2 Source of risk in the supply chain.](image-url)

Generally, there are two types of risks that a supply chain could be faced with. Those that are external to the supply chain and some are internal. Since consideration is being on supply
chain, two other categories could be added to this classification while included in the main classification. They are supply and demand risks which their importance and unintelligible boundary need separate consideration.

Demand risk could be described as the potential or actual vulnerability in flow of product, information, and cash between the focal company and the market. On the other hand the supply risk has the same description on the opposite way i.e. between the company and upstream. Therefore, it is risk associated with a company's suppliers. While demand and supply risk are naturally considered as an external risk and therefore cannot be influenced by the company’s action, it could be argued that a part of them actually are positioned inside, and the organization has the ability to control and react to them. Figure 3.2 shows the sources of risk and their relation.

Apart from the description above, external sources of uncertainty is constituted by competitors’ action, governmental restriction, natural disasters, wars, terrorism and epidemics, etc. while those inside the company more relate to the internal process. However, despite the fact that there might be the same risk faced by the organization, each company has a unique risk profile.

As it described earlier in this chapter companies need to move to the supply chain in order to increase their efficiency. This change in the strategy have several advantages such as utilizing the lean manufacturing concept and increase the level of customer satisfaction, but at the same time increase the complexity of the system. This complexity is due to several sources, product/service complexity, e-business, outsourcing, globalization, etc (Cucchiella et al., 2006). Furthermore, the high number of sources of complexity exposes the network to an increasing level of uncertainty and the uncertainty level exposes the network at an increasing number of risks. To achieve elevated levels of performance it is necessary to proceed to the correct management of such risks (ibid).

Although we will not considering the managing supply chain risk in this context, the previous subsection seems vital since the overall goal of this thesis is to discuss the benefits, barriers and bridges to effective supply chain management from the logistics collaboration perspective. These will be considered later in the chapter 6 of this text.

3.4 Logistics, history and definition

From the very beginning of the history of humanity to the building of today modern society, logistics is not a new idea. Procurement of raw materials and convert them to become serviceable was discovered from the ancient areas all over the world, meaning they used some techniques to provide their necessaries. What is recognized by the profession today as logistics was concerned with how to move materials to the required place, known as a point of consumption.

Early references to logistics are found primarily in military application (Lummus et al., 2001). Throughout the history of mankind wars have been won and lost through logistics strengths and capabilities or the lack of them (Christopher, 2005). Logistics received much attention from the military during both world wars specially the Second World War that necessitated greater movement of troops and supplies than any other period in history. Until World War II the term logistics began to be used pervasively to describe the support of military forces and their equipment. Beginning in the 1960s, logistical support of weapon systems became an integral part of the planning and design stages of these systems. Logistics was focused on
engineering issues, calculating initial support requirements, and programming resources to keep a system operational after introduction. The Persian Gulf War (Jan. 16, 1991–April 6, 1991) probably contributed to increased recognition because of the frequent mention by news commentators of the logistical challenges associated with the so called 7,000 mile “supply pipeline” to support the war effort in the Persian Gulf countries (Te, 2007). During that time the Defense Logistics Agency (DLA) ‘an agency in the United States Department of Defense’ provided more than $3 billion worth of food, clothing, medical supplies, and weapon system repair parts to the military services of the United States and several Allied nations (globalsecurity.org). Later, DLA provided more than $69 million worth of food, clothing and medical supplies to the humanitarian relief efforts (ibid). In those first critical months, most of the supplies transported to Saudi Arabia from bread to boots, from nerve gas antidote to jet fuel came from DLA stock (ibid).

The facts described above emphasize the enormous activity being done from the logistics perspective during the gulf war. The exact situation could be generalized to the business area where the planning and management of supply sources, inventories, transportation, distribution networks, and related activities as well as supporting information to meet customer requirements is considered. In addition to the definition presented by the Council of Supply Chain Management Professionals mentioned in the previous subtitle, Martin Christopher (2005) defines logistics as:

*The process of strategically managing the procurement, movement and storage of materials, parts and finished inventory (and the related information flows) through the organization and its marketing channels in such a way that current and future profitability are maximized through the cost effective fulfillment of orders.*

Besides both definitions it is important to say that Logistics management is vital not only to manufacturing and assembly industries, which are goods oriented, but also to retailing, transport and other distribution or service oriented industries (Huan, 1995). Both cost advantage and value advantage are the issues that can be achieved by effective implementation of logistics management. Every company is able to utilize the strategy itself and even better the integrated one to overcome the fierce competition in the today world business.

### 3.5 Why logistics management?

The power of customer and customer requirement is increasing in every market. In other words, attention to these requirements becomes a means for differentiation for company in order to catch the market as the competition become more and more severe. Furthermore, some new requirements are added to the customer expectations that were not essential to consider before. In addition to the product requirements, customers request for a verity of services. Occasionally these services become more vital in the eyes of customers rather than product itself, i.e. it is harder to maintain a competitive edge through the product itself. In a situation like this it is customer service that can provide the distinctive difference between one company’s offer and that of its competitors (Christopher, 2005). Lambert and Stock (2001) define customer services as “*a customer oriented philosophy that integrates and manages all elements of the customer interface within a predetermined optimum cost services mix.*”

Generally, the final goal of any logistics system is to satisfy the customer. In fact each component of the logistics system can effect whether a customer receives the right product, at the right place, in the right condition, for the right cost, at the right time (Lambert and Stock
2001). The term availability ‘right place at the right time’ is recently considered very important when it comes to customer service. The companies can not retain the customer any more if they don’t have the products in their stock. Nowadays no one can diminish the negative impact of out of stock. Several studies confirm the fact that the power of brand is decreasing compare to last years and will continue to do so. Also many of the shopping decisions are made at the point of purchase. All of these studies and observation verify the importance of having the product in stock, or availability. And as mentioned, many companies nowadays apply logistics management in order to satisfy the customer and finally improve the customer service. This in addition to the value advantage acquired by the company when utilizing LM since it provides the required service with a minimum cost.

As mentioned earlier the word logistics was first associated with the military. During World War II military forces made effective use of logistics models and form of systems analysis to ensure that materials were ate the proper place when needed. The term is still widely used in military and military type applications. The 1958 recession and profit squeeze created an environment in which business began searching for more effective cost control systems. Almost simultaneously, many firms realized that physical distribution and logistics were activities whose costs were neither carefully studied nor coordinated. A number of other trends were becoming apparent, and they made it necessary to focus attention on product distribution (Johnson, 1996). This concept is clearly described in figure 3.3. It shows the example of well-known trade-off analysis between inventory and transportation cost. Generally Logistics costs often shift in opposite directions or in other words are in conflict. As inventory is reduced transport costs rise because smaller quantities are shipped more frequently. On the other hand, as we reduce transport costs by shipping in larger quantities by less expensive modes, inventory levels in the system rise. However these conflicts would be alleviated through efficient logistics management which by improving the logistics and physical distribution, the transportation cost (or as a whole logistics cost) will be decreased while achieving the desired service level and at the same time cost efficiency for whole of the system.

![Figure 3.3 Relationship between transportation and inventory costs through improving the service level](Source: Efficient replenishment project, 1999)
3.6 Collaboration

The supply chain lies no longer with an individual company. Either it will not be able to be managed separately. Professions became so specialized and time to market is one of the most important aspects of competitiveness. As it mentioned concentrating in core competencies is a dominant motivator for companies to enter in a partnership. Effective supply chain demands a kind of partnership where each individual in the chain adopt a standardized solution and stands on common goals. Every participant looks after the chain optimization rather than individual advantage. In fact a very immediate and available opportunity when two or more companies involve in a chain is the situation where parties would be able to recognize each other competencies and combine them in order to satisfy the customer requirements. Some other features which may participant anticipate when entering in a partnership are joint planning, management, and measurement; and sharing goals, objectives, benefits, resources, information, and risks with partners. Collaboration is a recognized term which may could explain and entail all of the above features. Based on Min et al. (2005), collaboration should be defined as a firm’s culture of working together with other firms toward a common set of goals that bring mutual benefits to a partnering relationship.

According to Bownan (2004), the best supply-chain performers are deeply involved in relationships that call for tight links between partners. It’s an environment where information flows freely in both directions, upstream to suppliers, or downstream to customers. The situation where manufacturers, distributors and retailers respond quickly to changing business conditions and customer service is paramount.

3.7 Collaborative planning, forecasting and replenishment (CPFR)

Collaborative planning, forecasting and replenishment (CPFR) is aimed at improving collaboration between buyer and supplier so that customer service is improved while inventory management is made more efficient (Harrison et al., 2008). According to Levi et al. (2003), forecasts are always wrong, thus it is impossible to predict the precise demand for a specific item, even with the most advanced forecasts techniques. While this expression is quite true, but a very effective method which company may able to alleviate inaccuracy in the forecasts is collaboration. It is quite obvious that each a company have more information available regarding the customer demand the better the forecast may be. Therefore in CPFR which was oriented first time in 1995 by Wal-Mart, it was seen that collaboration is used to solve the errors in forecasts. Based on Emmett and Crocker (2006), using CPFR means that the organization must:

- Develop collaborative agreements;
- Create joint business plan;
- Create sales forecasts;
- Identify exceptions to the sales forecasts;
- Collaborate/ Resolve these exceptions;
- Create the order forecasts;
- Identify exceptions to the order forecasts;
- Collaborate/ Resolve these exceptions;
- Generate the order.

In summary, CPFR allows for planning rather than reacting, and uses internet technology to reduce inventory and expense, while increasing sales and improving customer service (ibid).
4 Collaboration

The purpose of this chapter is to define and explain the context of collaboration in the supply chain. As the other kind of business relationship collaboration could be perform in several forms and types which try to be identified. Finally, refer to the question number one of this research, a framework which could explain the why behind collaboration will be designed.

4.1 Definition

A supply chain is a network of suppliers, factories, warehouses, distribution centers and retailers, through which raw materials are acquired, transformed, produced and delivered to the customer. Being a complex network of suppliers, factories, warehouses, distribution centers and retailers, the success of any supply chain management system depends on how well these system components are managed and contributed. Levi et al. (2003) state that even if a firm has the available resources to perform a particular task, another firm in the supply chain may sometimes be better suited to perform that task simply because its relative location in the supply chain better positions it to do so.

As we have already mentioned, for organizations to compete in today’s business world which is characterized by globalization, increased customer responsiveness, channel integration and advances in information and communication technologies, they have no other alternative other than participating in a supply chain. Every successful supply chain strategy requires integration, cooperation and collaboration, which in turn demand aligned objectives, open communication, sharing of resources, risks and rewards (Soosay et al., 2008). Bring in mind the definition presented in chapter 3 by the council of supply chain management professional; the final part of the definition declares:

Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies.

The definition clearly illustrates the importance of coordination and collaboration with channel partners. In fact in order to have an effective and resistant supply chain, all the entity inevitably should perform a least level of collaboration with other members in the chain. The fundamental rationale behind collaboration is that a single company cannot successfully compete by itself. Indeed no truly successful supply chain could be found where parties involved do not collaborate. Within this definition of supply chain management, collaboration could be defined as a means by which all companies in the supply chain are actively working together towards common objectives.

Actually the parties are collaborating to ensure that the end customer is satisfied. To do this companies involved must share information, knowledge, risk and profits. Sharing entails understanding how other companies operate and make decisions, and goes much deeper than cooperation. Collaboration is mutual goal setting that goes far beyond a normal written
contract or partnership. According to Anthony (2000), Collaboration is defined as two or more companies sharing the responsibility of exchanging common planning, management, execution, and performance measurement information (Min et al., 2005).

In order to maximize the success of such collaboration there is a need for a deeper understanding of a number of issues, such as, the motivation to collaborate, where and with whom a firm can collaborate in the supply chain, type and scope of collaboration. These issues will be considered in detail through this chapter. Subsequently, a framework which indicates the necessity of collaboration in today’s world of business will be described through its relation with complexity and innovation.

4.2 Form of collaboration

Collaboration in business can be found both in inter and intra organization and ranges from the simplicity of a partnership to the complexity of a multinational corporation. According to Barratt (2004), there are a variety of forms of potential supply chain collaboration, which can be divided into two main categories, vertical and horizontal collaboration (figure 4.1). Furthermore, Soosay et al. (2008) states the third form of collaboration namely ‘lateral collaboration’, where it combines the benefits and sharing capabilities of both vertical and horizontal integration.

4.2.1 Vertical collaboration

This kind of collaboration would perform internally or along the supply chain. In the case of externally, along the supply chain, it means working more closely with trading partners to improve each other's efficiency for collective benefit. It is about giving and gaining visibility into each other's processes so that each can do a better job. For instance manufacturer can directly access the stock holding figures of their retail client to know when replenishment will be needed, the warehouse operator can know when the manufacturer will be calling for a replenishment order from stock, or the raw material supplier can know that the manufacturer has depleted his stock by fulfilling an order and can carry out a delivery.

4.2.2 Horizontal collaboration

Horizontal collaboration requires cooperation between non-competing (or even competing) companies that would not otherwise engage in business, e.g. two manufacturers sharing a warehouse space enabling shared deliveries to retailers, or a number of small manufacturing firms joining their shipments together to buy full vehicle loads (FTL) instead of each paying higher part load rates (LTL).
4.3 Type of collaboration

Integration is understood to increase the organization’s efficiency both internally and externally. According to Harrison et al. (2008), if significant improvements can be achieved by internal integration, potential for the benefits of external integration could be even higher. As shown in figure 4.2, relationship between organizations can range from arm’s length relationships to partnership (collaboration) or even further to joint ventures and vertical integration. Based on Lambert and Stock (2001) normally a firm will have a wide range of relationships spanning the entire spectrum, the majority of which will not be partnerships but arm’s length association. Arm’s length relationships are more transactional in nature. In economics, a transaction cost is a cost incurred in making an economic exchange. Therefore relationship in this level is about to be like a simple contract. For instance a seller provides a product (service) for several buyers which it normally has in a standard format. While this kind of relationship might be proper in many cases, there are situations where parties need to work closer especially when they move towards their core competencies. Generally an organization is involved in several business areas like providing, manufacturing, marketing, distributing, etc. where some or at least one of them is its core competency. Depending on the company’s specific policy, some fields of its job are more important than other and in the case of outsourcing decisions it must be considered more carefully. Whereas some insignificant ones could be achieved through arm’s length relation, the one closer to the core competency of the company understood to be achieved with some kind of partnership where collaborative approach is considered as one of the best practice for this purpose.
However, in spite of its obvious advantages, each company must carefully study the area where integration may increase its efficiency. As specified before integration bring both benefit and risk. That is, while the overall system performance might be increased, inefficiency in each section decreases the whole system presentation. Therefore understanding the type and level of integration before any action is vital. Many types of inter organizational relationships were introduced by several authors and scholars in the area of logistics and supply chain management (Levi et al., 2003; Lambert and Stock 2001; Harrison et al. 2008). Among them Lambert and Stock (2001) indicates three types of partnership (collaboration) as follows:

**Type 1**, the organizations involved recognize each other as partners and, on a limited basis, coordinate activities and planning.

**Type 2**, the organizations involved progress beyond coordination of activities to integration of activities.

**Type 3**, the organizations share a significant level of integration and each party views the other as an extension of its own firm.

As it is clear, type 1 is handling in operational level while it is more strategic when it comes to type 3 of this classification.

### 4.3.1 Example of collaborative strategy

In terms of external collaboration, there are number of potential opportunities for vertical supply chain collaboration which include on the downstream side of the supply chain, methods such as customer relationship management (CRM), collaborative demand planning (which include collaborative forecasting and replenishment - CPFR), demand relationship, and shared distribution (Barratt, 2004). And on the upstream side of the supply chain: supplier relationship management (also referred to as supplier development, e.g. VMI), supplier planning and production scheduling, collaborative design (which could include new product introduction), and collaborative transportation (ibid). Besides, strategic alliance (which could include third party logistics 3PL, retailer supplier partnership RSP, and distribution integration DI, etc.) may possibly be performed on the both side of the supply chain (Soosay et al., 2008; Levi et al., 2003).

On the other hand horizontal integration occurs when two or more unrelated or competing organizations (at the same level of the supply chain) producing similar products or different components of one product, form a cooperative association to share resources such as warehouse space and manufacturing capacity (ibid).
4.4 A framework for collaboration

There are a variety of issues and points that play a role in the selection of appropriate type, form, and a level of collaboration. According to Barratt (2004), a company can not collaborate with everybody. He states that organizations need to realize that the resource intensive nature of collaboration means that they need to focus their attention on a small number of close relationships rather than trying to collaborate with everyone. Often a combination of position in the supply chain, resources and expertise determine the most appropriate firm in the supply chain to perform a particular function (Levi et al. 2003). Gadman et al. (2005) suggests that a company’s collaborative strategy should reflect its competitive strategy. That volatility in the environment, the amount of risk they were prepared to take, how they planned to create value for their customers, and how that value supported financial objectives all played a part in decisions to collaborate.

An important element that should be considered when a company starts to define and design its collaborative approach is the understanding of final customers’ requirements. According to Burt et al. (2003), the degree of flexibility and speed of responsiveness required by the customer, cause a firm the appropriate level of performance. The same situation is correct for defining the level of collaboration with suppliers. Also as said by Gadman et al. (2005), when it came to strategic partnering, the results showed that the companies did not take a standard approach. Instead, they employed different strategies depending upon their competitive focus, their financial goals and how they created value for their customers and their willingness to take risk. But still the question is remained, with whom should a company collaborate? Most of the literatures suggest that the solution is to look for the key suppliers or customers and develop collaborative relationships with them alone. Once collaboration begins with key supply chain members, it eventually becomes routine and the focus can turn to new relationships (Barrat, 2004; Buret et al., 2003; Mentzer, 2001, Levi et al., 2003).

The other point is the level of collaboration, i.e. how much the firm should get into the partnership or is it essential at all. Although this discussion is not new, still it is one of the most challenging topics both in research and business area. While there could be found lots of scenarios about successful collaboration and partnership, numerous company loose hurt as a result of selecting wrong levels of collaboration, partners, area, type, and so on. Consequently, the need for a logical collaboration framework has not diminished and several authors and researchers try to help the organization in this matter. To begin companies should be aware of matters contributing in the creation of a realistic and acceptable collaborative activity. Note ‘Five Ws (and one H)’ concept, the maxim of the Five Ws (and one H) is that in order for a story to be considered complete it must answer a checklist of six questions, each of which comprises an interrogative word: Who, What, Where, When, Why, and How (wikipeia.org). Gadman et al. (2005) describe a set of questions on the collaboration strategies:
- How collaborative projects originated and how they worked;
- What the incentives were for people to participate;
- How they found, joined and left projects; and
- How the work of many contributors was coordinated;

Add to the preceding, who to collaborate, where in the chain, what form of collaboration, and so on.

This might create a somehow complex situation which appears from its origin ‘the supply chain’. In fact, even if the journey towards the ultimate SCM has been facilitated by the business and management concepts, these issues have still proved to be a difficult task for most companies and not many companies have therefore arrived successfully in a total SCM
environment (Sandberg, 2005). Thus, to go from arm’s length agreements where only internal short term costs have been in focus, to collaboration, seems to be a difficult task for companies, despite the many obvious advantages mentioned in the literature (ibid). Therefore, working towards collaboration in the supply chain not only is an easy task it might also create some problems for the organization. Furthermore, these scenarios are not the same and would be different by every company’s circumstances.

According to Wilding (1998), one key issue known to impact on the effectiveness of a supply chain is that of uncertainty. Generally a variety of issues contribute to uncertainty which is inherent in every supply chain and cannot be eliminated completely. Levi et al. (2003) states some factors interfere to uncertainty, they emphasized the challenge of matching supply and demand, the impact of inventory and forecast, and finally factors except those embrace demand as a source of uncertainty; including delivery lead times, manufacturing yields, transportation times, component availability, and so on can also have significant supply chain impact. Research at Intel, investigating the match between actual call off and the actual forecast, estimated that supply and demand were in equilibrium for 35 minutes in ten years (Wilding, 1998)! Furthermore, as supply chains become larger and more geographically diverse, natural and manmade disasters can have tremendous impact.

However, although uncertainty cannot be eliminated, its effect in the supply chain could be minimized. Particularly nowadays that we are facing with totally different situation than decades ago. As an example, revolution in information system and its availability could be mentioned. In addition, organizational, social, and other technological advances will perceive the innovative progresses which assist companies to reduce uncertainty and consequently the bullwhip effect.

To conclude the discussion so far, a framework for collaboration that will be able to answer the preceding arguments, especially in determination of appropriate strategy for collaboration can be designed as follows. There is a direct relation between the amount of complexity in the system and the kind and level of collaborative strategy. Gadman et al. (2005) explain that the challenge is to recombine to reinvent and people are encouraged to borrow ideas and practices liberally, making every product upgradeable, breeding ideas and processes early and often, and viewing interchangeable modules for people and products essential for mass customization. These experiments are aimed at continuously upgrading the performance of services and products, understanding the requirements of customers, knowing where to target their products, how to market and sell their products and developing new channels to market. In fact organizations in supply chains are compelled to restructure and re-engineer relentlessly to increase their effectiveness and satisfy customers. This realization requires firms to look beyond their organizational boundaries and evaluate how the resources and capabilities of suppliers and customers can be utilized to create exceptional value (Soosay et al., 2008).

Therefore to overcome the existent complexity companies need to be innovative and for any innovative strategy to be successful, they need to collaborate in order to take the advantage of all tangible and intangible resources (internally and externally). This expression illustrate simply in figure 4.3, the supply chain collaboration triangle.
4.5 Complexity

When Einstein was asked what was most helpful to him in developing the theory of relativity, he replied, “Figuring out how to think about the problem.” The challenges we face today and those we will confront in the future require new ways of thinking about and understanding the complex, interconnected and rapidly changing world in which we live and work (Hawking, 2000). The word complexity is defined in the Webster dictionary as follows:

*The quality of being intricate and compounded*

To understand the concept lets expand the given definition. *Intricate* (adjective): highly involved (ibid). *Compound* (adjective): consisting of two or more substances or ingredients or elements or parts (ibid).

By putting the definitions together the following distinction could be realized.

*Two or more substances, ingredients, elements, or parts being highly involved*

According to Gershenson (2004), this can be interpreted in the following way; in order to have a complex you need:

1. Two or more distinct parts, and
2. That are joined in such a way that it is difficult to separate them

According to Pavard & Dugdale (2000), a system starts to have complex behaviors (non-predictability and emergence etc.) the moment it consists of parts interacting in a non-linear fashion. A complex system is one which it is difficult, if not impossible to reduce the number of parameters or characterizing variables without losing its essential global functional properties (ibid).

Stephen Hawking (2003) puts it in the simpler way. He wrote, an increasing number of independent variables begin interacting in interdependent and unpredictable ways.
In all the definitions given, somehow we can realize some common characteristics, which make every complex system different from simple (static) one. Waldrop (1992) declare that complex systems are characterized by:
- A great many independent agents who are interacting with each other in a great many ways;
- Systemic interactions which can lead the system to spontaneous self-organization;
- Learning which takes place through feedback; and
- Finally, every complex, self-organizing, adaptive system possesses a kind of dynamism that makes them qualitatively different from static objects.

4.6 Supply chain complexity and collaboration

Today’s marketplace is so volatile. It is characterized by turbulence and uncertainty (Christopher, 2006). The uncertainty has tended to increase recently for a number of reasons. They include globalization, heavy competition, change in consumers buying habit which leads to huge uncertainty in demand, increasing the number of products and technologies which their life cycle have shortened significantly, etc. Also considerable ‘chaos’ exists in the supply chains through the effects of such actions as sales promotion, quarterly sales incentives or decision rules such as reorder quantities (ibid). Furthermore, recent and stricter governmental rules as a result of unstable situation like terrorist attacks, political and economical aspects, climate change (natural disasters), and some social concerns, have contributed a lot in increasing the market turbulence. Generally, these situations ‘companies and their associated market place’ are characterized more and more by uncertainty, unpredictability and finally complexity.

Considering the matters mentioned above, it is apparent that the origin of chaos and complexity in the supply chain are more or less the companies themselves and this is obviously not an amazing point since they are seeking a better, simpler, more efficient, and costless way of doing the business. In fact, it could be argued that complexity arise from the competitive advantages companies and subsequently their associated supply chain are trying to reach. Alternatively, when it comes to competitive advantage, for a company to stay profitable as well as competitive in this kind of environment it has to focus on the drivers that help the specific company to be competitive. One major driver for most companies is cost. The cost reduction is overwhelming for the business’s competition. Martin Christopher (2005), also introduced one more driver called value advantage which gives the product or offering a differential ‘plus’ over competitors offerings and increasingly it is the case that markets are becoming more service sensitive. Successful companies either have a cost advantage or they have a value advantage, or a combination of both. It can be argued that these two factors are the most important drivers for being compatible. Actually the challenge for company is to seek the strategy that will take the business towards a secure position of strength in the market based upon differentiation and cost advantages considering supply chain complexity management. As a result a set of management actions are needed that uses complexity drivers to create competitive advantage where possible. Although, those that are not considered key to competitive advantage should be eliminated. Vickers et al. (2006) state a three steps action that helps the companies to perform this conversion, from complexity to competitive advantage:
- Set top-down targets for performance improvements;
- Identify your key complexity drivers; and
- Adopt the practices necessary to manage those drivers most effectively.
Evidently, collaboration and collaborative efforts could be grouped as those necessary practices to effective exploitation of drivers. In fact, as globalization, highly diverse workforces and new ways of competing reshape the business landscape, there is growing evidence to suggest that using collaborative networks to leverage all elements of a firm’s intellectual capital is not simply a business advantage, it is a business imperative (Gadman et al., 2005). The fundamental notion behind collaboration is that by continuous increasing the number of global corporations, covering more countries, employing more people and addressing more market sectors; and non-stop transformation in technology specially information and data interchanges, requirements for possessing a least level of assets ‘particularly knowledge’ is growing while the organization’s capability to leverage those assets is effectively decreasing (ibid). Therefore companies try to seek and develop these drivers outside their four walls. By doing this, they may be able to get an appropriate response to the supply chain complexity while take their business towards a secure position in the market.

Other considerable concern in this context is the level of complexity. Winning companies have learned how to manage the complexity drivers for their particular industry and specific situation. Clearly, as the level of complexity change, different set of action is required. Although this might not respected as a rule and the choice of collaborate or not to collaborate is regarded by variety of aspects, from the complexity point of view requirement for collaborating increase as the level of complexity increase in the system and vice versa. According to Gadman et al. (2005) pp.29-30,

*In situations where there is high complexity and high need for knowledge creation which cannot be fully satisfied by existing intellectual assets, partnership strategies move beyond the four walls of the firm. Information technology and the internet enable a community gathering place for social and commercial interaction. Networks provide strategic and operational benefits by enabling members to collaborate effectively. Boundaries are permeable. The number and density of connections to the environment is increased to speed information flow and adaptation.*

Although, the expression above suggests that the higher the level of complexity the more eagerness to collaborate in order to benefit from all possible opportunities, at the same time the attention should be taken to the fact that firms go through collaboration activities in order to share both risks and rewards. There is always the other side of the coin as well! Therefore still organizations need to study their situation and define all the elements of collaboration before making any arrangement with each other.

Back to the drivers, according to Vickers et al. (2006), complexity drivers can be grouped into three categories: Configuration and Structure, the physical network of the supply chain and the organizational structure used to manage it; Products and Services, the portfolio of offerings managed by the supply chain; and Processes and Systems, the processes and systems used to manage the supply chain. The above classification together with the level of complexity, declares the importance of collaboration or any other partnership between firms either to systematically reduce the supply chain complexity or driving benefits from it. Looking through some elements of each category presented in the figure 4.3 even confirms this point in a stronger manner. The more variants there are of a particular driver, for example the more distribution channels, products, or manufacturing strategy the more complexity there is to manage. Consequently the challenge increase since every firm faces with a combination of these elements. Suppose a number of shipments coming to or going out from a number of
manufacturing location each of which performing typical strategy and utilizing their own information system, and compared to the situation where each entity aware of what others are doing and when trading partners decide on the selection of proper infrastructure, systems, etc.

<table>
<thead>
<tr>
<th>Configuration and Structure</th>
<th>Number of suppliers</th>
<th>Number of distribution centers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of manufacturing locations</td>
<td>Number of ship-to locations</td>
</tr>
<tr>
<td></td>
<td>Number of distribution channels</td>
<td>Number of customers</td>
</tr>
<tr>
<td>Products and Services</td>
<td>Number of products/services</td>
<td>Number of shipments</td>
</tr>
<tr>
<td></td>
<td>Number of direct materials</td>
<td>Number of orders</td>
</tr>
<tr>
<td>Processes and Systems</td>
<td>Supply chain processes and practices</td>
<td>Manufacturing strategy</td>
</tr>
<tr>
<td></td>
<td>Supply chain organization</td>
<td>Number of legacy information systems</td>
</tr>
</tbody>
</table>

Source: Vickers et al., 2006

Figure 4.4 The drivers of supply chain complexity

Fortunately, although the complexity of the supply chain has been raised due to globalization and volatile market place, simultaneously advance technology particularly information technology (IT) facilitate the ways that business were carrying out. IT allows information to be shared in near real time. Regardless of whether the tools is fax, internet, or integrated computer technology, the ability to transfer data between interested parties removes any reason to not be informed. So instead of seating behind and doing individually, firms persuade to move further. Try new markets and new way of performing the job ‘product or service’ even with their subsequent complexity since organizations are more confident to contribute in any partnership than before.

As final point, since the business becomes more and more sophisticated, customer demands modify and fluctuate greatly which cannot be satisfied on time, falling stock market in an area or a little change in a share price cause irreparable loss for a company, firms should be up to date and innovative. They need to seek and acquire as much as they can all the assets ‘tangible and intangible’ in order to survive in today’s fierce competition. They must retain customers and increase their loyalty by proving that the supply chain is kept healthy and can be reacted to all logical requests. What required is to eliminate the boundaries, accept a reasonable level of risk and try any kind of partnership which can shift the entire chain to the victory.

4.7 Collaboration and Innovation

The preceding subtitle concludes to this point that each the level of complexity increase in the system the requirement for capitalizing all the assets controlled by a company amplify and since no or rare individual entity exists that owned all the resources necessary to be compatible enough consequently the need for collaboration increase as well. When it comes to assets both tangible and intangible was pointed out so in addition to physical resources which should be utilized, the knowledge and organization’s ability to leverage that knowledge is considered an essential mission. One outcome to employ knowledge for the company is differentiation. Remind the argument regarding the value advantage which gives the product or offering a differential ‘plus’ over competitive offerings. Indeed, nowadays emphasis is on the new idea ‘product or service’ and to do so organizations should be innovative.

According to Webster Dictionary the term innovation defines as:

_A creation (a new device or process) resulting from study and experimentation_
People always attract to the new and different stuff, especially when it comes to technological products. New evolutions in computer, vehicle, aviation industry, etc. become one of the hottest news in the media and important parts of our life. Companies in the same area compete to introduce new version of the products and try to take the more portion of the market as they can. In fact they spend lots of capital on their R&D ‘Research and Development’ program in order to develop the new and different idea. Actually the winners are those who can more utilize the knowledge pool which have been growing as global business and corporation continue to grow. Subsequently the old organizational culture becomes barriers to keeping up with demand, and responding with innovative products and solutions (Gadman et al., 2005). However, this response requires a considerable effort and attention. According to Ettile (2006), the more change in the technology of products, services, and operations, the more change in administrative procedures, new strategies, new organizational structures, and new operating procedures will be required to successfully capture the potential benefits of the venture (see Figure 4.5).

![Organizational Innovation](Image)

**Figure 4.5** Successful management of the new adopted technology

As it is clear on the figure 4.5, two potential failures might be happening. The failure of technological change typically happen when either too much technology is adopted too quickly or not enough technology adopted to stay ahead of competitors (ibid). Therefore there should be a balance between adopting and innovating ‘new adopted technology’ strategy. Of course this is not the only issues that must be considered and other concern such as the complexity of the system (Figure 4.3) and its associated risk and other competitors’ position have to be captured carefully.

Generally, since organizations are forced to pursue a discontinuous improvements ‘from their products or services to strategies and processes’, collaborative approaches might be considered a way to perform this objective. This notion will be better clarified by investigating the process of technology development. As it appears in Figure 4.6, the process
begins with conducting market research. There is no need to explain the importance of this stage since all other company’s activities are performed to support and fulfill what is requested and realized to be important from the customers.

Figure 4.6 The continuous process of technology development

How a firm can conduct market research without any contact with the customers? Of course the answer is clear, the more a company realize customers’ need the better the required response. Actually they all try to escape from the uncertainty which might be generating through unusual demand that appears from the very down side of the supply chain. Undoubtedly one of the sources of uncertainty is forecasting. There is an expression about forecasting which tells ‘all the forecasts are wrong’. Although every firm in the chain may do forecasting, the level and the extent of the information which a firm relay on vary from case to case. Furthermore, since it is one of the sources of uncertainty, the need for real data is obviously demanding from any company in the chain and this declares how valuable any strategy which transfer these real data backward in the chain. One approach in this case is the well-known CPFR ‘Collaborating Planning, Forecasting, and Replenishment’ method. At this point the importance of information availability cannot be diminished. The good news is the presence of advanced technology and its contribution to assist the organizations. To execute, organizations just need to set up a reasonable level of infrastructure and evaluate the related processes periodically. By this, firms can assess potential of new technology, product, or service and response to that before competitors, that is, enhancing a secure position in the market which is generated by getting close to the customers.

Studying all the elements in figure 4.6 clearly confirm the advantages of collaboration in every stage. As mentioned earlier, the importance of R&D cannot be ignored today and since normally these R&D programs are costly, organizations try to leverage their partners’ competencies for this process. Suppliers may contribute to firm innovation by performing R&D of its own and thus absorbing some of the R&D costs the buying firm would have to normally incur. Moreover, suppliers often have valuable knowledge of production and
fulfillment processes that influence a firm’s performance. Finally, suppliers can transfer ideas for better products and features that could enable the buying firm to enhance products (Soosay et al., 2008). At the same time this contribution has other tangible benefit in execution as well. Benefits include a decline in purchased material costs, an increase in purchase material quality, a decline in development time and cost and in manufacturing cost, and an increase in final product technology level (Levi et al., 2003).

Concerning what is mentioned above and according to Stamm (2004), every innovating process is faced with a number of challenges which can be summarized as follows:

- In the innovation time to market is critical.
- Innovation often requires skills and resources that are not readily available in-house.
- Innovation is risky and costly.
- For innovation to happen different bodies of knowledge need to be connected.
- The most successful innovations address customer needs and create value.

And as it was already described, collaboration could be investigated as a tool to answer these challenges. Some challenges such as understanding customer need and making internal as well as external connection to exploit the knowledge pool have already been mentioned and how collaborative approaches addresses these problems were discussed earlier. In the following the rest will be considered.

**4.7.1 On time introduction to the market**

One important stage in the product life cycle is the introduction stage. Especially in the high-tech industries where this time has been shorten during past few years. Therefore while the whole life of a typical product is not exceeding from some month, how important is quickly coming to the market. Furthermore since these are new products or services, normally historical data are not available to forecast an appropriate level of demand. This dilemma could be alleviated by establishing a collaboration frame through the chain. The advantages are numerous, just as an example the cumulative forecasts are more accurate, taking a bigger slice from the pool knowledge, and taking the advantages of outsourcing could be mentioned.

**4.7.2 Taking opportunities; sharing threats**

Connection of innovation with risk and its associated costs is not ignorable. In fact high level of risk and cost are common barriers to innovation and directly linked to each other (Stamm, 2004). Alternatively, as it was mentioned earlier in this chapter, firms enter into inter firm collaborative arrangements in order to share risks and rewards. According to Ettile (2006), competitive pressure and scarce technical resources has forced global companies to seek out technology and leverage the best at each location it supports. Therefore as it could be seen successful supply chains are those which more exploit the entities’ capability and work together explicitly so everyone truly knows rationale beside collaboration.

In addition to the competitive forces that drive managers to seek out all types of supply chain efficiencies, several competitive forces are specifically encouraging managers to find opportunities to work with suppliers during the product design process. These forces include the continuing focus on strategies that encourage companies to focus on their core competencies and outsource other business capabilities (Levi et al., 2003). The point is clear; no individual company has all the resources needed to generate new idea frequently. Indeed the solutions and required assets should be sought beyond the four walls of the firm. That is
taking the advantage of supplier competencies in order to both enhancing opportunities and sharing threats.

4.8 Collaboration and competency

The discussion so far introduce the nature of collaboration as a kind of inter organizational partnership which could be seen in different forms, types, levels depends on the company’s specific policy. Furthermore, collaboration is identified as one of the key solutions which allow companies to have a better reaction to the amount of innovation they required, in order to handle the existing complexity. In figure 4.2 we have introduced types of relationships between organizations which started from the simplest form, arm’s length relationship, to vertical integration. In addition it was clarified that while it may not applicable all the time to apply vertical integration, where a company own all the processes, different and independent companies can perform the tasks together as a single unit. That is, taking the advantages of vertical integration without its huge expenses. With true collaboration, companies get closer to each other and release data which before were not accessible by other. Every body receives the same information and customer demand flow back to the chain without modification. This process increases the efficiency of material flow from supplier to the customer. Furthermore, efficiency of resource flow will increase as well. Collaboration allows members to reduce expenses by sharing available assets such as a truck, trailer, warehouse, container, or even production plant. In fact collaboration provides complete visibility to the entire process flow, from beginning to the end. Therefore, as it presents in figure 4.7, each the level of integration in the chain increase members gain forward visibility through the supply chain, as well as the ability to create efficiencies.
5 Collaborative Logistics Management

The purpose of this chapter is to describe logistics collaboration in supply chains. It aims to derive and verify a collaborative framework which exists in all logistics flows and between different parties in logistics setups. The discussion is based on the frame of reference and chapter 1 in this thesis.

5.1 Logistics excellence

Effective logistics is one of the most important means of competition in the business world and distribution logistics has always been a key factor for the competitiveness of industrial companies. This can be emphasized by some new evaluation in both market and production systems. Delocalization of the manufacturing capacity in order to employ the cheap resources and quick response to the customers’ expectation which meting their future demands is very difficult are just two of these evaluations.

This review of the evaluation of supply chain strategies in various industries suggests the following insight: the Internet and the associated new supply chain paradigms introduce a shift in fulfillment strategies from cases and bulk shipment to single items and smaller-size shipments and from shipping to a small number of stores to serving highly geographically dispersed customers. This shift has also increased the importance and the complexity of reverse logistics (Levi et al., 2003). Furthermore, customers’ expectations in terms of delivery service are constantly growing. Such factors make the distributive logistic system, and the related costs, increasingly important and often critical for competitiveness of companies (Caputo, 2006).

The other important point is the tendency of more and more companies in the introduction of lean philosophy in their production. One of the main principles in the lean manufacturing is the use of smaller batch size. In fact it is the usage of just in time ‘JIT’ in the material planning of the system. That is what is needed to arrive, exactly when is needed and where is needed. Therefore again there is a shift from bigger batch size to smaller one with more frequency in the delivery of the material. This statement together with what is mentioned previously about globalization and dispersion of each party through the world, not only makes the implementation of philosophy difficult, even impossible to execute in some circumstances. Generally from the economical perspective it is not beneficial to perform the direct shipment as the distance between supplier and manufacturer increase except the fleet could be loaded completely (FTL). Actually this problem would be solved by performing effective logistics management. A variety of techniques and methods from logistics management are able to assist organizations to mitigate such a problem.

The importance of logistics management is reinforced when one looks at the significance of logistics to firms in today’s supply chain arena. According to Council of Supply Chain Professionals, during 2006 the growth in the U.S. economy was on par with the pace set in 2005, increasing about 3.5 percent. The growth in the business logistics system was tempered somewhat from the 2005 record increase, but still rose over 11 percent in 2006. Business logistics costs were $1,305 billion and rose from 9.4 to 9.9 percent of the nominal Gross
Domestic Product (GDP). This is an increase of $130 billion over 2005 and another record high for logistics costs. Considering the significant role that logistics plays in the overall economy, any improvements in efficiency or effectiveness due to collaborative logistics priorities will be welcome.

Figure 5.1 Logistics cost as percent of GDP

5.2 Logistics fulfillment

According to Levi et al. (2003), as with any business function, there are four basic ways for a firm to ensure that a logistics related business function is completed. These are:

- **Internal activities**, when a company has resources and expertise available, logistics activity could perform internally. Especially if this logistics is one of the firm’s core competencies, this may be the best way to perform the activity. If not, this may not a logical option since logistics activity requires huge amounts of investment including infrastructure, resources and expertise. Most importantly these assets should be updated periodically, causing more and unnecessary consideration which will then make the company disregard other important and essential activities in its system.

- **Acquisitions**, if a firm has not resource available internally, another firm could be acquired to perform the task. As an example a joint venture could be mentioned that involves shared ownership between the two parties. Although this method will give full control over the acquired company and might be useful in some circumstances, still it has its own drawbacks. Generally it is very expensive and difficult to obtain a suitable company. Furthermore, normally acquired company has not the same culture and organizational structure. Therefore it may impose an additional cost to adjust its structure to the desired condition.

- **Arm’s length transactions**, most of the relationships between the organizations are of this type where a seller typically offers standard products or services to the variety of customers. Normally this kind of arrangement does not exceed a specific and short period of time. While this method is suitable in many situations, still there are areas which a company in its logistics activity need closer and integrated kind of relationship with either the supplier or customer.

- **Strategic alliance**, this kind of fulfillment is not the same as acquisition which involves shared ownership between the partners, nor is the same as arm’s length
transactions which is not entail any kind of responsibility between two parties. Based on Levi *et al.* (2003), these are typically multifaceted, goal oriented, long term partnerships between two companies in which both risks and rewards are shared. While parties remain separate from ownership perspective, a well managed partnership can provide benefits similar to acquisition or vertical integration. Regardless of the strategy which company selects in this way, collaboration and cooperation with partner(s) in terms of resources, information, knowledge, and etc. is essential.

### 5.3 Logistics management component

To begin, consider the logistics management definition given in chapter 3 by the Council of Supply Chain Management Professionals, CSCMP:

*Logistics management is that part of SCM that plans, implements, and controls the efficient forward and reverse flow and storage of goods, services, and related information between the point of origin and point of consumption in order to meet customers’ requirements.*

Seen most simply and generally, logistics consist of flowing the material and information from procurement, through organization, and to the customer. The term customer could be referred to anyone in the chain who has placed the order as well as those subdivisions inside an enterprise. So, the logistics observe simply as a leverage for company that able it to meet the customer requirement and at the same time lowering the costs.

Based on the definition above, logistics management is a part of SCM. It is a part where would be seen everywhere in the chain. That is from the point of origin to the point of consumption. As illustrated in figure 5.2, connection between parties makes a loop rather than be linear from supplier to customer as it is in the supply chain since logistics management consists of reverse logistics as well. Furthermore, it consists of various flows and activities with which customer’s requirement would be met. Based on Lambert and Stock (2001), key logistics activities are: customer service, demand forecasting, inventory management, logistics communication, material handling, order processing, packaging, parts and service support, plants and warehouse site selection, procurement, reverse logistics, traffic and transportation, and warehousing and storage. While not all organization may explicitly consider every one of these activities, they all affect the logistics process (ibid). Actually, logistics is a system or a process with many components and as it mentioned with a number of activities which must be related in order to fulfill its primary objective. A simplified example of this relationship is demonstrated in figure 5.2, a typical supply chain with four members. Although, it is a basic representation of logistics system, yet it consists of many components and explicitly necessitates a presence of any harmony between these components. Either these components are owned by a company, which is so rare, or several companies performing these activities in order to carry out the logistics portion of the supply chain they must be combined if the total system efficiency is desired.

### 5.4 Flows in logistics

The definition given above also implies that three flows in a logistics system exist. First, material flow is a flow of goods from their sources through the necessary processes, including storage, retrieval and delivery, then on to the customer with no unnecessary delays or costs. Second, resource flow contains all the resources needed for carrying out the system mission.
One major difference between material and resource flow is that the ownership of goods passes on the way from suppliers to customers while the ownership does not change as the resources flow in the network. Therefore, resource flow is always a two way flow in contrast to the material flow which is a one way flow from upstream to downstream (Lumsden, 2006). Third, the linking of the desired information communicated among the members in the logistics channel constitutes information flow. The major information passing through a network is demand which always moves backwards and represents the orders in the system, i.e. two-way horizontal information. Based on (ibid), there is one other type of information transmission, vertical information, which is within each member and it identifies the status and physical location of the company’s goods and resources. This creates the need for the installation of a logistics information network. In addition to the three previous flows, monetary flow which involves pay in advance and funds’ transfer, and it can be handled by electronic fund transfer (EFT). As presented in figure 5.2, these mentioned flows exist between each two points in a network.

**Figure 5.2** The ingredients in Logistics Management model.

### 5.4.1 Material and resource flow

The final goal of any logistics system is to satisfy the customer. In fact each component of the logistics system can effect whether a customer receives the right product, at the right place, in the right condition, for the right cost, at the right time (Lambert and Stock 2001). Among
these criteria, place and time utility have the greater importance and are considering as a measure in determination of efficiency for material and resource flow in the logistics system. Material flow representing the movement of products or merchandises from a point ‘sender’ to another ‘receiver’ and it consists of raw material, work in process, and finished goods while resource flow makes the material flow possible. Furthermore material and resource flow are the two physical flows in the logistics system. According to Lumsden (2006), resources could be divided in two structures, static and dynamic. Static structure like storage while dynamic structure is either consumed over time such as labor or in circulation for instance carrier.

Essentially these two flows constitute the main function of a logistics system and due to their nature and structure they bring a level of complexity into the system. The complexity arises since these two flows must join each other in order to create value. Lumsden (2006) points out that one of the most important reasons for inefficient resource utilization is that resource and material flow do not coincide neither in space nor time. Consequently existence of a balance in the system appears essential between these two flows. Either the material flow be greater than resource flow which then surplus should be stored until resource being available or resource be greater than material which same resultant recognizable, these imbalances in the system incur high expenses for the system. A typical example for such these situations is utilizing full truck load (FTL) instead of less than truck load (LTL). This will happen in the case of greatness of resource flow on material flow. So one can not employ all the capability of the available resources and this impose some costs which would otherwise be replaced with benefits.

Another concerning aspects in the matter of material and resource flow are economical parameters. These are factors that determine variations in costs. According to Lumsden (2006), these economical parameters include economy of scale, economy of scope, economy of density, economy of experience, and economy of presence. He has described each parameter intention as follows:

- **Economy of scale** aims at the usage of larger and more resources which lead to a lower cost of operation.
- **Economy of scope** is present if it is cheaper to operate two services in one single entity than it is to produce the services separately.
- Economy of density aims at working on larger markets, which leads to more efficient utilization of resources.
- Economy of experience means that the cost per item decreases when it is produced in greater amounts or when the operator stays on the market for a longer time since the advantages of ‘learning by doing’ be achieved.
- Economy of presences means that there is an economic value in being physically present or available.

Fixed costs are costs that do not change regardless of the amount of use, or at least change relatively little as a function of use. That is, they are costs that must be incurred even if production were to drop to zero. Examples of fixed costs could include factories, warehouses, machinery, electrical transmission systems and railways. Variable or marginal costs, in contrast to fixed costs, change directly as a function of use. Examples of variable costs are fuel, labor, and etc.
Large economies of scale are most likely to be found in industries characterized by large fixed costs. That is, very large levels of production are required to bring unit costs down to the lowest possible levels. To attain such levels of output, it is necessary to have massive investment in production facilities. On the other hand marginal cost can decrease as the volume of output increases. The reason is that larger production volumes allow fixed costs to be spread over more units of output. Therefore the more efficient usage of resources is needed in order to take the advantages of economy of scale.

Logistics activity needs huge amounts of investment, large fix costs, and hence could be characterized by large economy of scale. This feature together with the fact that it is almost impossible for a typical company to be expert in all the business area force the organizations either to do the business jointly or contract out a part of trade to professional company. In consideration of economy of scale, it is the reason why many companies outsource the logistics activity to the third company, which in turn already has available resources to recompense the enormous expenditure of the trade. In other words, it can be said that from the economical perspective it is more efficient and beneficial to collaborate, since taking the cost advantages obtain from scalability will increase through more available resources. As an example to this expression cross docking technique, a perfect logistics solution could be mentioned. According to Reeves (2007), a cross dock is simply an intermediate staging area for freight. Instead of having geographically dispersed suppliers ship less than full truckloads of material directly to the point of use at assembly plants, full truckloads of material destined for multiple assembly plants are shipped from suppliers to a cross dock facility where the inbound materials are disaggregated, and then re-aggregated for outbound shipment to individual final assembly plant. Actually a truly exploitation of economy of scale could be recognized by implementing cross docking in logistics management system.

There are other reasons that the cost of producing an additional unit of output can decrease as the volume of output increases. One is that with larger assets, firm might be able to organize activity more efficiently. An example to this is the usage of larger fleets. In economical perspective, this will allows transportation costs cut significantly. In addition to financial benefits, other non monetary advantages like reducing environmental pollutions would be expected. Furthermore as the number of assets increase, operator has more flexibility to arrange the assignments somehow which increase the efficiency of the system.

Another point might be that companies with larger volume of output are able to offer a lower price for its service and win competition. Usually, freight rates decline as the volume of cargo tonnage shipped increases, and this can apply to either or both inputs and the final product. Obviously, price is one of the certain parameters in selection of proper supplier (taking the advantage of economy of scale). On the other hand, economies of scope are efficiencies associated with increasing the scale (i.e., the extent of) of marketing and distribution. They are conceptually similar to economies of scale, but whereas economies of scale apply to efficiencies associated with increasing the scale of production, economies of scope refer to increases in the number of different products. Here the quality of the offering might be measured as an important mission rather than the price (cost) of the work. To do so firm could combine and perform a collection of products or services. For example it can be more efficient to ship a range of products to any given location than to ship a single type of product to that location. This is more requested in the retail industry where a number of SKUs ‘Stuck Keeping Unit’ increase, especially for the commodity products that at the same time obsolescence are a critical matter. On the other hand as the number of offering increase, customers have a wider range of options to select. This later point could be regarded as value
adding services which increase the ability of an organization in executing its job. Actually these value added services are more requested nowadays by the customers in the logistics area. As an example the functions of terminal which is a part of logistics system could be mentioned. According to Lumsden (2006) terminal’s function might be consolidation, transshipment, coordination, sorting, kitting, sequencing, commercialization, and sorting. Either all or some of the mentioned functions are performed they certainly increase value of the logistics service.

All of the above expressions confirm the importance of economical parameters in effectiveness of material and resource flows. But the method that a company selects in order to drive a benefit is more important. Certainly, collaboration and any other cooperation strategy would be able to assist any logistics system in establishment of an appropriate infrastructure for the material along with resource flow in the logistics management system. Indeed specific resources are developed when actors collaborate, communicate, and cooperate.

5.4.2 Information flow

In recent times information has become a key player in determination of productivity of a complex enterprise. Customer order together with all other information flowing between different company’s department and even in beyond the four walls of the company, through the entire supply chain, are so critical in order to support other operations in the system. According to Lambert and Stock (2001), the speed and quality of the information flow have a direct impact on the cost and efficiency of the entire operation. Slow, erratic communication can lead to not only lost customers but also excessive transportation, inventory and warehousing cost, as well as possible production inefficiencies. In fact the cost of misunderstanding the actual customer demand is enormous so organizations try to have real and on time information in order to make a proper decision. In such a scenario it is necessary to forecast and estimate the demand as exactly as possible, supply raw materials to the point of sale and reorganize the business structure if necessary. To realize these goals a system must seamlessly integrate both information and material flow. Such a system can provide access to information, aid decision making and execution. Therefore, it is quite evident that one of the key constituent of logistics management strategies is information sharing.

In other words, the key challenges are how a company can quickly integrate its information systems with those of partners, suppliers and customers to form a smart supply chain. In addition, a thoughtful investment in an information infrastructure that will not become obsolete in a year or a less period of time must be made. To meet these challenges, an enterprise must move from a monolithic information system (using a central database in a neutral format) to a software agents approach in which agents anywhere on the net can sense and act on a defined environment. Therefore, we need to establish a new collaboration infrastructure for the entire supply chain net so that a supply chain management system could act based upon a dynamic environment and be able to easily communicate and collaborate with other systems running in partners’ or suppliers’ computers (Liu, 2006).

For companies that provide import/export services, shipment consolidation, customs brokerage services or domestic inter modal transportation for rail, truck and air, keeping track of inbound and outbound shipments is a challenge. Distributors or logistics service providers has an important and sensitive role in the supply chain where transportation, warehousing, and other related jobs are their core business and other parties like manufacturer or customer are
dependent to them and demanding the reliable, available and on time information to better understand the current status of shipments.

Fortunately technology assists organization to acquire this purpose and the World Wide Web (WWW) could be mentioned as an example. In fact nowadays information can flow smoothly through the internet and transfer effectively throughout the world. There is no doubt that availability of information has been increasing and companies that could take more advantage through this accessibility are winners. In addition new channels for product promotion, sales, and distribution with substantial benefits to consumers and producers could be provided by the internet. These new channels change the business environment in dramatic ways and can improve or break existing businesses in a short period of time. According to Tan (2000), adopting electronic commerce (e-commerce) via the Web has become a key strategy to manage the supply chain. Firms capable of taking advantage of the WWW have a highly developed culture of internal and external collaboration, a vision for process and technological enabled change, and an information system infrastructure capable of supporting WWW based collaboration (ibid).

Another point in this matter is the role of information flow in effectiveness of material and resource flow. There is no doubt that in order for material and company’s resources to flow smoothly through different logistical activities, a comprehensive information system is required. This is also needed to support other flows of logistics system including monetary flow. According to Emmet (2006), the material flows are triggered by information, as information is needed for decision making. Information is also used to:

- implement other activities,
- plan,
- organize,
- direct,
- coordinate, and
- control

Information flows therefore link internal company activities and also link external suppliers and customers. Effective information and communication technology will process orders, track and trace progress and provide timely and real time visibility.

Having mentioned above the following question might arise, “how such this information system could be prepared for a system?” Consideration of this question together with diversity and dispersion of the logistics activity make the situation more complicated. Since these activities are operating either by different organization’s departments or some separate entities, availability and reliability of uniform data increase the efficiency of the system which confirms the importance of concrete information flow.

In the previous paragraph the importance of uniform data was discussed. In fact variety of data is required to perform logistics activities. Furthermore these data are spread through different bodies especially in the case where each logistics activity is performed by different companies. That is exactly the same situation as different companies work in a similar supply chain. As mentioned earlier, logistics is defined by the Council of Supply Chain Management Professionals as a part of SCM that deals with material and resource flow, services, and related information between the point of origin and point of consumption. Therefore the necessity of collaboration between different activities increases so as to provide a similar data for meeting customers’ requirements. In fact lack of transparent and similar information for
all the concerning departments or entities leads to situations where everyone makes decisions disrespecting others which finally conclude to inefficient flow of material and resources. This scheme is drown by Lambert and Stock (2001) through figures 5.3 to 5.6.

**Figure 5.3 Demand and Product (material and resource) flows**

As shown in figure 5.3 demand in a chain goes from retailer backward to the distributor, from distributor to the manufacturer and finally to the supplier. On the other hand the product (including material and resource) flows from upstream to downstream in order to respond to the demand. This is a simplified supply chain in terms of number of layers and companies being involved at the chain since in reality it is difficult even to draw it on paper. However figure 5.4 more accurately shows what is happening in a supply chain if every entity does its business and makes the decision individually regardless of the other members. Those double arrows between each layer which could be utilized as a means for interchanging the information become barriers in representing the real demand for other concern members. For instance consider the situation where the distributor has no idea of what will be requested from the retailer until the order is received. Continue this process backward until the chain makes the matter even more seriously and create the well known “Bullwhip Effect”.

**Figure 5.4 Barriers to information flow in a traditional supply chain**

Now compare the previous condition with figure 5.5 where everybody receives identical information, front to back and vice versa. Even those in the very end of the chain know what
is happening, recognize the actual customer demand, and can adapt their operation periodically to the reality. In fact the need for forecasting does not eliminate and still the organization should plan far ahead. However as the real data come to the chain, there is integration between entities involved, and adaptability becomes easier.

**Figure 5.5** Information based supply chain flows

Timely and accurate information flow not only is a motive for smooth and continual product flow matched to demand, but could also be utilized as a competitive advantage. As it was illustrated in chapter 3, for a company to stay profitable as well as competitive in this kind of environment, it has to focus on the drivers that help the specific company to be competitive. Two drivers were mentioned, cost and value. In fact better flows of information through the network could bring numerous values for the company. Especially in the logistics area where other parties in the chain including customers are so dependent to them regarding the current situation of products. Many logistics service providers (LSPs) nowadays perform their jobs with the aid of advanced information technology. Indeed they put more value on their job by collaborating with other partners in terms of information sharing.

When it comes to logistics activity, time is a critical issue that should be considered, especially in transportation where due to its nature both consignor and consignee like to increase the efficiency of the truck through time and space. Almost always companies prefer to save time and of course don’t want to be faced by any delay whether it is in outbound or inbound logistics service. By implementing collaboration through information flow all parties can manage the consignment better and know for instance if shipments are on schedule, or know when shipments are delivered. Also any other changes that are preferred by anyone who is concerned about the shipments would be able to accomplish since all data are moving and accessible anywhere anytime.

There are lots of evidences which could be considered in order to confirm the significance of collaboration through information flow in the logistics activity. For this purpose either inbound or outbound delivery service could be mentioned. As an inbound example suppose in one multinational company that receive the material not in a formal manner, the warehouse manager should have an access to the reliable data that show him the status of the shipments in order to have staff and equipment ready to receive the delivery. Sometimes the company is just a logistics service provider that has a contract with another transportation company. By collaborating particularly in the information system this process would be done in a way in which both of them increase their efficiency. Transportation company increases its service’s
value and reliability, and LSP could have a better response to the customer’s order. The same example could be mention in the outbound logistics service or other areas related to the logistics management.

5.4.3 Monetary flow

Although cash flow is one of the four activities in the logistics, it has failed to attract enough attention from academics. Fewer researches have focused on cash flow performance than on materials or information flows. Actually, Cash is the fuel that drives businesses. Financial flow consists of credit terms, payments and payment schedules, plus consignment and title ownership (Key, 2001). Managing this flow involves record-keeping, tracking and analysis by many entities.

Generally, monetary flow is dependent on other logistics flows. Product should be moved from supplier to customer and the ownership must be transferred in order to cash be paid and flow backward. In case of material flow for instance, the faster goods move from seller to buyer, the faster sellers can be paid.

Collaboration in terms of cash flow increases the robustness of the entire system. A very immediate outcome for such this integration is that companies would be able to make their payments in a timely manner.

5.5 Collaborative logistics

One of the recent extensions of the supply chain collaboration conceptual framework is collaborative logistics management (CLM). The objective of CLM is to reduce or eliminate inefficiencies in the logistics process (for example time, inventory, space, errors and distance) through collaboration, in order to bring benefit to all trading partners. This approach leads to assets such as facilities and capital equipment being used to the fullness of their capacity and economies of scale being maximized. CLM involves information and process flow whereby suppliers and buyers collaborate jointly with carriers or third party logistics providers (3PLs) to provide effective and efficient shipment delivery. According to Czaplewski and Soin (2002), “Collaborative logistics is defined as mutually beneficial cooperative problem solving and opportunity exploitation beyond traditional, predefined trading partners, to foster new different and innovative ways to solve business problems and capture new business.”

As indicated in the previous chapter, the fundamental rationale behind collaboration is that a single company cannot successfully compete by itself and to do this it must share information, knowledge, risk and profits with other parties involved. Furthermore collaboration occurs when companies work together for mutual benefit (Langley, 2000), which otherwise would not be accomplished. That is every entity must be guaranteed that this partnership will increase total system effectiveness and its rewards be shared among all parties.

Among all the activities in the supply chain, collaboration in logistics area is seen to be more logical and reasonable. Due to huge amount of investment and regular reinvestment that this business requires, outsourcing decision is common for those who logistics is not their core competencies. Logistics collaboration is a result of a logistics outsourcing decisions (Visser, 2007). While a number of outsourcing strategies exist, based on Lynch (2001), collaborative logistics is driven by a changing corporate vision that views competition and suppliers as potential collaborative partners in logistics.
5.5.1 Forms of logistics collaboration

As mentioned in chapter four, collaboration can be divided into two main categories, vertical and horizontal collaboration. This is also the case for logistics collaboration where logistics service providers (carrier) and shippers use both forms. As it is summarized in figure 5.6, horizontal collaboration is described by cooperation between parties at the same level in the business, competing (or even non-competing) companies. On the other hand vertical collaboration means working more closely with trading partners to improve each other's efficiency for collective benefit. It is about giving and gaining visibility into each other processes so that each can do a better job.

![Figure 5.6 Vertical and horizontal logistics collaboration](image)

5.5.2 Collaborative logistics intensity

When two or more organizations agree to work together, synergy is a common outcome. This is readily apparent, for instance, when buyers and sellers agree to share point of sale product information, so as to better understand demand in the marketplace. Taking this phenomenon one major step further, the essence of collaboration suggests that competencies are created when collaborative activity actually takes place (Langley, 2000). How could these competencies be created?

In a logistics system some issues are being requested by a shipper. These are transportation costs, inventory carrying costs, on time performance, etc. Furthermore they desire to have fixed departure times and frequencies of transport services. On the other hand subjects such as empty vehicle per mile, unexpected waiting times, less than truck load (LTL) operation, etc. are critical matters for carrier. The point is these two companies are working together while they have different objectives. Furthermore, other parties have another concerning matters as well. There is no doubt that these companies actions are linked together or simply conflicting with each other. Simultaneously, each firm seeks the best and more beneficial solutions which
might not be valuable for others or even seem worthless. However, while it seems a bit complicate for joining two qualities, those smart companies observe this dilemma as an opportunity in order to increase their competitiveness. In fact, though they are confirming these variations in their objectives, they leverage these relationships to gain efficiencies through shared operations. These interactions between companies participating in supply chain setups are generally believed to increase efficiency and decrease costs and enable members of an existing community to meaningfully and productively share valuable resources. Although the poor performance might not result in lack of cooperation, competencies are created by performing the job through collaborative activities.

Basically, companies have a variety of options when they want to join a partnership. Depending on the level they want to be involved, they can select the intensity which is more appropriate to their situation. In the previous chapter three types of collaboration (partnership) in the supply chain were mentioned. The exact classification is recognized from the literature for types of logistics collaboration as well. Based on Visser (2007), the three types of logistics collaboration are:

**Type 1, Operational collaboration**: deploy activities more efficiently within the existing logistic structure. Partners collaborate at an operational level with a short term horizon.

**Type 2, Coordination collaboration**: achieve savings by coordination between parties. Partners exchange information and planning together with a midterm horizon.

**Type 3, Strategic collaboration**: accomplish structural savings as a result of restructuring of the shared logistic structure. Partners investing together and collaboration has a long term horizon.

**Figure 5.7 Three types of logistics collaboration (adopted from Visser, 2007)**
As mentioned, an effective logistics network requires a cooperative relationship between shippers and carriers. However the above classification starts with coordination in activities which is the least level when two companies would like to run any kind of partnership practice. Coordination means organizing or harmonizing the efforts. Here organizations recognize each other as the partners coordinating on a limited base that could eliminate any duplication in work, for instance when a shipper and carrier agree on doing an assignment together. Alternatively, the term used to describe type 2 and 3 is “integration” which is a more powerful expression in defining a relationship. Integration means incorporation and joining together. This is more than just a simple supporting and typically many functions within the organizations are involved. Normally companies create partnership on business rather than on one or several assignments. Especially in type 3 where the organizations view each other as an extension of their own firm.

The important point in consideration of each type is the period which two organizations plan to work with each other. It is recognizable that as the level of integration increases, the time that the relation extends will increases as well. The reason is that developing and maintaining such a relationship, particularly under stress, requires considerable time and effort from the involved parties. Moreover, the responsibilities and expectations are varying in selection of each type.
As it mentioned in chapter 4, the uncertainty in supply chain has tended to increase recently for a number of reasons. Among them globalization, heavy competition, change in consumers buying habit which leads to huge uncertainty in demand, increasing the number of products and technologies which their life cycle have shortened significantly, etc. were mentioned. Moreover this fact that in a typical supply chain a number of companies with different activities are performing, each of which has its own preoccupations and concerns while they must put the final customer satisfaction on their mind, verify the complexity even in statement whereas it is more tough in the practical situation. Among them, logistics activities are so wide and tend to be more costly in comparison with other operations which this later spontaneously increase the level of complexity. Furthermore, logistics is an intermediary process which increase other processes dependency. Meaning other parties in the chain depend on its performance a lot.

Matters given in chapter four and five of this context confirm the importance of collaboration between the partners especially in the logistics area. Surprisingly, however, while shippers and carriers may wish to pursue more collaborative relationships with business partners, this may not always be feasible. In fact, despite those issues discussed in the previous chapters barriers exist in implementation of collaborative logistics management (CLM). In order to achieve the positive results of CLM, the processes between participating companies should be real time, extendable, automated and cost effective. Hence, the implementation of CLM requires systems that enable inter organizational collaboration in a cost effective and technologically compatible manner. Without such systems, companies attempting to apply CLM may find the effort ineffective and difficult to manage. Below driving forces, benefits, barriers and bridges will be discussed in detail.

6.1 Driving forces
According to the literature Collaboration between companies participating in supply chain setups is generally believed to increase efficiency and decrease costs (Gadman, 2004; Stefansson, 2005; Langley, 2000; Harrison et al., 2008; Lynch, 2001; Emmett et al., 2006; Mentaer et al., 2000). Remember the drivers for effective supply chain introduced in chapter 4 of this context, they were cost and value advantage. Collaboration among the partners in the chain has several positive effects and it can be argued that they have either cost advantage,
value advantage, or both of them. That is, collaborating in the chain and between the partners
supposes to decrease the costs and/or bring a surplus value over the offering product/service
which the later lead to preference over the competitors.

According to Lynch (2001), it is critical to understand that collaborative logistics is driven by
a changing corporate vision that views competition and suppliers as potential collaborative
partners in logistics. Smart companies are leveraging these relationships to gain efficiencies
through shared operations (ibid). As it was already mentioned collaborative logistics can
significantly reduce costs, increase supply chain efficiency, and make trading partners more
flexible in addressing shifts in consumer demand. Therefore the two very immediate reasons
that companies enter to collaboration are cost reduction and improve total system
responsiveness. In addition to these two, However, the motives for this purpose may vary
from company to company and different depend on the company’s position in the chain.
Emmett et al. (2006), classified the driving forces (the reasons why companies enter
collaborative relationships) from both buyer and supplier perspectives. These reasons are
represented in table 6.1 and 6.2 respectively. Yet, by looking at them, they remark our main
category regarding the driving forces.

<table>
<thead>
<tr>
<th>Main reason why companies enter collaborative relationships (buyer’s perspective)</th>
<th>Type of driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of delivery item</td>
<td>Cost</td>
</tr>
<tr>
<td>Secure reliable sources</td>
<td>Cost &amp; Value</td>
</tr>
<tr>
<td>Influencing supplier’s quality</td>
<td>Value</td>
</tr>
<tr>
<td>Improve delivery schedules</td>
<td>Value</td>
</tr>
<tr>
<td>Access to supplier’s new technology</td>
<td>Value</td>
</tr>
<tr>
<td>Reduce internal procurement procedures and costs</td>
<td>Cost &amp; Value</td>
</tr>
<tr>
<td>Support JIT initiatives</td>
<td>Cost &amp; Value</td>
</tr>
<tr>
<td>Reduce administration procedures and costs (for example, ordering and invoicing)</td>
<td>Cost &amp; Value</td>
</tr>
</tbody>
</table>

Source: Adopted from Emmet (2006)

Table 6.1 Driving factor form buyer’s perspective

<table>
<thead>
<tr>
<th>Main reason why companies enter collaborative relationships (supplier’s perspective)</th>
<th>Type of driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secure buyer for product</td>
<td>Cost &amp; Value</td>
</tr>
<tr>
<td>Influence customer’s quality</td>
<td>Value</td>
</tr>
<tr>
<td>Support customer’s JIT initiatives</td>
<td>Value</td>
</tr>
<tr>
<td>Improve forecasts of requirements</td>
<td>Cost &amp; Value</td>
</tr>
<tr>
<td>Reduce ongoing administration</td>
<td>Cost &amp; Value</td>
</tr>
<tr>
<td>Reduce internal sales procedures and costs</td>
<td>Cost &amp; Value</td>
</tr>
<tr>
<td>Price improvement</td>
<td>Cost</td>
</tr>
<tr>
<td>Influence/gain access to customer’s new technology</td>
<td>Cost &amp; Value</td>
</tr>
</tbody>
</table>

Source: Adopted from Emmet (2006)

Table 6.2 Driving factor form supplier’s perspective
6.2 Benefits of logistics collaboration

The most immediate benefits that businesses can expect from collaboration in logistics are lowered inventory risk and costs, along with reduction in warehousing, distribution, and transportation costs. In the long term, the most significant benefits to business with advanced collaborative capabilities will be dramatically improved customer responsiveness, increased flexibility for changing market conditions, and finally improved customer service and satisfaction. The important point in consideration of collaborative logistics is that while collaboration’s yield may be shared unevenly among the partners, one must look at beyond an entity’s gain and consider all the positive effects along the supply chain (Czaplewski et al., 2002). In fact trading partners must realize that all the benefits gained by each entity represent a more efficient performance in a cumulative base when companies share their ideas, information, or any other resources which may benefits total system rather than individual firm (ibid). This understanding definitely leads to the final goal of any logistics system which is final customer satisfaction.

6.2.1 Risk sharing

Outsourcing, Lean manufacturing, Just-in-time inventory are considering as some of the best business strategies in the world which can help to minimize cost and let the companies to focus on core competencies. While these strategies are generally believed to increase efficiency and decrease costs they also may stretch the supply chain to its breaking point (Bosman, 2006). Recent trends in outsourcing the production of goods to low cost far-away facilities have significantly increased risk within the supply chain. Distance and longer lead times have heightened the chances of interruptions in supply of the products. However, those negative effects of such strategies might be lightened by sharing the risks developed through collaboration. In fact a truly integration which entail justly shared of benefits, costs, and risks between organization is required to exploit those strategy efficiently.

6.3 Barriers

Generally, barriers facing company for logistics collaboration are human or technology related. Although this classification does not cover all the factors that restrain the collaborative approach, but most of the important reasons fall in this category. The most common barriers contributing to failed collaboration is listed in table 6.3. Among them, some are more serious and need more consideration.

Generally, like other kind of partnership’s strategy, collaboration start with contracts. A very clear contract which delivers the same understanding to all involved parties is mandatory. In a simple buyer-seller collaboration two following problem may arise as a result of failure to reach an understanding. Buyer does not describe properly the requested job. And seller does not consider its competencies and accept the contract while it is over the company’s ability. The former may happen as a result of not having the understanding of owns company’s functions and competencies. One other major pitfall in effective collaboration is transactional methods of partnering. According to Emmett (2006), many companies still desire to do business based on transactional method. A major reason for this is that business is founded on power. It is easy to beat someone up when other have some power. Power here is from the position of the buying company and the control they have of the resources (ibid). Furthermore, companies have become used to regularly negotiating rates with suppliers and carriers, with the main goal of getting the lowest price possible at a given time (Czaplewski, 2002). This is exactly conflicting with collaboration thought which is a win-win situation. Another impediment to collaboration is the expectance of short term results. Alternatively,
long term and more beneficial results are the consequence of collaboration. Trust is another main barrier on collaboration. How might a company release its critical data for other partners while he/she does not trust them? Finally communication plays an important role to implement any kind of partnership. Therefore lack of connection in terms of transferring the required information generates a wall between parties involved. This topic was considered in detail in chapter 5 of this context.

<table>
<thead>
<tr>
<th>Barriers contributing to failed collaboration</th>
<th>Type of barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to reach an understanding¹</td>
<td>HR</td>
</tr>
<tr>
<td>- lack of shared goals</td>
<td></td>
</tr>
<tr>
<td>- different opinion concerning responsibility area</td>
<td></td>
</tr>
<tr>
<td>- lack of understanding of owns company’s functions</td>
<td></td>
</tr>
<tr>
<td>- having unrealistic expectation</td>
<td></td>
</tr>
<tr>
<td>Lack of top management support</td>
<td>HR</td>
</tr>
<tr>
<td>Lack of trust</td>
<td>HR</td>
</tr>
<tr>
<td>Poor (or lack of) communication</td>
<td>TR- HR</td>
</tr>
<tr>
<td>Lack of benefit / risk sharing (different opinions of how costs and savings should be shared)²</td>
<td>HR</td>
</tr>
<tr>
<td>Transactional methods of partnering³</td>
<td>HR</td>
</tr>
<tr>
<td>Opportunism and self interest (may lead to betray)⁴</td>
<td>HR</td>
</tr>
<tr>
<td>Failure to measure collaborative approach advantages⁵</td>
<td>HR</td>
</tr>
<tr>
<td>Focus on negative implication⁶</td>
<td>HR</td>
</tr>
<tr>
<td>Focus and concentrate on short term results⁷</td>
<td>HR</td>
</tr>
<tr>
<td>Technical difficulties (such as IT problems)⁸</td>
<td>TR</td>
</tr>
<tr>
<td>Start up factors such as initial costs⁹</td>
<td>TR</td>
</tr>
</tbody>
</table>

Table 6.3 Barriers to effective collaboration

6.4 Bridge to effective collaborative logistics management

As the barriers contributing to failed collaboration are identified, bridges can be designed and implemented to attain desired benefits. The most important and effective bridges mentioned by the literature are listed and grouped in table 6.4. Without any superiority, two way information sharing, trust and commitment, right mix of channel partners, and appropriate level of investment are mentioned by all the authors and scholars. Clearly, not only they may

¹ Ackerman (1996); Harrison et al. (2008); Mentzer et al. (2000); Emmett (2006); Harrison et al. (2008)
² Emmett (2006); Harrison et al. (2008)
³ Czaplewski et al. (2002); Emmett (2006); Mentzer et al. (2000); Harrison et al. (2008); Min et al. (2005)
⁴ Mentzer et al. (2000); Harrison et al. (2008)
⁵ Czaplewski et al. (2002); Mentzer et al. (2000)
⁶ Harrison et al. (2008)
⁷ Emmett (2006)
⁸ House et al. (2001)
⁹ Mentzer et al. (2000)
act as a bridge for successful collaborative arrangement, they all must be in place before starting any kind of partnership. The reason to name them as enablers for collaboration is their great impact on maintaining collaborative relationships if they performed properly. Other factors mentioned more or less by the same weight depend on the situation where the study was run.

<table>
<thead>
<tr>
<th>Key enablers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two way information sharing and data transparency (communication)</td>
</tr>
<tr>
<td>Trust and commitment</td>
</tr>
<tr>
<td>Top management support 10</td>
</tr>
<tr>
<td>Right mix of channel partners</td>
</tr>
<tr>
<td>Financial and non-financial investments including:</td>
</tr>
<tr>
<td>- time,</td>
</tr>
<tr>
<td>- money,</td>
</tr>
<tr>
<td>- training,</td>
</tr>
<tr>
<td>- right and up-dates technology, and</td>
</tr>
<tr>
<td>- other required resources</td>
</tr>
<tr>
<td>Ability to understand, measure, and allocate the benefits and losses of collaboration 11</td>
</tr>
<tr>
<td>Definition and understanding of 12</td>
</tr>
<tr>
<td>- Scope, goals and objectives of operation</td>
</tr>
<tr>
<td>- Roles</td>
</tr>
<tr>
<td>- Expectation</td>
</tr>
<tr>
<td>- condition of satisfaction</td>
</tr>
<tr>
<td>Common interest 13</td>
</tr>
<tr>
<td>Openness 14</td>
</tr>
<tr>
<td>Mutual help 15</td>
</tr>
<tr>
<td>Real, tangible, and substantial rewards (financial and non financial) for all partners 16</td>
</tr>
</tbody>
</table>

Table 6.4 Important factors in establishing and maintaining collaborative relationships

6.4.1 Value of information – Prisoner’s dilemma

Two ways information sharing is the first step towards collaboration. As it was explained in chapter five, the key challenge today is how a company can quickly integrate its information systems with those of partners, suppliers and customers to form a smart supply chain. A very well known example in effectiveness of information sharing is prisoner’s dilemma. This is an example of two thief who are arrested by the police. Each suspect can either confess with the hope of a lighter punishment or may refuse to talk. The police do not have sufficient information to convict the suspects, unless at least one of them confesses. Each must choose

10 Mentzer et al. (2000); Lambert et al. (2001); Levi et al. (2003); Emmett et al. (2006); Min et al. (2005)
11 Czaplewski et al. (2002); House et al. (2001); Longley (2000); Lynch (2001); Min et al. (2005)
12 Czaplewski et al. (2002); House et al. (2001); Mentzer et al. (2000); Levi et al. (2003); Lynch (2001); Min et al. (2005)
13 Mentzer et al. (2000); Emmett et al. (2006); Min et al. (2005)
14 Mentzer et al. (2000)
15 Lambert et al. (2001); Mentzer et al. (2000)
16 Czaplewski et al. (2002); Emmett et al. (2006); House et al. (2001); Mentzer et al. (2000)
without knowing that what the other will do. In other words, each has to choose whether or not to confess and implicate the other. If neither confesses, then both will serve one year on a charge of carrying a weapon. If both confess and implicate each other, both will go for prison for 10 years. However, if one of them confesses and implicate the other but the other does not confess, then the one who cooperate with the police will go free, while the other will go to prison for 20 years in maximum charge (Datta, 2004).

Prisoner’s dilemma is an example for choosing or not selecting collaboration where the players decide on strategies simultaneously and are thereafter committed to their chosen strategies. This simple example shows the effectiveness and essentiality of information sharing between the partners in order to increase the system efficiency and obtain the optimal profit.

6.5 Case study
To explore the “whys” behind our survey findings, one case study was conducted. Data collection for the case study came from two sources. General information about the company’s history and business idea, collected from the official web site of the company. These data were our secondary source of information. The primary source of data is provided through an interview with the owner of the company. The interview was conducted face-to-face and promised confidentiality to facilitate candid responses. During interview, a semi-structured interview guide was used. The guide was divided into general questions, questions on collaboration among the interviewee’s company customers and suppliers, types and frequency of information used by the company, and finally questions about driving forces, benefits and barriers on collaboration. The guide consisted of both open ended and rating scale questions, enabling a clearer perspective of the interviewee’s responses.

6.5.1 Company’s history and business idea
Already in 1959 launched Universal Furniture in Hong Kong where the company developed into one of the world’s leading furniture manufacturer with production in the Far East and sales in the U.S., Canada, Europe, Middle East, and Australia. In the early 1980's Universal Furniture started its activities in Europe starting in Kinna / Skene. Universal Furniture AB was founded in 1982 and quickly became a leading supplier of furniture for Scandinavian, German and English furniture stores. 1989 was listed Universal Furniture on the New York Stock Exchange and the American owners Lifestyle Furnishing took over Universal Group. 2002 the current owner of the Scandinavian Universal took over the division and the company became Swedish. And in February 2004 the company changed its name from Universal Furniture AB to Hans K.

HansK designs and distributes furniture produced in Asia to furniture retail shops around north Europe, mainly Scandinavia. Right now, the company is dealing with 450 retail customers and several manufacturers in Asia for over than 1000 SKUs (stock keeping unit). As the figure 6-1 represents the position of the company in its supply chain, Hansk is a wholesaler and distributer of furnishing products which the designing process (including the product characteristics and functions) carries out whit in the company. In fact, in spite of its position in the chain which is far from the final customer, HansK business idea was formed to make a direct connection between the company and the edge (final customer). To do this successfully, while the company needs to realize new trends in the market (by getting close to
the end user), it is necessary to get closer to other companies in the chain both upstream and downstream. That is, gaining the advantage of knowledge pool and other assets controlled by other parties to increase total system efficiency.

Figure 6-1, *HansK supply chain.* Source: Hans Karlsson

### 6.5.2 Business collaboration policy

Three types of collaboration were identified in chapter five. The company’s typical position in the chain dictates the importance of coordination both with upstream and downstream partners. Based on company’s policy, they have more integrated partnership with their customers than their suppliers. Compare to the given classification, company does business with their suppliers more in operational level while dealing with the customers are made in type two (coordination collaboration).

### 6.5.3 Information sharing policy

The most common information shared between the partners in the chain is forecasts, while HansK receive the exact status of its products from the retail-shops as well. Two types of forecasts exist in HansK supply chain. One is created yearly from the last year data and some predictions of new trends in the market. This is done by the company and its customers together. Other one which is forms the orders and occurs once a month. That is, company receives orders from the customers, analysis them, form its order, and send it to the supplier every month. But this order would be modified at the beginning of every week (on Monday). Since most of the products are characterized as make to order with a three months lead time.
for production and delivery of items, a very close relation between partners are needed in order to eliminate any disruptions in flowing of products.

The main means of communication used by the company is the traditional way assisted by the internet. Actually they receive and send the information by e-mail. The current situation of the company, lack of essentiality, and the high costs to run a more advance communication system were some reasons to prevent the company in considering other progressed ways. Actually, according to literature study which was given before, the content of information is more important than the way which it communicates. Those more advance communication means (such as EDI or internet base program) may facilitate the transferring of information but not the content of information.

Types of information exchanging between the company and other partners are production planning, stock level, forecasts, point of sale (data coming from customers), deviation and correction message, delivery in formation, and future product promotion. In fact, in the case of information sharing, it seems company well connected to both suppliers and customers. But refers to its particular situation in the chain, company does not work absolutely as an intermediary. Does not asking such this service from other parties (typically suppliers) was the company’s response for this lack of communication.

6.5.4 Logistics collaboration policy

“Furniture in time”, this is the label written on the logo of HansK. Time is considered as the most important factors for the company when it comes to Logistics management. As the company outsource its logistics activity to the third party, the more information transparency regarding companies projects increase the ability at 3PL for better service. Base on the literature study given in chapter five, When it comes to logistics activity, time is a critical issue that should be considered as important as possible especially in transportation where due to its nature both consignor and consignee like to increase the efficiency of the truck through time and space. As the production facilities are located in Asia, time is a very critical factor to decrease the amount of lead times, which is three months for HansK. For this reason, HansK collaborate with its logistics service provider for transferring real data regarding the position of the consignments.

6.5.4.1 Driving forces and benefits of collaboration

From the available alternatives regarding the factors contributing in starting the collaboration, price, secure reliable sources, and access to supplier’s new technology were mentioned which are in some way ranked similar to what observed in the literatures. As it was expected, all of the elements regarding the benefits of collaboration were confirmed by the company. This was also mentioned by the literatures where collaboration nominated as one of the most overused word in supply-chain management today. Companies doing routine business deals claim to be “collaborating”.

6.5.4.2 Barriers

Based on the table 6.3, barriers to effective collaboration, the most important impediments to collaboration from HansK’s perspective were ranked as follows:
1. lack of trust between companies
2. lack of understanding of own company’s function
3. different views of how costs and benefits will distributed among partners
4. different perceptions of the partnership’s roles
7 Conclusion and further research

This chapter brings the objective of this research project and the three research questions and summarizes the results pertaining to each of the research questions. Future research is also brought up at the end of the chapter.

7.1 Conclusion

True collaboration involves breaking down barriers between chain partners. The key to lowering these barriers depends on the level of trust and the efficient flow of real time information among trading partners. By providing information such as promotional plans, historical shipping data, as well as real time load data, companies can significantly enhance collaboration in terms of logistics activities and therefore contribute to more efficient management of supply chain. The example of two or more suppliers who are carrying freight along similar routes was given in chapter five, and proved that their collaboration to have a full truck load increased the efficiency for both parties in term of time, rates and quality of the task.

Furthermore, the discussion given about the importance of information and information technology implied that in order to take the advantages of collaborative logistics management and achieving positive gains in efficiency and cost reduction across the entire supply chain the following elements are required:

- real time customer-based information,
- real time supplier-based information, and
- focused investment in Web-enabled technology

Generally, the results of this study confirm that the reality is far from the situation described in many conceptual articles. In fact, the description of logistics collaboration given in this thesis proves that companies involved in collaboration are still performing on operational level. The reason why the companies do not collaborate on more strategic level needs to be investigated by a separate study but the description given in chapter three of this context about supply chain risk is the most important reason presented by the literatures which was also observed in the case study. Companies involved in the chain still have fear to release their tactical data to other partners. This situation is even more serious in the logistics industry where a typical logistics services provider may does business with two competitors simultaneously.

However, referring to the first research question in chapter one of this thesis, we determined a framework for collaboration which was confirmed both by the result of the case study and interview with some professions in the area of logistics, and supply chain management. Again, as figure 7.1 shows, the framework verifies a correlation between collaboration, innovation, and complexity in the supply chain.
Since we defined logistics as a part of supply chain, the agreed framework is also understood to be matched for logistics system. In fact, reference to all the characteristics of logistics activities such as high investment costs, dependency of other processes to logistics activities as an intermediary process, periodical reinvestment, and a lot of other indicators confirm the determined structure for logistics.

With regards to the second research question, perceived driving forces, benefits and barriers from literatures were presented in chapter six of this context (tables 6.1, 6.2, and 6.3). Generally, when it comes to the literatures, the term ‘collaboration’ receives much attention and almost all of them discuss about its benefits whereas some identified driving forces as impediments as well. However, it is widely believed that collaboration between companies participating in supply chain setups increase efficiency and decrease costs. As mentioned in chapter six the most immediate benefits that businesses can expect from collaboration in logistics are lowered inventory risk and costs, along with reduction in warehousing, distribution, and transportation costs. Furthermore, improved customer responsiveness, increased flexibility for changing market conditions, and finally improved customer service and satisfaction would be expected by keeping collaborative strategy.

In terms of driving forces, cost and secure sources were recognized from the literatures to be the most important reason for companies to enter a strategic partnership like collaboration. This point was seen from the case study as well. Price/cost has long been a driving force in traditional buyer-supplier relationships (Emmett et al., 2006), so it is not surprising that this is confirmed by the case study. In addition, having an ensured source of supply in time of scarcity, a source that will live up to its commitments and promises is considered to by the other important factor in entering collaborative relationships (ibid). And again, it is not surprising to recognize this factor important in the case study since a reliable source is vital for establishing a long term relationship.

When it comes to barriers, failure to reach an understanding, lack of top management support, lack of trust, and poor (or lack of) communication were mentioned in most of the studies. Among them, lack of trust between companies, lack of understanding of own company’s function, different views of how costs and benefits will distributed among partners, and
different perceptions of the partnership’s roles were recognized from the case study. Again, the result from the case study stands along with the factors realized from the literatures.

As it was presented in table 6.4 in chapter 6, two way information sharing, trust and commitment, right mix of channel partners, and appropriate level of investment were mentioned by almost all of the literatures regarding the question number three of this research. Generally, these factors did not consider us to examine the case study as it is quite clear and we have already answered this question in chapter 6. However, during the research process we found a more essential and interesting question to explore which we preferred not to include in our study since it needs its own investigation. The question is; why in spite of all the obvious advantages, barriers, and key enablers, collaboration is not a common strategy and companies just like to pretend they are collaborating.

Finally, this study presents an overall understanding based on the literatures study and a limited number of interviewees’ opinion. Therefore, the results will not be applicable for all players in the logistics and supply chain. This was also not the purpose of our study. Our objective was to develop an understanding of logistics collaboration and investigate its consequence in supply chain. This objective has been reached successfully.

7.2 Further research

This research project mainly has a theoretical character. The next step is to analyze logistics collaboration decisions in more detail to identify actual thresholds in these decisions. Furthermore, the presented framework regarding collaboration is not yet fully tested in industry as well as discussed in academia; therefore further studies are needed in order to certify the designed framework.

Another phenomenon observed in this study and mentioned in the conclusion is the question on lack of collaboration in spite of all clear benefits, barriers and key enablers or lack of collaboration on more strategic level. Here more in-depth studies have to be performed in order to increase the understanding for the underlying of the reasons and to find out some more practical suggestions in terms of bridge to effective collaborative logistics management.
References


(Accessed October 17, 2008)


Lawrence V.Snyder, Zuo-Jun Max Shen. (2006), “Managing Disruptions to Supply Chains”, Vol.36 No. 4,


Appendix I Interview's questionnaire

The following questions were set up in order to design a guide for the interview. The questionnaire is divided into general questions, questions on collaboration among the interviewee’s company customers and suppliers, types and frequency of information used by the company, and finally questions about driving forces, benefits and barriers on collaboration. The questionnaire consists of both open ended and rating scale questions, enabling a clearer perspective of the interviewee’s responses.

What is the company’s main business area?

- □ Subcontracting
- □ Wholesaler
- □ Service sector
- □ Manufacturer
- □ Retailer

Company’s product characteristics:

- □ Standard
- □ Make to order
- □ Make to stock
- □ Customized

Company’s mission regarding the logistics activity:

- □ Centralized
- □ Decentralized

The kind of company’s collaboration strategy:

- □ A collaboration in which both customer and supplier are involved
- □ Collaboration with customer
- □ Collaboration with supplier

In the case of information sharing, does the company pass the necessary information (forecasts, sale data, etc.) from any of the customer to any of the supplier?

In the case of positive answer, what is the reason for that?

- □ Because the customer requesting that.
- □ Because the supplier requesting that.
- □ The total service will improve in the supply chain.
- □ It is economically profitable for all parties involved.

Types of information exchanging between the company and other partners:

- □ Production planning
- □ Stock level
- □ Forecasts/future need
- □ Point of sale
Deviation and correcting message
Future product promotion
Future price
Future deliveries
Delivery information, ex. Receipt confirmation, proof of payment, consignment tracking, etc.

What are the main reasons if the company does not share some information with other parties?
- The information may become available for the competitors.
- Technical difficulties.
- Its costs are more than expected benefits.
- Other parties in the chain (supplier) do not requesting such this service.

Within which logistics area collaboration is performed and to what extent:
- Production
- Forecast
- Stock relationship/inventory management
- Transport planning
- Strategic planning (ex. Warehouse location, choice of supplier)

Who is the driving party in pursuing the collaboration?
- The company
- Other parties

How logistics activities in the company are planned?
- One party has the responsibility for operational planning of some logistics activities.
- Parties plan on an operational level for some logistics activities.
- Parties plan on a more strategic level for some logistics activities (stock location, outsourcing decision, etc.).

Factors contributing in starting the collaboration (driving forces)\(^\text{17}\):
- Price of delivery item
- Secure reliable sources
- Influencing supplier’s quality
- Improve delivery schedules
- Access to supplier’s new technology
- Reduce internal procurement procedures and costs
- Support JIT initiatives
- Reduce administration procedures and costs (for example, ordering and invoicing)

\(^{17}\) Rank the most important items.
Benefits of collaboration:

Costs related:
(The logistics costs mean those costs that are affected by the logistics activities in company, ex. Stock personal, warehouse, transportation, forecasting, etc.)

Service related:
(With better service means right products arrive at recipient, at the right time, the right place, and the right quantity.)
☐ The company’s service to the partners has improved.
☐ The company itself receives a better service from other partners.
☐ The total service to the final customer has improved.
☐ The lead times in terms of orders and deliveries between the parties has been shortened.

Other benefits:
☐ Increase the competitiveness.
☐ Increase the competencies.
☐ More clear responsibility between the parties involved.

Factors make the collaboration difficult to implement:
☐ Start-up factors such as initial costs.
☐ Technical difficulties, such as IT problem.
☐ Lack of trust between companies.
☐ Different companies’ perception and goals from collaboration.
☐ Different skills in logistics activities.
☐ Lack of understanding of own company’s functions.
☐ Different views of how costs and benefits will distributed among partners.
☐ Different perceptions of the partnership’s roles.

Management contribution:

General idea regarding collaboration with other partners in the chain regarding the logistics activities:
(Measure the logistics performance after performing the collaboration strategy)

The main communication form which the collaboration is performed:
☐ Letter, telephone, e-mail
☐ EDI
☐ Internet
☐ None

18 Rank the most important items