Collaborative Improvement – Interplay but not a Game

Rasmus Kaltoft
The Continuous Innovation Network

The Continuous Innovation Network (CINet) is a global network set up to bring together researchers and industrialists working in the field of continuous innovation. CINet is a continuation of the European Continuous Improvement Network, which was established in 1994. The mission of CINet is to develop into a school of thought on continuous innovation.

Continuous innovation is the ongoing process of initiating, developing, operating and improving new and existing configurations of products, market approaches, processes, technologies and competencies, organisation and management systems. As organisations strive to achieve a synergistic balance between short-term oriented, operationally-effective exploitation strategies and longer-term, flexibility-oriented exploration strategies, the rapid growth of the global knowledge economy has placed learning at the centre of this critical balance.

The CINet PhD Network

CINet has developed a PhD network, which promotes research collaboration among PhD students and their institutions on topics of interest to CINet. In detail, the network objectives are as follows:

- To promote the development of research on continuous innovation and its applications to enhance companies' effectiveness and better use of human resources for more sustainable organisation of work.
- To facilitate research integration and mobility on a global level.
- To enhance research quality and, in particular, to promote synergy and collaboration on empirical research.
- To promote a better quality of PhD training and supervision.
- To promote joint research programmes involving companies and academia offering the prospect of rigorous training and exposure of PhD students.

Major activities supporting the ongoing development of the PhD network include:

- The Annual CINet PhD Seminar.
- The Annual CINet PhD Workshop, which coincides with the Annual CINet Conference.
- The CINet research Series – excerpts of PhD theses published by members of the PhD network.
Previously published in this series:

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Taking part in a large and in many ways exciting project like CO-IMPROVE has been a great opportunity and experience for me. When enlightening colleagues of my experiences from CO-IMPROVE as a well-organised project feeding my PhD research with stimulating data, I at times felt a certain degree of envy from them. I could only hope that many more research students would get the same opportunity as I was lucky to encounter. This “envy” is understandable because being a member of a large network like CO-IMPROVE really constitutes a nurturing environment with great opportunities for a research student. I would therefore like to thank the network for three good years of collaborating - the CO-IMPROVE project team will always be special to me. I would like to thank the CO-IMPROVE partners: Anders Berger and Thomas Nyvall from IFS (Sweden), Kostas Seferis from I2S (Greece), Federico Caniato, Mariano Corso, Raffaella Cagliano from Politecnico di Milano (Italy), Daniele Tovaglieri from Aermacchi (Italy), Jos Hijkoop from Power Packer (The Netherlands), Louis Brennan, Paul Coughlan, Fiona Lombard, David Coghlán, Tim McNichols, Roger Nolan from Trinity College Dublin (Ireland), José Gieskes, Olaf Fisscher, Rick Middel from Twente University (The Netherlands) and Harry Boer, Frank Gertsen and Jacob Steendahl Nielsen from Aalborg University (Denmark). I have also engaged very closely with the system integrator (customer) and the suppliers participating in the Danish part of CO-IMPROVE, but unfortunately I cannot thank these persons by full name, since these companies have been made anonymous in this thesis. So, using only the first name and the synonym for the company name, I would like to thank Lars Bo, Henning, Bo, Ove, Peter and Thomas from the System Integrator, Martin from Milling (supplier one), Poul Erik and Poul Erik from Casting (supplier two) and Susanne, Jan and Arne from Turning (supplier three).

In many instances, I have chosen to dedicate decisions and conclusions to “we” instead of “I”, which is different from many other theses I have studied during my research. The reason for making this choice is the fact that I was a member of a team with very frequent interactions and intensive relationships. In this team, consisting of Harry Boer, Frank Gertsen and Jacob Nielsen, we had different objectives, responsibilities and tasks, but worked very closely together in order to help each other and accomplish our contributions to the CO-IMPROVE project; “We”, in other words, is a recognition of our team of four. A great and sincere appreciation goes out to the three of you.
1. Introduction

The research project constituting the empirical foundation of this thesis, is called CO-IMPROVE (collaborative improvement for the Extended Manufacturing Enterprise). When reading this thesis from beginning to end, the reader will become very acquainted with the research project CO-IMPROVE. In this chapter I will briefly present the field of research, the research project, as well as the unit of analysis in CO-IMPROVE. Furthermore, I will describe the overall topic of the research questions and their relevance and end the introduction with the structure of the thesis, which is slightly different from the usual format used in Denmark.

Continuous improvement (CI) is “the planned, organised and systematic process of ongoing, incremental and company-wide change of existing practices aimed at improving company performance” (Boer et al. 2000). This definition suggests that CI is an intra-firm activity and, indeed, most of the theory on the topic does focus on CI within the firm. However, the battlefield of competition is increasingly moving from the level of individual firms to that of supply chains and networks, including Extended Manufacturing Enterprises (EMEs) (Busby and Fan 1993, Stock et al. 2000). Consequently, new approaches must be developed to enhance both the business performance of EMEs and the continuous improvement of their performance, relative to that of other EMEs.

Due to geographical separations between partners involved, EMEs can hardly rely on established organisational and managerial mechanisms to support continuous improvement, while the Information and Communication Technology (ICT) needed to bridge these barriers is in its formative stage. And then, even with suitable ICT-support, learning to improve collaboratively is a non-trivial, protracted process. Good theories and tools to support collaborative improvement and inter-organisational learning are currently not available.

The EU-funded project CO-IMPROVE addressed this need. Focusing on the learning required to enhance collaborative improvement at the EME-level. The objective of the project was to develop:

- A Business Model describing what a collaborative improvement environment may look like, enablers and barriers to achieving such an environment, possibilities to create the enablers and overcome the barriers, and tools that are available for the partners to manage key aspects of the development process.
- A portal-based Software System, enabling and enhancing the capturing, storage, retrieval, and dissemination of knowledge generated as part of ongoing collaborative efforts, and, through that,
facilitating collaboration between, and joint learning by, dispersed partners.

- **Implementation Guidelines** supporting the situational design, implementation and ongoing development of collaborative, EME-level improvement, using the Business Model and the Software System.

The methodology chosen to develop these three products was action research combined with action learning which implies heavy involvement of the researcher. The project involved four universities from Denmark, Ireland, Italy and The Netherlands, and two software vendors in Greece and Sweden. Furthermore, three EMEs were involved, consisting of three systems integrators located in Denmark, Italy and The Netherlands, respectively, and three to four suppliers each, located in these countries and, in the Italian and Dutch cases, in Austria and Germany as well.

So, the unit of analysis in CO-IMPROVE was the Extended Manufacturing Enterprise, defined as a group of suppliers with relationships with the same customer and both directly and indirectly with each other. However, in none of the three EMEs we studied, there was significant interaction between the suppliers. In the course of the project, therefore, focus was slowly moved towards the dyadic relationships between the suppliers and the system integrator. Consequently, the dyad is the unit of analysis in the present thesis. Another important feature of the research reported here is that it is concerned with industrial buyer-supplier relations, whereas some of the literature used and found very relevant is from other collaboration areas such as non-for-profit organisations. Therefore, since literature from adjacent areas is used and found relevant, the conclusions in this thesis are likely to have relevance to the same areas, although they are primarily aimed at industrial collaborations.

### 1.1 The research within this thesis

Through my training as an engineer, I developed a curiosity in sustainable and continuous improvement, and we were constantly educated not to perform sub-improvements that would not be sustainable or would fail to solve the actual problem. The last semester of my master’s studies involved developing the dyadic relationship between two large Danish production companies. During the completion of that semester, I thought about taking the concept of continuous improvement and implementing this in a dyadic relationship. This idea happened to be developed as an EU-funded research project led by Aalborg University, and I took the opportunity to apply to become one of two PhD researchers within this project, i.e. CO-IMPROVE. Like many other action research projects, the research project CO-IMPROVE has a lot of prospective research areas and the researchers involved would get insight in many different, potentially interesting areas. I chose to focus on the factors, particularly their influence on and interplay between dyads collaborating that play a role in the process of dyads collaborating on performance improvements and establishing a collaborative improvement relationship.

### 1.2 Relevance

The objective of this section is to argue that the present thesis is dealing with an area of research that has significant theoretical and empirical relevance. The section will end with a short presentation of the actual problem which the thesis will elaborate further upon.

It is merely a fact that competitiveness of industrial companies has long been focused on positioning the product on the market, and improving internal operations. However, with the value of purchased goods in some extreme cases representing 90% of the overall costs, researchers started to look up-stream for sources of competitive advantage and concluded that customers very much depend on their supplier base (Ellegaard, 2003). Various authors have presented this extended view of competitive advantage using different labels. Dyer et al. (1998) and Kaufman et al. (2000) talk about the relational view, Best (1990) about the new competition, while network researchers use terms such as strategic networks (Gulati et al.,
Introduction

Production philosophies such as outsourcing, mass customisation, modularisation and just-in-time delivery also emphasise the importance of interaction with suppliers since these philosophies cannot be implemented without some level of commitment from the supplier base (Ellegaard, 2003).

The trend in industry is towards more organised and closer forms of networking and integration with suppliers. Many tags are used to describe a customer-supplier relationship, including partnership, relationship, alliance, network, or, with more negative connotations, conflict, competition, co-option, co-opetition or collusion. The term used in this thesis is collaboration. The strategic importance of collaboration has been widely debated and recognised. The prevailing thought is that competing supply chains that successfully manage to integrate supply and demand through collaboration, deliver significantly improved performance, and benefit even further from closer relationships that themselves foster more opportunities for greater improvement. See e.g. Huxham (2003) and Vangen and Huxham (2003) on collaborative advantage, and Barratt (2004), Blake et al. (2003) and Merrii-Sands and Sheridan (1996) who give several examples of benefits. Ellegaard (2004) specifically describes benefits from customer attractiveness.

The topic of collaboration will be further elaborated upon in the thesis, but there is another topic which is relevant to introduce here as well, namely continuous improvement. Among the major benefits of continuous improvement are: increased operational performance (zero waste, set-up time, stock, handling, breakdowns, lead time) and ‘people performance’ in the form of improved development, empowerment, participation, involvement and quality of working environment for employees, all of which address contemporary societal needs. The problem with continuous improvement is that it seems to be a very simple and attractive concept at first sight, but it is actually difficult to design, implement and develop successfully (Bessant and Caffyn, 1997). Continuous improvement requires ‘learning to learn’, or learning to improve ever more efficiently and effectively and to tackle ever greater complex improvement problems and challenges. While enhancing learning within firms is difficult enough, inter-organisational learning and continuous improvement are even more difficult to achieve, however necessary this may be under the current market and competitive pressures. This is mainly due to barriers that are related to the functional/organisational and, in particular, spatial/geographical and time differences between the partners involved. In such a situation, ‘traditional’ mechanisms to support continuous improvement within firms are less appropriate, especially those supporting the capturing, storage, retrieval, transfer, and dissemination of knowledge generated as part of the learning process.

To summarise, although many terms are used to denote the phenomenon, more and more firms engage in inter-organisational collaboration. Furthermore, it is difficult to implement continuous improvement (CI) within the firm, let alone inter-firm level CI. Yet, the competitiveness of collaborations increasingly depends on collaborative improvement.

1.3 Structure of thesis

This thesis is based on four articles with a main report that summarises, but also elaborates on, the findings presented in the articles, thus presenting advanced insight. To get the best possible grasp of the content, it is highly recommended to read the four articles in their full length, before reading the main report. These articles can be retrieved from the current author or Centre for Industrial Production. For readers who do not have the time to do this, the body of the thesis also contains brief summaries of the articles. One of the articles presents and discusses a contingency model of factors and their interplay that we have found to affect the process of developing collaborative improvement. The other articles discuss one or more of these factors in more detail. The present thesis will discuss the many terms used to describe the various
factors, further develop the model in terms of terminology, relevance and completeness, and go into much more depth in describing and discussing the interplay between the factors.

The structure of the thesis is depicted in Figure 1:
2. Background

Improvement has always been important for industry. In the late 1970s and early 1980s, many companies adopted isolated improvement techniques and practices to increase their competitive strengths, particularly from the then booming Japanese industry. Many of the common techniques and practices implemented are part of Continuous Improvement. Theories about networks of companies started emerging in the early 1980s and companies gradually started improving not only within, but also beyond their own boundaries. At present the improvement beyond boundaries is happening more and more in a collaborative manner. This background chapter starts by introducing the empirical background of the study, i.e. CO-IMPROVE, the overall research project and the companies involved. Next, the theoretical background will be sketched. That part takes both a structural and a behavioural/process perspective. In the structural part, theories on networks will be reported whereas the continuum from arm’s length to fully integrated collaboration is described in the behavioural/process perspective. The main theory for this thesis, on collaborative improvement, contributes to both perspectives. Many of the headlines in this chapter are very descriptive and different from the rest of the thesis. I chose to do this in order to make it possible for the reader to read this chapter as a story. This story is told from my perspective and briefly describes the background for this thesis.

2.1 Empirical Background

This thesis builds on a large research project, CO-IMPROVE, which is outlined in this section. See the “CO-IMPROVE Business Model” for a detailed description. The companies playing a crucial role in the Danish part of CO-IMPROVE will likewise be described in this section.

2.1.1 CO-IMPROVE

Before introducing the actual project as well as project objectives, a brief introduction to the field of research is presented to state the reasons for initiating the project.

Increasing competition has led many companies to gradually move from vertically aligned operations (Hayes and Wheelwright, 1984) to horizontally aligned operations (Ghoshal and Bartlett, 1995), a change implying that co-ordination is shifting from the hierarchy to the market place. One way of achieving horizontally aligned operations is through collaboration between companies, for example in a so-called Extended Manufacturing Enterprise (EME) (Frohlich and Westbrook, 2001). In effect, the battlefield of competition is increasingly moving from the level of individual firms to that of EMEs (Busby and Fan, 1993; Stock et al., 2000). Consequently, new approaches must be developed not only to enhance the business
performance of EMEs, but also, in particular, the continuous improvement of their performance, relative to that of other EMEs. Due to geographical and time differences between partners, EMEs can hardly rely on organisational and managerial mechanisms supporting continuous improvement, while the Information and Communication Technology (ICT) needed to bridge these barriers is in its infancy. And then, even with suitable ICT-support, learning to improve collaboratively is a non-trivial, protracted process. Active collaboration between the firms involved is required in order to create and maximise synergy, while allowing each individual partner to realise its own strategic goals at the same time. This requires a well-developed capacity to learn at individual, firm and inter-organisational level. As yet, there are no clear-cut theories or tools to support collaborative improvement and inter-organisational learning.

CO-IMPROVE had several objectives
The EU-funded research CO-IMPROVE (collaborative improvement) addressed the collaborative improvement need of industry. Focusing on the learning required to enhance collaborative improvement of EME performance, the objective of the project was to develop:

- A Business Model, establishing a framework for collaborative improvement. The Business Model essentially describes what a collaborative improvement environment may look like, what may be enablers and barriers to achieving such an environment, what possibilities there are to create the enablers and to overcome the barriers, and what tools are available for managing and monitoring key aspects of the development process.
- A portal-based Software System, which aims to enable and enhance the capturing, storage, retrieval, transfer and dissemination of knowledge generated as part of ongoing collaborative efforts.
- Implementation Guidelines supporting the situational design, implementation and ongoing development of collaborative, i.e. EME-level improvement.

CO-IMPROVE had a variety of partners
The project involved four universities from Denmark, Ireland, Italy and The Netherlands, two software vendors in Greece and Sweden, and three EMEs consisting of three systems integrators (customers) located in Denmark, Italy and The Netherlands, respectively, and three to four suppliers each, located in these countries and, in the Italian and Dutch cases, in Austria and Germany as well, see Figure 2.
The CO-IMPROVE project plan and realisation
To help the project to achieve its objectives, the consortium adopted and actually realised a five-phase plan (see Figure 3).

Phase 1: Requirements
During this phase, theories in various areas, including organisation, supply chain management, organisational learning and continuous improvement, were collected and analysed. From that and interviews with the practitioners, the communication requirements of the participating EMEs were developed.

Phase 2: Design
This phase was based on the requirements established in the previous phase. The main tasks within this phase were the development of the CO-IMPROVE Business Model and the Software System.

Phase 3: Operation
In this phase, the participating EMEs applied an action learning approach to ‘learn to improve collaboratively’. The EMEs started using the Business Model and the web-based Software System. By applying an action research approach, the partners in charge of developing the Business Model and the Software System continuously assessed the companies’ experiences, which were fed back into further development of the products. The knowledge and experience from the action research were combined in a draft review report and discussed in a large workshop at the end of this phase. This report also included draft Implementation Guidelines inferred from the action research of the action learning processes. The results of this discussion, together with the outcome of a brainstorm session held at the same workshop, formed the input to finalise the review report.

Phase 4: Revision
The review report of the previous phase provided the basis for a revision of both the Business Model and the Software System. The aim of this phase was to create a generic Business Model and Software System.

Phase 5: Validation
This phase was concerned with validating and testing the generic Business Model, Software System and Implementation Guidelines. Both the Business Model and Software System were validated internally, by the EMEs, and externally, through user interest groups larger than the groups participating in CO-IMPROVE. The Implementation Guidelines were validated through so-called theoretical generalisation.

Parallel activities throughout the project were Project management to assist the consortium to achieve the project objectives, and support activities aimed at Dissemination and Exploitation of project results.

The following diagram shows the sequence of the major phases:
2.2.1 I spent a lot of time in the Danish CO-IMPROVE companies

Figure 2 showed that the CO-IMPROVE project had three industrial partners from the industry, that is, three System Integrators, with three to four suppliers each involved as well.
As a researcher in the Danish part of CO-IMPROVE I spent a lot of time in the Danish CO-IMPROVE EME, which consisted of the Danish System Integrator, and three of their suppliers, which we will keep anonymous in this thesis.

<table>
<thead>
<tr>
<th>Company</th>
<th># employees</th>
<th>Geography</th>
<th>Field of expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>System integrator</td>
<td>1800 (7000)</td>
<td>Denmark (Global)</td>
<td>Among the largest manufacturers and suppliers of mobile hydraulics in the world today.</td>
</tr>
<tr>
<td>Supplier one Milling</td>
<td>80</td>
<td>Denmark</td>
<td>Primarily a subcontractor with experience within CNC-machining of all types of steel, metals and foundry goods.</td>
</tr>
<tr>
<td>Supplier two Casting</td>
<td>250</td>
<td>Denmark</td>
<td>The second largest foundry in Denmark.</td>
</tr>
<tr>
<td>Supplier three Turning</td>
<td>65</td>
<td>Denmark</td>
<td>A machine shop that works with all types of metal up to 65 mm in diameter.</td>
</tr>
</tbody>
</table>

Table 1: The companies participating in the Danish part of CO-IMPROVE.

Our approach, i.e. action research, involved a great deal of interaction with the companies.

In order to manage the action research/learning process, the university team and the four companies met on a monthly basis. Typically, the purchasing manager of the System Integrator (from here on just SI) and three of his purchasers would be present. Furthermore, the managing director/owner of supplier one, the managing director and the production manager of supplier two, and the marketing manager and/or the quality manager of supplier three would attend. In addition five researchers would attend, i.e. a representative (professor) from another academic partner in CO-IMPROVE (an expert in action learning and action research), two PhD researchers, the local project leader (associate professor) and the overall project leader (professor).

Between the meetings, each of the dyads would engage in improvement activities. Jacob Nielsen and myself (as research students) virtually lived in the companies, each spending approximately four days a week somewhere in the EME, and one day a week at the university for reflection, and discussion with, our supervisors (Harry Boer and Frank Gertsen). Focusing most of our efforts on the three dyads, rather than the EME as a whole, we worked closely together with the suppliers’ staff and the three SI purchasers. We were heavily involved in all the improvement projects and actually partly managed and occasionally even performed (part of) the improvement activities, making analyses, giving training, devising simple tools, and implementing some of the results ourselves. The following table gives an idea about the type of improvement projects worked with and implemented.

<table>
<thead>
<tr>
<th>Dyad</th>
<th>Improvement projects</th>
<th>Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>one, two and three</td>
<td>Improve the quality of goods supplied</td>
<td>Lower than 250 PPM on average</td>
</tr>
<tr>
<td>one, two and three</td>
<td>Improve the suppliers’ delivery performance: Supplier one: performance rate is 62%. Supplier two: performance rate is 37%. Supplier three: performance rate is 68%.</td>
<td>Delivery performance of 97%</td>
</tr>
<tr>
<td>one and two</td>
<td>Roll out TPM from SI to supplier</td>
<td>To roll out TPM in the whole factory to the supplier</td>
</tr>
<tr>
<td>Dyad</td>
<td>Improvement projects</td>
<td>Goals</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>one and two</td>
<td>Implement a kanban system</td>
<td>Implementation of kanban principles with regard to ordering and delivery</td>
</tr>
<tr>
<td>one</td>
<td>Improve the information flow regarding the ordering process.</td>
<td>This project was suspended because the SI was (and still is) in the process of implementing a new ERP system</td>
</tr>
<tr>
<td>two</td>
<td>Develop an FMEA and VPC standard.</td>
<td>Less quality problems Improved start-up process of new products</td>
</tr>
<tr>
<td>three</td>
<td>Develop a purchasing agreement, to make the trade between Supplier and SI easier and faster, and to reduce unnecessary contact.</td>
<td>Improved re-ordering process.</td>
</tr>
</tbody>
</table>

Table 2: Examples of improvement projects.

2.2 Articles based on our co-improve project

The thesis elaborates on four (of several) articles in which we reported and discussed our findings. In this section, I will present a brief overview of these four articles.

Kaltoft et al. (2004) address the question how companies pursuing a collaborative improvement relationship can achieve a balance between the social and transactional aspects of their relationship, and move from a (mostly) arms-length relationship (Figure 5) to a relationship supporting collaborative improvement (Figure 6).

Research question I

How does the way in which the participants in a collaborative improvement process deal with the transactional and social aspects involved affect the success of that process?

The second article, by Boer et al. (2005), is entitled "Factors affecting the development of collaborative improvement with strategic suppliers". and proposes an answer to Research Question II. The article identifies and discusses the impact of the following factors on the collaborative improvement process:
**Goods and money relationship**

![Diagram of Goods and money relationship](image)

*Figure 5: A transactional relationship.*

**Collaborative improvement relationship**

![Diagram of Collaborative improvement relationship](image)

*Figure 6: A collaborative improvement relationship.*

- Vision (strategy, sense of direction).
- Individual behaviour (commitment, political behaviour, opportunism).
- Power.
- Trust (and its counterpart: contract, safeguards).
- Competence.
- Partner characteristics (strategy, structure, size).
- Culture.

**Research question II**

Do the seven factors play a role in the process of developing collaborative improvement in an EME environment, and are there any other factors at play?

How do the factors affect the process of developing collaborative improvement in an EME environment?
The third article, "Implementing collaborative improvement. Top-down, bottom-up, or both?" (Kaltoft et al., 2007) considers the effects of implementation approach. The research question was:

**Research question 3**

*Do the different approaches yield different results and if so, why?*

In CO-IMPROVE, the three EMEs chose different approaches, namely:

<table>
<thead>
<tr>
<th>Approach</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom-up learning-by-doing</td>
<td>The Danish EME focused on improvement projects and daily problems, with a lot of effort put into highly facilitated improvement projects.</td>
</tr>
<tr>
<td>Top-down directed</td>
<td>The Italian EME focused on theory, assessing Collaboration level, primarily directed by academics, with a medium amount of effort put into non-facilitated improvement projects.</td>
</tr>
<tr>
<td>Laissez-faire</td>
<td>The Dutch EME chose a non-directed approach, focused equally on theory, assessment and improvement projects, but with little effort put into non-facilitated improvement projects.</td>
</tr>
</tbody>
</table>

The article shows that not only do these approaches differ significantly, they also have their own unique strengths and weaknesses.

Finally, in Nielsen et al. (2004), we investigated “[t]he influence of power, trust and political behaviour in the process of collaborative improvement”.

**Research question 4**

*How do power, trust and political behaviour influence the process of collaborative improvement?*

### 2.3 SO WHAT THEORIES HAVE WE STUDIED SO FAR?

In the four articles, various theories have been used for different purposes. Some of these theories are explicitly used and discussed in the article, some are incorporated implicitly. The implicit theories we used will be described further into this section, when I write about the continuum on which the dyads appear to have developed their relationships, and about the characteristics of the behaviours we have seen throughout the process. First, however, I will present the explicit theories used in the article and the reasons for using these theories.

#### 2.3.1 Explicitly used theories and why we have used them

In Kaltoft et al. (2004), we state that collaborative improvement requires two kinds of behaviour, one focused on the transactional aspects, and one focused on the social aspects. In theorising the first category, we used transaction cost theories. According to Ellegaard (2003), the original reference is Coase (1937). We used Williamson (1985) in Kaltoft et al. (2004). One reason for doing so is that this theory is one of the
Background

theories most referred to in publications on buyer-supplier relations and supply management (Ellegaard, 2003). The main reason, however, is Williamson’s (1985) view of the relationship between two companies. He regards the transaction as the main unit of analysis and the transaction costs equivalent to the friction in physical systems. The overall aim is to keep these costs at a minimum. In the article, we use this view as one of the perspectives to discuss the improvement aspect of collaborative improvement relationships. For discussing the other key aspect of collaborative improvement relationships, i.e. the social aspects, we used theories on:

- **Co-operative competencies**: socially complex aspects such as communication, knowledge transfer, and the ability to develop trusting relationships (Tyler, 2001).
- **Relational capability**: the capability to interact with other companies (Lorenzoni and Lipparini, 1999).
- **Social capital**: the firm’s relationship with individuals and companies (Ahuja, 2000).

In Boer et al. (2005), we used network theory (Håkansson, 1989) to analyse the main topic of the article, i.e. the interaction between companies. The explanatory factors we used are based on *virtual organisation theory* (Jansen et al., 1999; Bultje and Van Wijk, 1998), *Supply Chain Management literature* (Williamson, 1981; Sako, 1992; Kumar, 1996; McCutcheon and Stuart, 2000), *Transaction Cost Economics literature* (Child and Faulkner, 1998) and *contingency theory* (Mintzberg, 1983; Daft, 2001). The reason why we used these theories is that all theories are well established and all have identified and tested factors that seemed to be useful to explain collaborative improvement.

Kaltoft et al. (2007) uses action learning theories (Revans, 1998; Marsick and O’Neil, 1999; Pedler, 1996; Marquardt, 1999) to test and discuss the approach implemented in the three CO-IMPROVE EMEs. Action research was the research methodology we applied in CO-IMPROVE. Action learning is inherent in action research and we used organisational learning theory to discuss whether the companies have in fact experienced learning in the process of developing collaborative improvement.

We have identified a number of factors, some more influential than others, but in all cases power, political behaviour and trust played a crucial role. In Nielsen (2004), we therefore took a closer look into established publications on these factors to establish if the observations and conclusions presented in the literature are suitable to explain a collaborative improvement setting. For discussing power we used references such as Dahl (1964), Emerson (1962) and Pettigrew (1973); for trust we used McCutcheon and Stuart (2000), Sako (1992) and Ganesan (1994); for political behaviour Fehse (2002).

### 2.3.2 Implicitly used theories, or rather the umbrella of theories

A number of related theories constitute the umbrella of theories which the CO-IMPROVE publications deal with. The overall umbrella covering the majority of theories used in CO-IMPROVE is network theory. I studied the networks of companies involved in CO-IMPROVE from two perspectives. Firstly, a structural perspective helped us characterise the empirical settings in terms of network, dyad or chain. The second perspective is a functional, i.e. behavioural/ process, perspective, i.e. how the process has developed, e.g. from an arm’s length relationship with no integration, to a much closer collaborative relationship. Different behaviours characterise the different steps of the continuum.

Using these structural and functional perspectives, the main body of theory which this thesis will contribute to is collaborative improvement theory. We will introduce the various theories in the following subsections.

**Structural perspective**

The structural perspective of looking at and evaluating the CO-IMPROVE cases will be comprised by the well established theoretical term *network*, a rather neutral term that constitutes many levels of integration in networks. A dyad is a network with just two companies. A supply chain is networks of more than two companies supplying to each other. An Extended Manufacturing Enterprise (EME) is a network in which a
number of suppliers have a relationship with a customer but also with the other suppliers. The different types of networks are characterised by the level of integration between the members of the network, and by the number of participants. Each of the above networks is further explained in the following, starting with an introduction to network theory.

**Network theory**

Most of this part is based on Håkansson (1989). The “world” view behind the network theory is that no company is free or independent of other companies – on the contrary, all companies are part of a network of companies with which they are not fully familiar. The company will then try, within this network, to create, grasp and exploit opportunities to its own advantage. Håkansson (1989) describes a network as the arena in which companies operate, and states that networks are important change instruments and it would not be possible to create changes without the support of the other participants. However with support almost any change becomes feasible. Although each network is unique the networks have various things in common. On example is that the links between companies are based on the fact that they produce and use complementary and/or competitive products. Consequently, a network always contains an element of both co-operation and conflict. Håkansson (1989) has developed a theoretical model describing networks in terms of actors, resources and activities as the three factors constituting them.

![Network model](image)

**Figure 7: Network model, developed by Håkansson (1989).**

Actors perform activities and they control and use resources in the process. The value of the resources is determined by the activity in which they are used.

The model illustrates that a network is a complicated set of relationships with actors controlling resources by performing activities. This is further elaborated upon in the articles and in the discussion chapter of this thesis. In Figure 8 various forms of network are illustrated.
The different types of networks illustrated in Figure 8 are explained in the following sections.

Dyads
A dyad is the simplest form of network. When looking in a variation of on-line dictionaries (such as www.geocities.com, www.openweave.org, www.cybermuse.gallery.ca), all definitions refer to two units joined in a pair or, even simpler, a group of two. From studying several dyadic models, Freytag (1990) concludes that all models deal with two partners who are conscious about the fact that action from one partner can influence the situation for the other partner. We are therefore dealing with a mutual dependency of some depth or another. With more than two partners, different terms are used, which we deal with next.

Supply networks
Recently, a new stream in the literature on customer-supplier relationships observed that the study of dyadic relationships between one customer and one supplier does not allow capturing the overall advantage that could come from an integrated view on supply management. This approach suggests instead focusing on the overall set of relationships that form the “supply network” of a focal company (Lamming, 1993; Harland, 1996). A supply network can be generally defined as a body of advanced relations characterised by an integrated strategy and management policy that the focal company maintains with a limited set of its suppliers (Bartezzaghi and Sassatelli, 2001).

Lamming et al. (2000) identify two distinct streams of research that have been influential in the development of the concept of supply networks:
1) The largely descriptive research on industrial networks conducted by researchers within the Industrial Marketing and Purchasing (IMP) group.
2) The more prescriptive research on supply chain management, based on the fields of strategic management, operations management and logistics.

Researchers within the IMP group have developed conceptual models to provide a better understanding of business markets in terms of the nature of buyer-supplier relationships and the embeddedness of these in “industrial networks”, modelled as inter-connected actors, activities, and resources (Håkansson, 1982, 1987; Ford, 1990; Håkansson and Snehota, 1995).

The term “supply chain management”, which emerged in the early 1980s (Oliver and Webber, 1992; Houlihan, 1984), originally referred to the management of materials across functional boundaries within an organisation, but was soon extended beyond the boundary of the firm to include “upstream” production
chains and “downstream” distribution channels (Womack et al., 1990; Womack and Jones, 1996; Jones and Clark, 1990; Christopher, 1992).

The relatively recent incorporation of the term “network” into supply chain management research represents an attempt to make the concept wider and more strategic by harnessing the resource potential of the network in a more effective manner. Harland (1996) defines a supply network as a set of intertwined supply chains. Cascade (2001) defines a supply network as a body of advanced relations defined by integrated strategy and management policy which the focal company maintains with a limited number of its suppliers. Three distinctive features are included in this definition:
1) The existence of partnership relations between the customer and the supplier.
2) A systemic view of supplier relationships.
3) The definition of integrated strategies and management policies for the overall network.

According to this conceptualisation, supply network theory is an evolution of partnership theory.

An initial classification of supply networks given by Lamming et al. (2000) distinguishes between supply network aimed at producing “innovative-unique” products and those for “functional” products. Another classification proposed by Cagliano et al. (1999) is based on the level of systemic interaction among components within the final product and the level of technological and operational commonalities.

Tiered networks are supply networks organised in levels of suppliers, i.e. “tiers”. The first tier is formed by main subcontractors, which are responsible for the supply of a complete product or subassembly, and thus have to manage a group of second tier suppliers. This is the typical model of Japanese supply networks (see e.g. Dyer and Ouchi, 1993; Ellram, 1995; Fujimoto, 1997) and is generally suited for high levels of systemic interaction among the final product’s components.

The learning network model has been proposed by Stuart et al. (1998) as opposed to tiered networks. In this form of network, competencies, know-how and experience on operational practices are shared among members that often operate at different levels of the value chain. The aim is to increase the overall knowledge of the network. This type of network is suited when the production is characterised by the presence of high technological or operational commonalities.

Obviously, the two forms of networks can also co-exist. These networks have been defined as strategic networks (Cagliano et al., 1999).

Pfohl and Buse (2000) classified production networks in four categories:
- Strategic networks, which refer to our definition of supply network.
- Virtual enterprises, which refer mainly to horizontal collaboration.
- Regional networks, concerning relationships within industrial districts.
- Operative networks, which refer to networks of subcontracting companies, performing relatively standardised tasks and single value adding activities.

Extended Manufacturing Enterprise
An Extended Manufacturing Enterprise is depicted in Figure 9.
Inter-firm relationships have become increasingly fashionable during the last decades. Theories about networks of firms have developed since the early eighties. The idea is that the firm needs to look beyond its boundaries to find all the resources and competencies needed to produce its products or deliver its services. The result is a restructuring of roles, responsibilities and organisational structures to align inter-firm relationships with the market demands (Rich and Hines 1997). According to Douma (1997), these relationships are fuelled by a number of global developments, in particular internationalisation of markets, increasing complexity of technologies and increasing speed with which innovations take place.

The concept of the extended manufacturing enterprise (EME) is rooted in the supply chain management literature. The original focus of this stream was on customer-supplier relationships; gradually though, the horizon of management attention widened from just the internal aspects of operations to the vertical relationships of the company (Kraljic, 1983).

The generic term when studying EMEs is supply networks, see the above section. However, an EME has certain particular characteristics. According to Busby and Fan (1993) and Child (1998), an EME is a network of manufacturing companies that co-operate closely to maximise the benefits of the business they are involved in. The principal company regards its suppliers as legally independent but functionally integrated into its own organisation. Another characteristic is that the EME strongly focuses on benefits for all companies involved, and that these benefits are achieved through collaboration, and increased through collaborative improvement.

Stock et al. (2000) define the extended manufacturing enterprise as a globally dispersed collection of strategically aligned organisations. The EME concept has brought new attention to how organisations coordinate the flow of information and materials across their supply chains. Stock et al. (2000) explore and develop the concept of enterprise logistics as a tool for integrating the logistics activities both within and between the strategically aligned organisations of the extended enterprise.

The basic mechanism that characterises EMEs is collaboration. According to Ring and Van de Ven (1992), collaboration between companies means that they are working together, over an extended period of time, to the benefit of both. The term collaboration will be further elaborated upon in section 0.

One of the consequences of the systemic vision that is associated with both the concepts of Supply Network and Extended Manufacturing Enterprise is that the advantage coming from the collaboration can be measured at network level, and not only at company level. The system comprising the focal company and its suppliers can be viewed as a company with extended boundaries which sells its products in the market and thus obtains an EME-level performance (Holmberg, 2000; Brewer and Speh, 2000). All the same, within this setting the performance of each company in the network depends not only on its internal
operations, strategies and capabilities, but also on the performance of the companies that work together and that contribute to the development and production of the final product. In particular, improvement is essential for EMEs to be able to adapt to the continuous evolution of the context in which they operate and to sustain or increase their competitive advantage. The EME setting can offer both radical and incremental change and can be a way to improve supply networks. Radical change means network design or redesign, while incremental change is less drastic, more continuous and can be implemented in a context of stable relationships and collaboration.

In summary, we have described an EME as a network of manufacturing companies that collaborate to maximise the benefits of the business they are involved in. According to this idea the suppliers are viewed as legally independent but functionally part of the principal company. Thus, we can conclude that the concept of EME is:

1) Centred on pooling manufacturing resources, also among partners working together in the network.
2) Focused on operational integration of information and material flow.
3) Offering a setting in which companies have a great opportunity to implement long-lasting improvements due to the close interaction, i.e. collaborative improvement

![Figure 10: The continuum of supplier-buyer relationships (Spekman et al., 1998).](image)

### Behavioural/process perspective
The purpose of this section is to address the process of developing collaborative improvement. It is quite obvious that a fully developed collaborative improvement relationship is the end-point of such a process. However, what does it mean to engage in the development of a collaborative improvement relationship with companies? An attempt to give an answer to this question is found later in this section. At the other end of the continuum is an arm’s length relationship, based on price negotiations and no integration. But what are the stages between the two extremes? Spekman et al. (1998) present one of the few attempts within the collaboration literature to sketch the continuum on which companies can move and position themselves.

One extreme is an open market negotiations relationship, an arm’s length relationship, which, according to Spekman et al. (1998), is characterised by no integration between the companies, negotiation on price rather than improvement discussions, and conflicts rather than collaboration in the true meaning of the word, i.e. working together. Co-operation is a starting point for integration. According to Spekman et al. (1998) co-operation involves exchange of essential information and engagement with long-term contracts. The key to differentiate collaboration from co-operation is the common search for synergies, goals and joint efforts versus a simple convergence of actions aimed at separate, autonomous goals of the partners. The next step towards collaboration is co-ordination in which both work flow and information are exchanged in such a way that Just-In-Time (JIT), Electronic Data Exchange (EDI) or other mechanisms (not
necessarily IT systems) are permitted in the relationship (Spekman et al., 1998). Spekman et al. (1998) still do not regard the two latter steps as true partnerships; on the other hand collaboration is. Collaboration is not defined in the reference, but one thing is stated, namely that in a collaborative relationship a much higher level of trust is required, a level beyond the high trust level is needed to engage in typical JIT and EDI relationships.

In the next section I will go into details of the concept of collaboration.

2.3.3 Collaboration

Theory about networks of companies developed since the early eighties from the idea that companies need to look beyond their boundaries to find all the resources and competencies needed to produce their products/services. While some generic definitions of network are simply based on the presence of relationships between persons, groups or bodies (e.g. Aldrich and Dubini, 1989), more specific ones distinguish networks as the place of long term relationships between actors (e.g. Thorelli, 1986), and specifically an intermediate organisational form between market and hierarchy (Thorelli, 1986; Miles and Snow, 1992). One of the basic mechanisms that characterises network relationships is collaboration, which is the willingness to share goals, information and technologies.

Introducing collaboration theory

Spekman et al. (1998) consider collaboration as the last step in the transition from open-market negotiation to joint agreement relationships; see also Appley and Winder (1977), Brown (1983) and Walton (1987). Kahn (1996) points out the differences between simple interaction and collaboration: interaction refers to formal, transactional communication links, collaboration to informal, co-operative relationships that build a shared vision and mutual understanding among participants.

Often inter-company collaboration is achieved through collaborative relationships at a personal level between individuals of the firms involved (e.g. Lawton et al., 1991 or, in the NPD process, Cook, 1977; Levinthal and Fichman, 1988; Van de Ven and Walker, 1984; Paasivaara and Lassenius, 2001). Differences do exist between intra- and inter-company collaboration in the sense that in inter-company relationships, a greater number of problems arise related to the availability of information, trust, information and communication media and technology, goal alignment, process mismatch, and agreements (Paasivaara and Lassenius, 2001).

Defining collaboration

Collaboration literally means working together (Huxham, 1996; Jordan and Michel, 2000). Other terms used to describe the essence of collaboration include partnership, relationship, alliance, coalition and network. This great deal of variety in terminology causes confusion for two reasons. On the one hand, there is a plethora of terms used to describe inter-organisational structures that may involve collaboration. On the other hand, there are multiple interpretations of the term collaboration itself. For these two reasons, it makes a lot of sense to make clear what I mean if I use the term collaboration. First I will present a couple of definitions proposed in the literature.

Jordan and Michel (2000) define collaboration as:

A number of companies linked to create and support a service or product for its service life including final disposal.

According to McLaren et al. (2000), collaboration (in a supply chain) involves:

A focus on joint planning, coordination and process integration between supplier, customers and other partners in a supply chain. It also involves
strategic joint decision-making about partnership and network design.

Huxham (2000) writes:

_Collaboration and collaborative governance are taken to include all forms of, and labels for, governance that involves people in working relationships with those in other organisations._

According to Lawton _et al._ (1991):

_Collaboration is a form of horizontal integration where companies operating in similar or related activities establish joint agreements for technology and information exchange._

Winer and Ray (1994) have published a collaboration handbook, in which they write:

_Collaboration is a mutually beneficial and well-defined relationship entered into by two or more organisations to achieve results they are more likely to achieve together than alone._

None of the above definitions fits the current research for various reasons. Some of the definitions are too narrow, for example only considering collaboration in which there is a tight dependence between the partners (as in Jordan and Michel, 2000), or focusing on technical exchange (as in Lawton _et al._, 1991). The definition I found to fit best is from Huxham (1996), because this definition is the most neutral and least exclusive definition. Huxham (1996) define collaboration as:

_A process in which organisations exchange information, alter activities, share resources and enhance each other’s capacity for mutual benefit and a common purpose by sharing risks, responsibilities and rewards._

According to this definition, collaboration brings about the idea of interdependence between actors with shared goals and vision, exchanging information with each other and working together on joint activities to accomplish results at a level not achievable without each other.

But why engage in a collaborative relationship?

**Why collaborate? Why bother? Is it worth the effort?**

It is clear that initiating collaboration is a protracted process that may require a lot of resources. According to some authors, success is in fact rare in collaborations. Merril-Sands and Sheridan (1996) claims that despite the hypothesized economic advantages, collaborative arrangements rarely lead to cost reduction. Moreover, cost saving incentives alone will rarely provide the basis for a productive and sustained collaboration (Gray, 1989; Grindly _et al._, 1994; Huxham, 1996; Kanter, 1994).

Other authors (some of which are presented in this section), however, have written about successful relationships and documented the benefits achieved. So the key question seems to be how and under what circumstances collaboration between two or more companies can be implemented and turned into a success.

Huxham (1996) provides part of the answer. According to her, organisations should only engage in collaboration when 1) it clearly helps each organisation achieve a priority aim and 2) it is clear that a single organisation, acting alone, cannot address the problem. Other authors give additional clues. In the private sector, collaboration has been motivated largely by the desire for improved competitiveness, access to new markets and technologies, risk sharing and increased economies of scale (Jonsson and Zineldin, 2003; Bergquist _et al._, 1995; Evan and Olk, 1990; Gomes-Casseres, 1993; Gray, 1989, 1996; Grindley _et al._, 1994; Huxham, 1996; Kanter, 1994; Ouchi, 1990; Powell _et al._, 1996; Ring and Van de Ven, 1992). Gray (1989)
even argues that collaboration or other forms of strategic alliances are logical and necessary responses to turbulent conditions in the environment. In the public sector, the shrinking resource base for not-for-profit organisations has stimulated the same move towards strategic alliances (Merril-Sands and Sheridan, 1996). The strategic importance of collaborations has been widely debated and recognised. In the following, I present some of the views on why companies with internally as well as externally focused operations perform better than companies with mostly internally focused operations.

Many organisations are heavily focused on planning (forecasting demand and supply, production scheduling) within their own organisation, but fail to take into consideration (the impact of) the plans of other organisations (Ireland and Bruce, 2000).

Barratt (2004) gives a number of reasons for competitive failures of vertically focused companies, including the difficulty to develop a full understanding of internal processes and responsibilities, poor internal communication, and overload of information. When these issues can cause problems within an organisation, if an organisation is not managed well, these issues can cause problems, but this may also result in great opportunities for improvement, in the interaction with other organisations. According to Barratt (2004), companies promoting their products, but not passing the information related to that into the supply chain, may well end up in a situation with increased demand, but short supply.

Other authors have written about improved efficiency of inter-company processes (see e.g. Frohlich and Westbrook, 2001). Above all, a well-managed collaborative relationship leads to greater integration of processes, reduction of redundancy and duplication, a more efficient exchange of information and, consequently, elimination of waste and misunderstandings, and easier planning. Second, the costs of coordinating the organisations involved are reduced, i.e. the costs of finding partners, negotiating and administering the transaction. Finally, collaboration can reduce transaction costs significantly, by making opportunistic behaviour of the companies involved more expensive.

Collaborative supply chains that manage to integrate supply and demand, deliver significantly improved performance, and benefit even further from closer relationships, which foster more opportunities for greater improvement. See e.g. Huxham (2003), Vangen and Huxham (2003), Barratt (2004), Blake et al. (2003) and Merrill-Sands and Sheridan (1996) for examples of benefits.

In the book “Creating Collaborative Advantage” edited by Huxham (1996), there is no consensus about the term collaborative advantage. The authors do not agree on one specific definition, but Huxham herself describes the term as e.g.:

- The creation of synergy between collaborating organisations.
- An output that could not have been achieved except through collaboration.
- The need for each individual organisation to achieve its own objectives better than it could alone.

According to Kanter (1994), collaborative advantage is competitive advantage deriving from the ability to create and sustain fruitful collaborations. Thus, learning to collaborate is a key factor for success, and the key mechanisms supporting collaboration are embedded in structures, processes, and skills. Some of the major benefits deriving from inter-firm collaboration are risk sharing, access to new markets and technologies, speeding products to market, pooling complementary skills, or simply optimising overall performance and reducing costs (see, among others, Kogut, 1989; Kleinknecht and Reijnen, 1992; Hagedoorn, 1993; Eisenhardt and Schoonhoven, 1996).

Contractor (1986) has developed the perhaps most elaborate overview of benefits coming from collaboration; see Table 3. That table shows that the benefits from collaboration are manifold, stretching
from actually making money from lowering cost to benefiting indirectly from lowering risk or overcoming government trade barriers.

In summary, great benefits can be achieved from collaborating with other companies. However, it comes with costs and it may present quite a challenge for a company to reach the point to which benefits overcome the resources spent. The next section will describe this.

**Developing a collaborative relationship presents quite a challenge**

A review of the literature suggests that, despite the rapid growth of strategic alliances, the experiences have been mixed (Bergquist *et al.*, 1995; Heaton, 1998; Huxham, 1996). While some have been highly successful, in many others anticipated. Bergquist *et al.* (1995) studied 75 alliances in the United States and found that about one out of three had either failed outright, had to be radically restructured, or survived only because the partners could not extricate themselves. Bleeke and Ernst’s (1991) study of 49 international partnerships revealed that two-thirds ran into serious financial or managerial trouble during the first two years. Over a longer period of time, one out of three failed, but half were considered to be a success by both partners. Assessments of R&D experiences with consortia in Japan and the United States suggest that collaborative research has been fraught with difficulties and has not always yielded the anticipated advantages (Evan and Olk, 1990; Hane, 1994; Heaton, 1988; Werner and Bremer, 1991).

| risk reduction: | product portfolio diversification |
| | dispersion and/or reduction of fixed costs |
| | lower total capital investment |
| | faster entry and payback |
| economies of scale and/or rationalisation: | lower average cost from larger volume |
| | lower cost by using comparative advantage of each partner |
| complementary technologies and patents: | technological synergy |
| | exchange of patents and territories |
| co-opting or blocking competition: | defensive joint ventures to reduce competition |
| | offensive joint ventures to increase costs and/or lower market share for a third company |
| overcoming government-mandated investment or trade barriers: | receiving permit to operate as a local entity because of local partner |
| | satisfying local content requirements |
| initial international expansion: | benefit from local partner’s know-how |
| vertical quasi-integration: | access to materials, technology, labour and capital |
| | regulatory permits |
| | access to distribution channels |
| | benefits from brand recognition |
| | establish links with major buyers |
| | drawing on existing fixed marketing establishment |

“Collaborative inertia” presents another challenge for companies engaging in collaboration (Huxham, 2003). With this, the authors refer to a deteriorating force experienced if the performance or achievements of the collaboration are disappointing. Inter-organisational collaborations are essentially more time and resource consuming than intra-organisational activities, which can be hard to accept and which some
collaborations have not budgeted for (Huxham, 2003; Merril-Sands and Sheridan, 1996). For an organisation to get access to skills and knowledge from another organisation, which does not exist within the first mentioned organisation, has a downside, namely loss, through sharing, of control (Gomes-Casseres, 1993). Sharing control increases managerial costs and time, as decisions and division of work and responsibility usually have to be negotiated.

Other critical factors found to undermine collaborative alliances include:

- Significant differences in power and influence among the parties (Bleeke and Ernst, 1991; Gray, 1989).
- Differences in organisational cultures and values, particularly in international alliances (Bartlett and Ghoshal, 1987; Huxham, 1996; Kanter, 1994).
- Lack of trust (Mattessich and Monsey, 1992; Ring and Van de Ven, 1994).
- Conflicts in staff’s accountability to the alliance or the parent organisation (Evan and Olk, 1990).

Finally, most researchers stress that managing alliances requires skills and systems that are not the same as those that lead to success in vertically organised hierarchical organisations (Bergquist et al., 1995; Gray, 1989; Kanter, 1994). This requires the collaborative partners to develop new (or additional) management skills and systems.

Challenges such as culture, trust issues, power relations and skills etc. will be further discussed in Chapter 4.

### 2.4 Linking the structural with the behavioral/process perspective

The structural perspective offers well-established theories, such as the network theory. One of the lacks we have identified within the structural theories is that it does hardly, if at all, deal with improvement. We have not been able to identify much on how well networks do and how they can be improved, and what factors affect success and failure. The behavioural/process perspective provides insight into 1) different positions companies can assume on the continuum of intensity of integration, 2) the potential advantages related to each of those positions, and 3) difficulties to be dealt with when progressing on the continuum.

One of the things not addressed in either of the perspectives is the improvement of the relationship between firms working together. Continuous improvement theory did not help either, because that theory focuses on improvement activities within the firm. In CO-IMPROVE the term collaborative improvement was created to denote the continuous improvement activity between firms.
In the following section I try to explain what collaborative improvement is, why it is important and from where it has developed.

2.4.1 **Collaborative improvement**

Private organisations’ individual reasons for establishing a collaborative improvement relationship can be compared to a funnel. At the wide end the specific reasons are manifold, but it all comes down to the issue of creating a higher margin and a larger gap between competitors by continuously improving the current business.

Improvement provides one way of making more money, and one way of obtaining improvement is by cooperating with business partners. In relation to this, Jonsson and Zineldin (2003) state that for a customer to establish an effective long-term business relationship with a supplier, mutual continuous improvement efforts are a must (along with supplier selection criteria and supplier involvement in product development) as well as an objective.

Improvement is, and has always been, important to any company. In the early 1970s, companies around the world started to adopt Continuous Improvement (CI). The concept of CI originates from the Japanese management concept Kaizen, which means “continuous change for the better” (Berger, 1996). CI has found widespread application in industry and led to increased efficiency and better-motivated employees (Imai, 1986; Lillrank and Kano, 1989; and Adler, 1993; referred to in Berger, 1996). Continuous improvement is:

> The planned, organised and systematic process of ongoing, incremental and company-wide change of existing practices aimed at improving company performance (Boer et al. 2000).

![Collaborative improvement diagram](image)

***Figure 12:*** The reasons for initiating a collaborative improvement relationship boils down to a few reasons.

A strong limitation of the literature of CI is the unit of analysis, namely the single company. Studies into the *state-of-the-art* of supply networks and continuous improvement show that the battlefield of competition is increasingly moving from the level of individual firms to that of networks of organisations, such as the Extended Manufacturing Enterprise (EME). CI can no longer be confined to the intra-company level. Although this is a core issue for many companies, there is still a substantial lack of empirically grounded contributions and theories on the enablers and barriers to the implementation of CI in an inter-organisational setting. Transferring this concept, originally developed for the context of single firms, requires an adequate analysis and adaptation in order to consider the peculiarities of inter-company
processes and organisational mechanisms. Consequently, new approaches must be developed not only to enhance the business performance of EMEs, but also, in particular, continuous improvement of their performance, relative to that of other EMEs. Due to functional and, especially, geographical and time separations between partners involved, EMEs can hardly rely on organisational and managerial mechanisms supporting continuous improvement.

The CO-IMPROVE project team defined collaborative improvement as:

A purposeful inter-company interactive process that focuses on continuous incremental innovation aimed at enhancing the overall performance of the Extended Manufacturing Enterprise (EME).

Managing an EME requires attention to how the organisations involved coordinate the flow of information and materials within and across their supply network. In this context, collaborative improvement concerns bringing about change in the EME, developing the EME’s capabilities, and generating actionable knowledge, all at the same time. Finally, it is an evolving systematic change process that is undertaken in a spirit of collaboration and learning. According to this definition, some of the key features of collaborative improvement are the following:

- Collaborative improvement is purposeful and addresses specific issues/needs.
- Collaborative improvement is a continuous, incremental and planned change process aligned with the strategic goals of the EME.
- Collaborative improvement involves partnership and is based on mutual trust.
- Collaborative improvement aims at enhancing EME performance and developing the EME’s capabilities.

The definition from CO-IMPROVE deals with incremental innovation, whereas the main form of incremental innovation is continuous improvement. Another reason for labelling the improvement activities as innovation is because the collaborative improvement activities are focused at creating new knowledge, "not just doing what we do" but better.

2.4.2 Collaborative Improvement – a New Aspect of Doing Business

A collaborative improvement activity is a process focused on enhancing overall inter-organisational performance at two levels:

- Collaborative operations, i.e. the set of operational processes that are performed in collaboration with other partners.
- Collaborative learning, i.e. the process through which learning and improvement capability is achieved.

An established theory used to explain collaboration between partners is the transaction cost economics theory. With transaction is meant an exchange of goods, services or information between actors. A transaction is formed by three elements: the object of exchange, the actors involved, and the rules of exchange. The transaction cost economics theory, first formulated by Coase (1937) and further developed by Williamson (1975) is based on the concept that there are costs associated with a transaction, which are related to partner search and selection, negotiations between partners, monitoring the partners’ behaviour, and the legal cost of the transaction. In collaboration relationships, mechanisms should be put in place in order to reduce transaction costs associated with opportunistic behaviours. Examples of such mechanisms are long-term contracts and trust (Lyons, 1994).

The assets owned by a company which support effective collaboration, have been referred to as social capital. The importance of social capital in collaboration is underlined by Ahuja (2000), who classifies the forms of accumulated capital in three categories: technical, commercial and social capital. Technical capital represents a firm’s capability to create new technologies, products and processes. Commercial capital represents the assets needed to commercialise new technologies. Social capital represents the firm’s
relationships with individuals, other firms or institutions, and provides it with information and status benefits. Social capital includes resources (trust, reputation, status, credibility, information, support, advice, knowledge, and authority), social structure, and organisational goals. Firms with high social capital are more able to develop new ties and relationships (see also Boddy et al., 2000 and Harland and Knight, 2001).

By learning we refer to sharing knowledge, joint creation of new knowledge, and using this to strengthen the capabilities and eventually the business of both partners. Creating and sharing knowledge, however, is critical and problematic, and the difficulties have been addressed by many authors. In the following section, collaborative learning will be further analysed.

2.4.3 Collaborative learning means learning together

According to Bessant et al. (2003), engaging in appropriate practice, which is a dynamic alternative to the more commonly used term best practice, requires capability to change according to lessons learned and to continue to learn. Many authors maintain that this learning has to occur within as well as beyond the organisation. Bessant et al. (2003) use the term supply chain learning. Supply chain learning (SCL) in short is inter-organisational learning using the supply chain as a mechanism for upgrading and transferring appropriate practice. In the context of SCL, companies learn at two levels, i.e. single and double loop learning. Where its content is relatively straightforward, e.g. the use of a new standard, the learning is likely to be a form of single loop learning (Bessant et al., 2003). Double loop learning, in contrast, is significantly more challenging, involving for example a change in the entire approach towards operations, and it is much more difficult to achieve (see Argyris, 1976 for more details on single and double loop learning). Although there is not as yet much evidence of inter-firm learning, learning beyond the boundaries of a single firm is a necessity (Bessant et al., 2003).

Stuart et al. (1998) highlight the specific competitive advantages of a learning network compared to tiered networks. In a tiered network, there is a one-to-one relationship between the buyer and the supplier, and the focus is on optimising that relationship (Stuart et al., 1998). In a learning network, the interaction is among the partners involved and the focus is on learning and developing world-class practice (Stuart et al., 1998).

Lundvall (1996) analysed the process of knowledge sharing, and described learning as an interactive process and knowledge as a collective asset shared in networks and organisations. In an earlier paper, Lundvall and Johnson (1994) proposed four types of knowledge that can be exchanged: Know-what, Know-why, Know-how, Know-who. Lundvall (1996) explains how organisations can learn different kinds of knowledge and addresses the role of individuals in knowledge sharing. Referring to the strategic role of knowledge and learning in the competition, the growing complexity of the knowledge base and the increased rate of change, Lundvall argues that it is fundamentally important for firms to establish long-term and selective relationships aimed at producing and distributing knowledge. The base of the “learning economy” is the formation of knowledge based networks, some of which are local while others cross national boundaries. The access to such networks may be crucial for the success of firms as well as research teams. The growing importance of information infrastructures implies that the question about inclusion and exclusion from such networks becomes increasingly important. Dyer and Nobeoka (2000) analysed the “network-level knowledge-sharing” in the Toyota system and highlighted the three fundamental dilemmas that Toyota solved:

1) Motivation of individuals to participate and openly share valuable knowledge.
2) Prevention of free rider and opportunistic behaviours.
3) Reduction of costs associated with finding and accessing different types of valuable knowledge.

Nonaka (1994) and Nonaka and Takeuchi (1995) describe the process of knowledge creation. In order to become an organisational asset, the knowledge developed by individuals must be amplified through social
interaction and converted to organisational knowledge (Nonaka and Takeuchi, 1995). Nonaka (1994) suggests that organisational knowledge creation takes place in informal and formal interactions between individuals communicating tacit and explicit knowledge. He argued that “organisational knowledge creation can be viewed as an upward spiral process, starting at the individual level moving up to the collective (group) level, and then to the organisational level, and sometimes reaching out to the inter-organisational level” (Nonaka, 1994, p. 20).

Within CO-IMPROVE a model was developed based on theoretical studies. This CO-IMPROVE business model incorporates different levels on which learning can occur.

2.5 The CO-IMPROVE Business Model

Before explaining the actual model, I find it necessary to explain what we do not mean by business model. Typically, a business model (also called a business design) is the mechanism by which a business intends to generate revenue and profits. It is a summary of how a company plans to serve its customers. It involves both strategy and implementation.

According to Timmers (1998), a business model is “an architecture for the product, service and information flows, including a description of the various business actors and their roles, a description of the potential benefits for the various business actors, and a description of the sources of revenues”. This definition somewhat covers the true meaning of business model in CO-IMPROVE. But the actual reason for labelling it as a business model is that it constitutes a model for an organisation to make collaborative improvement into a successful part of the business.

The basic architecture of the CO-IMPROVE Business Model consists of three levels, corresponding to the three units of analysis previously described. The levels are:

- **EME level**: this level refers to the entire network involved in collaborative improvement. The ultimate goal is to develop and spread knowledge, improvement and innovation among all the firms at this level.
- **Relationship level**: this level refers to the many supply relationships included in the EME, each one involving two or more firms. Each firm generally dedicates many people to a relationship, usually coming from different functions: sales, purchasing, production, design, engineering, quality.
- **Project level**: this level corresponds to each of the specific improvement activities or projects put in place within a relationship. The time horizon of the projects is shorter than that of the relationship, and also the scope is much narrower, since each project is focused on a specific goal. Generally, only a limited number of people from each firm are involved in a project.

Within each of the three levels, collaborative improvement takes place through a cyclical sequence of steps or phases which repeat over time (see Figure 13). In the next sections, each of the three cycles is described in more detail.

2.5.1 Project Level Improvement Cycle

At this level each cycle is made of four steps, directly derived from the well-known Deming or PDCA cycle, transferred to the inter-company level.

- **Plan**: in this phase, the improvement project is planned. This involves defining steps, actors to be involved, roles, responsibilities and tools to be adopted, modes of interaction, etc.
- **Do**: in this phase, the project is executed. Key activities are analysing the problem/area that should be improved, generating and then testing possible solutions.
- **Check**: results of the improvement project are evaluated, in terms of change in the operational

---

performance targeted by the project. This phase provides input for the measurement phase at relationship level.

- **Act**: once an improvement solution has been developed and results have been confirmed by testing, the solution is made standard practice and extended to all the related operations, thus enabling to repeat the improved performance over time.

Figure 13: The CO-IMPROVE Business Model

### 2.5.2 Relationship level improvement cycle

Improvement at the relationship level logically starts from a generalisation of what is learnt at project level. Starting from those inputs relationship-level collaborative improvement can be seen as a sequence of three phases:

- **Measurement, sharing and reflection**: at the beginning of each cycle, the current level of operational integration is assessed. Operational integration refers to the extent to which collaborative operations are integrated and genuinely collaborative. This phase evaluates the results of previous cycles at project level and, at the same time, provides inputs for measurement at EME level. Sharing and reflection refer to the diffusion and discussion of the results of project level cycles at relationship level, in order to drive future actions.

- **Goal alignment**: the assessment of the previous phase allows the identification of gaps between the current and desired level of operational integration, thus highlighting areas for improvement (e.g. manufacturing, quality, order cycle, etc.). In this phase, discussion and negotiation take place between parties in the relationship to identify shared priorities among the improvement areas, thus providing goal alignment between the firms involved.

- **Idea generation and selection**: once the improvement area is defined, taking into account the outcome
Background

of the priority setting phase at EME level, ideas for specific improvement activities need to be generated through brainstorming, expert suggestions, data analysis, etc. Ideas are then evaluated in terms of feasibility, constraints and cost. This phase provides inputs to focus on and start further improvements at project level.

2.5.3 EME level improvement cycle

Collaborative improvement at EME level logically starts from a combination and generalisation of learning and improvement at relationship level. Three additional sequential steps or phases can be identified:

- **Measurement, sharing and reflection:** the assessment of the current level of collaborative improvement maturity and the results of previous improvement cycles at relationship level provide the input for a phase of measurement, information and knowledge sharing and reflection extended to the EME level. The current status and past results are analysed in order to drive future actions.
- **Strategic alignment:** at EME level there is a need to align the efforts of all the firms involved towards common competitive priorities. For this purpose, the EME performance should be assessed in order to develop a joint understanding of the positioning compared to competitors and market requirements. Evaluating and sharing performance at this level allows defining shared goals.
- **Priority setting:** Once the strategic alignment is achieved, collaborative improvement requires the definition of priorities to guide the improvement efforts towards a common goal. This phase implies discussion and negotiation in order to agree on priorities at EME level. This phase provides inputs for the (next) improvement cycle (-s) at relationship level.

2.5.4 Interaction between the three cycles

Although different from each other in scope and content, the three cycles are strictly related. What happens at EME level guides the actions at relationship level and, in the same way, decisions at relationship level guide actions at project level (see Figure 13). This is a top-down influence, but at the same time also a bottom-up influence is present through the feedback loop provided by the measurement phases at each level.

The three cycles have different frequencies. The EME level cycle is the less frequent, since strategic alignment is a long-term process and changes at EME level require long time to take place; in particular the collaborative improvement maturity Relationship level cycles are more frequent, since improvement priorities can change in a shorter time compared to strategic goals, and several relationship cycles are needed to effectuate a change at EME level. Finally, project level cycles are the most frequent, since they are short-term oriented. Usually, several projects take place within a single relationship level cycle, since many improvement activities are required to generate a relevant change at the level of operational integration.

2.6 So how did we study this phenomenon?

The methodology applied to this research is action research combined with action learning.

Action research is a cyclical process of diagnosing, action planning, action taking, evaluating and specified learning (Lau, 1999). Action research focuses on research in action, rather than research about action, in which members of the studied system actively participate in the cyclical process. In this way, the researcher aims to contribute both to practical concerns of people in an immediately problematic situation and to the goal of science by generating emergent theory. The action researcher is not an independent observer, but becomes a participant, and the process of change becomes the subject of research (Westbrook, 1995). Several broad characteristics define action research (Coughlan and Coghlan, 2002):

- **Research in action, rather than research about action.**
- **Participative.**
Collaborative Improvement – Interplay but not a Game

- Concurrent with action.
- A sequence of events and an approach to problem solving.

Action learning is an approach to the development of employees in organisations, which takes the task as the vehicle for learning. It reverses the traditional learning process where the learning takes place before the application. In action learning, the starting point is the action, and it is based on two principles (Revans, 1998):
- "There can be no learning without action and no (sober and deliberate) action without learning”.
- "Those unable to change themselves cannot change what goes on around them”.

Action learning is formulated around Revans’ learning formula, L=P+Q (Revans, 1998). L stands for learning, P for programmed learning (i.e. current knowledge in use, already known, what is in books etc.) and Q for questioning insight. Revans (1982) describes three processes central to action learning:
- A process of inquiry into the issue under consideration - its history, manifestation, what has prevented it from being resolved, what has previously been attempted. Revans calls this process System Alpha.
- Action learning is science in progress through rigorous exploration of the resolution of the issue through action and reflection. He calls this System Beta.
- Action learning is characterised by the quality of group interaction, which enables individual critical reflection, and ultimately enables learning to take place. This is the essence of action learning and Revans calls it System Gamma. Revans (1998:75) refers to managers as “disciples of the Aristotelian ethic” who act “by doing what they set out to do and by setting out to do what they believe”.

<table>
<thead>
<tr>
<th>Action Learning Characteristics</th>
<th>Action Learning in CO-IMPROVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A problem – whereby complex organisational issues which touch on different parts of the organisation and which are not amenable to expert solutions are selected and worked on.</td>
<td>The improvement of collaboration between system integrator and suppliers to enhance supply chain management through implementation of the software system and the business model.</td>
</tr>
<tr>
<td>The group – comprises a typical number of six to eight members who have an interest in the problem, know something about it and have the power to implement solutions.</td>
<td>Inter-organizational network, comprising system integrator and its suppliers, with knowledge and power to implement the business model and software system.</td>
</tr>
<tr>
<td>The questioning and reflective process.</td>
<td>Network meetings at which new ideas is presented, actions reported on and new actions planned.</td>
</tr>
<tr>
<td>The commitment to taking action.</td>
<td>Committing the networks to implementing the business model and software system.</td>
</tr>
<tr>
<td>The commitment to learning.</td>
<td>Committing the networks to the action learning process.</td>
</tr>
<tr>
<td>The facilitator.</td>
<td>Members of the academic partners acting as learning coaches. This is important to keep the networks focused on learning.</td>
</tr>
</tbody>
</table>

Table 4: Action Learning in CO-IMPROVE.

While the practice of action learning is demonstrated through many different approaches, two core elements are consistently in evidence:
- Participants work on organizational problems that do not appear to have clear solutions.
• Participants meet on equal terms to report to one another and to discuss their problem and progresses (Marsick and O’Neil, 1999).

The implementation of action learning has four elements - the person, the group, the problem and actions taken to solve problems in the problem in the organisation, and the learning from this problem solving (Pedler, 1996). Action learning is essentially built around a structure whereby participants meet in a group, discuss and reflect on the progress of the particular project(s) on which they are working and then follow up on the learning from that meeting in the day-to-day enactment of attempted solutions to the problem.

Marquardt’s (1999) six components of action learning provide a useful characterisation of the structure of action learning. These six components are in Table 4 compared with the CO-IMPROVE approach to action learning.

2.7 Work has been performed, but what have we not done, yet?

In a previous section, I presented the research questions from the four articles collected in the back of this thesis. A collaborative improvement process is very complex and gives researchers a large variation of possible choices for research areas. In Kaltoft et al. (2004), we conclude that a new and different behaviour is needed in a collaborative improvement setting. Compared to a less intensive relationship, the new behaviour involves a different balance between social and transactional aspects. Boer et al. (2005), seeks to identify factors that come into play when developing a collaborative improvement relationship. Some of the factors are endogenous to the process, such as lack of trust and vision, the use of power, and exposing individual behaviour, while others are exogenous, such as partner characteristics and culture. First, we used the literature to identify a number of factors that influence the process of developing collaborative improvement and also to establish a language, a terminology suitable for disseminating the research. We then sought to understand from our empirical data if there are other factors at play not identified in the literature. We have then, in other articles, dug deeper into some of the factors. In Kaltoft et al. (2007), we went into depth with the factor approach. In Nielsen et al. (2004), we researched the factors power, political behaviour, and trust. It is quite clear that one factor does not stand alone, but is influenced by other factors; this is especially evident from the cases presented in Nielsen et al. (2004).

The discussion in this thesis will extend the knowledge about the collaborative improvement process by analysing which factors other researchers have found within the collaboration literature, and by considering whether they agree with our terminology and findings. The other part of the discussion will elaborate further on the fact that one factor does not stand alone, but is influenced by other factors; we call this the interplay between factors. Our initial findings tell us that one factor can have detrimental effects in one dyad while it can have beneficial effects in another dyad, which is partly due to the interplay with other factors. Consequently, the first question researched in the thesis is:
The model referred to in the research questions is labelled in this thesis as the contingency model of collaborative improvement development, and is to be found in Boer et al. (2005), as well as in the Discussion Chapter 5 and Conclusion Chapter 6. The second research question for this thesis is:

**Thesis research question 2; interplay**

- How does interplay between the key factors in a collaborative improvement process affect the success or failure of the collaboration?

Thesis question number one is concerned with a comparison between the existing collaboration literature and our findings, which are expressed in our model. First and foremost, I wish to find out what terminology has been used in the existing Collaboration literature, and if our terminology is comparable to that and/or should perhaps be changed to create synergy and coherence with the existing collaboration literature. Next, I want to find out if our findings are relevant to the existing literature. Finally, I want to discuss the completeness of the set of factors in the model – have we forgotten any crucial factors? This is to some extent a theoretical question, in the sense that one may wonder whether a theory is ever complete? Theories may become outdated and irrelevant, e.g. the theory that the world is flat. On the other hand, I can also imagine a situation where a body of knowledge seems quite complete, but only until the world changes, inducing new ways of behaving or looking at the world. An example in place could be the research on manufacturing processes during the early 1900s. The theories developed seemed fairly complete at some stage, until years later, when the development of new technology, especially factory automation, brought with it a whole new perspective. Research started to blossom again, and additional and/or new theory was developed. In other words, with this research question I am merely trying to think about, and present to the reader, my view of how well developed, or not, the theory on collaboration is. How well described and exemplified are the factors that come into play when implementing one form of collaboration, namely collaborative improvement?

Thesis research question number two deals with the interplay between the factors or, in model terms, the arrows between the factors. The aim here is to describe each arrow. I will not discuss the completeness and relevance in regards to the interplay relative to existing theory, simply because there are hardly any publications within this field of research from the collaboration or adjacent literature.
3. Focus and Framework

In this chapter I will present the empirical, theoretical, instrumental and methodological focus of the thesis. The purpose of that is to recapitulate the content of the previous chapters and to present different focuses leading to the research questions. Secondly, I will present the analytical framework which will be the backbone of the discussion.

3.1 Focus of the Thesis

Figure 14 recapitulates in an illustration the various focuses explained in the Background and Methodology chapters. The research questions are the core of the thesis, and the various focuses lead to the two main research questions. In the following, the four focuses will be explained.

3.1.1 Empirical Focus

Empirically, the present thesis aims to help managers who are considering and/or in the process of establishing, a strategic relationship, i.e. an inter-organisational relationship between two production companies; a customer and a strategic supplier. The research project reported here was meant to focus on Extended Manufacturing Enterprises (EMEs) but I had to decide otherwise and will focus on dyadic relationships instead. This reason is twofold. First, CO-IMPROVE contributed little to collaborative improvement on the EME level: not one single collaborative improvement project involved all participants in the entire EME. The EME setting created an environment with learning spreading from one dyad to another, but that learning was very limited and then restricted to single-loop or adaptive learning, i.e. doing what we do but better (Bessant et al., 2003; Bessant and Buckingham, 1993). Consequently, I simply do not have enough interesting empirical data to contribute to the theory on supply chains and networks.

3.1.2 Theoretical Focus

Collaboration is the overall concept used in the present thesis. However, collaboration is a very broad umbrella-concept for many sub-concepts. In this thesis the term or concept is aimed at explaining the dyadic relationships between production companies collaborating in an inter-organisational setting. The thesis is particularly focused on explaining the collaborative improvement part of collaborative relationships. In discussing our findings I will mostly rely on collaboration literature, or similar, not collaborative improvement literature, simply because there is no such literature. The conclusion and generalisation is focused on developing knowledge within the concept of collaborative improvement.
3.1.3 Instrumental focus

The instruments we used in the CO-IMPROVE project were intervention in and facilitation of the development of collaborative improvement by the system integrators and the suppliers involved.

In the Danish setting, we facilitated monthly workshops as well as improvement projects. Being a facilitator has added great detail to the empirical knowledge due to the level of involvement by the researchers. Using facilitation as an instrument has allowed us to be in charge of most of the improvement projects, and as a result, we were always involved in every part of the projects, which provided us with the maximum data possible. By actively intervening, the CO-IMPROVE researchers tried to change not only the mindset of the practitioners but also the work processes and management approaches of the organisations. This required a fundamental understanding of the people and organisations involved and we achieved this by becoming part of the daily life of these organisations or, in other words, being part of the action.

Figure 15 illustrates that a researcher can be involved on different levels of the data collection. Observing an action is the most distant level, and being part of the action on equal level with the action as project participants represents the other end of the scale. Being part of the action also gives the researcher the most fundamental and detailed understanding of the action, whereas observing the action merely gives the researcher the ability to develop a broad overview and in the end to generalise this knowledge. Facilitation is placed at a higher level than intervention: a facilitator's job is to keep momentum, make sure that
participants stick to deadlines. Intervening in mindsets, processes and approaches is a level closer to the action than facilitating.

3.1.4 Methodological focus

Action research and action learning was the chosen methodology for the CO-IMPROVE research project. Therefore the central methodology for this thesis was action research (by university teams working closely together with three EMEs in Denmark, The Netherlands and Italy) and action learning processes (by the EMEs). Therefore theoretical insight was derived from naturally occurring data rather than through interviews and questionnaires, see Marshall and Rossman (1999) on the matter. In intervening with the participant organisations and their representatives on the project, the researchers had many roles, such as facilitator, supporter, asking the “right” questions, educator, mediator and/or directly involved as a participant on the same level as the practitioners.

![Image](image_url)

Figure 15: Different levels of involvement in a research project.

3.2 Framework – The contingency model of collaborative improvement development

In Boer et al. (2005), we identified the main factors influencing the process of collaborative improvement, and described and discussed the interplay between the factors. Figure 16 summarises and illustrates our findings.

In Boer et al. (2005) the model is explained in detail; a summary can be found in the Discussion Chapter. Kaltoft et al. (2004), discusses how implementing a collaborative improvement relationship requires a new behaviour. The article, in discussing this, leads up to the difficulties of implementing a collaborative improvement process. Boer et al. (2005), presents the factors that influence the process, see Figure 16. Kaltoft et al. (2007) and Nielsen et al. (2004) explain in depth the role of, and discuss the interplay between, some of the factors, namely approach, power, trust and political behaviour. I regard Boer et al. (2005) as the core text which the rest of the articles evolve around.
The thesis will take its point of departure in, and further elaborate on, the articles. In the discussion chapter of this thesis, the collaboration literature is presented and discussed in order to provide an overview of the factors found within this particular body of literature and to discuss the factors with the ones presented in the framework of Figure 16. Next, an overview of the terminology used in the collaboration literature is presented. This is followed by a discussion of the terminology used in the framework. Then, the collaboration literature is used to establish if our framework lacks key factors, or if we have found important factors that are not addressed in the literature. In the last part of the discussion we will use our empirical data to discuss the interplay between the factors. For this part of the discussion it has not been possible to find supporting or opposing literature.

Figure 16: The contingency model of the collaborative improvement development.
4. Discussion

This chapter discusses the thesis research questions we used in Boer et al. (2005), and well-established literature to identify a number of factors we thought would affect the development of collaborative improvement. We tested these factors against our CO-IMPROVE findings and concluded they were indeed relevant. We also found a couple of additional factors, and described and discussed the interplay between the factors.

In the first part of this chapter I will discuss the factors in comparison with and contrast to collaboration theory to conclude on the relevance, completeness and terminology of our findings relative to this specific body of theory. In the second part of the chapter, I will describe and discuss the interplay between the factors identified, which has not been done in our articles. In the last part of the chapter, I will discuss collaborative progress, and the focused balance between the social and transactional aspects of a collaborative improvement relationship.

4.1 Discussion of Factors

In this section, I will discuss the factors identified and developed in Boer et al. (2005). Before discussing the factors, I will present the model developed in the article.

4.1.1 The Contingency Model – Choosing the Factors

The model was presented in the Framework chapter, see Figure 16. In this section I will present how the model was developed. For further details see Boer et al. (2005).

Figure 16 depicts the most important factors at play in the development of a collaborative improvement relationship and the model is the analytical framework for this chapter. The list of the factors is developed dialectically, that is, in an ongoing process of confronting existing theories with our empirical findings, and vice versa. This is typical for action research. The Danish researchers in CO-IMPROVE designed the model, brought it to the Italian and Dutch settings to test if the same factors applied and if the factors would interact in the same way. The conclusion was that this model is descriptive indeed of the situations experienced in all three EMEs.

The model has two kinds of factors, i.e. endogenous and exogenous factors. According to www.websters-online-dictionary.org, an endogenous factor is a factor which is derived or originated internally, whereas exogenous is derived or originated externally. To relate it closer to this thesis and the articles this thesis is
based on, endogenous factors are identified within the unit of analysis, which in this thesis is regarded as the collaboration between firms. Exogenous factors, on the other hand, are identified outside the unit of analysis. Both types of factors have direct impact on the process. To exemplify, the Managing directors/owners of the supplier, as well as the purchaser from the SI, are all endogenous, whereas the IT department, that was involved at some stage in the CO-IMPROVE project (see Nielsen et al. (2004)), is exogenous to the unit of analysis.

4.1.2 The literature used for the discussion

The first research question from Kaltoft et al. (2004) is aimed at examining whether these factors play a role in a collaborative improvement process. The conclusion is that the factors in fact do play a role in that process. The factors identified in the article are identified from adjacent fields of theory. The objective of the discussion presented next is to seek answers to thesis research question 1 and, through that, test and validate our findings particularly up against the collaboration literature. Parts of adjacent literature not used in the article are used here, especially in areas where collaboration theory is scarce or non-existent. Table 5 comprises an overview of the references used.

This section will discuss each factor used in the contingency model of collaborative improvement development by describing the factors and relating this to findings put forward by other authors. I will first relate the terminology used in the contingency model to terminology used in other publications. Next, I will assess the relevance and completeness of the factors identified in the CO-IMPROVE project, again by comparing and contrasting our findings with factors identified by others. Finally, I will analyse the influence of factors not identified in CO-IMPROVE by revisiting our empirical material. The objective of the section is then to conclude:

- Whether we should add, remove or change factors and, which ones.
- Whether we should use a different terminology, in order to make our findings easier to assess from the collaboration, continuous improvement and supply chain literature.
- With a discussion especially of those factors we did identify, while others did not, as well as factors we did not identify, while others did.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Relevant keywords</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barratt, 2004</td>
<td>Supply chain management; collaborative relationships</td>
<td>Collaborative culture, external and internal trust, mutuality, information exchange, communication and understanding, openness and honesty, managing change, cross functional activities, process alignment, joint decision making, supply chain metrics, resources and commitment, intra organisational support, corporate focus, role of technology</td>
</tr>
<tr>
<td>Beckett et al., 2003</td>
<td>Collaboration</td>
<td>Integration, organisational barriers, trust, learning, time, effort, business plan (vision)</td>
</tr>
<tr>
<td>Bessant et al., 2003</td>
<td>Supply chain, organisational learning, kaizen</td>
<td>Plant visits, joint teams, communication, IT, dependency, commitment, learning, approach, periodic revision, open-book practice, trust, vision, collaborative inertia, culture, skills, time, arrogance, external problems (commercial reality)</td>
</tr>
<tr>
<td>Reference</td>
<td>Relevant keywords</td>
<td>Factors</td>
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<tr>
<td>----------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cao et al., 2000</td>
<td>Systemic thinking, organisational change, TQM</td>
<td>Approach</td>
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<tr>
<td>Cox et al., 2003</td>
<td>Buyer-supplier relationships</td>
<td>Power, willingness</td>
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<td>Eden and Huxham, 2001</td>
<td>Negotiation, collaboration, behaviours</td>
<td>Negotiation focus, vision, episodes rather than factors</td>
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<td>Action research, alliances, Collaboration, collaborative advantage, partnership</td>
<td>Ambiguity, complexity, dynamics, collaborative advantage, collaborative inertia, membership,</td>
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<td>Huxham, 2000</td>
<td>Collaboration, governance, partnership</td>
<td>Complexity (relationships, memberships, government and task structure, pluralism, ambiguity, dynamics), diversity (resources and aims, language and culture, power)</td>
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<td>Collaborations, collaborative advantage, action research, partnership, leadership, joint working (primarily in governmental or not-for-profit collaboration)</td>
<td>Collaborative advantage, collaborative inertia, common aims, power, trust, membership structures (ambiguity, complexity, dynamics), leadership</td>
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<td>Ingle, 2000</td>
<td>Implementation, TQM</td>
<td>Approach</td>
</tr>
<tr>
<td>Ireland and Bruce, 2000</td>
<td>Collaborative planning, forecasting and replenishment</td>
<td>Trust, openness, understanding senior management, vision, technology</td>
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<td>Jonsson and Zineldin, 2003</td>
<td>Supplier relations and satisfaction, trust</td>
<td>Communication, adaptation, reputation, power, corporation, relationship bonds, dependency, relationship benefits</td>
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<td>Merrill-Sands and Sheridan, 1996</td>
<td>Collaborative alliances</td>
<td>Membership, purpose, structure, process, communication, funds</td>
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<td>Medlin et al., 2002</td>
<td>Collaborations, business relationships, coordination, relationship performance</td>
<td>relationship experience, future orientation (vision), economic goal, flexibility, role integrity, commitment, trust, relationship performance</td>
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<td>Parung et al., 2004</td>
<td>Collaboration, failures</td>
<td>Inter-personal/group relationship, outcome performance, organisational and structural</td>
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<td>Porras et al., 2004</td>
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<td>Zineldin, 1998</td>
<td>Collaboration</td>
<td>Environmental forces (commercial reality), the exchange and interaction process, communication, overall atmosphere (process)</td>
</tr>
</tbody>
</table>

Table 5: Overview of references and main literature area targeted.
To complete this analysis and discussion, I have identified a number of articles that contribute to the field of implementing collaboration with factors that influence this process. In addition, I have also identified articles from adjacent fields of research. The references I used are listed in Table 5, together with key words indicating the discipline(s) or area(s) of research to which they contribute and the factors they have identified in the articles.

In discussing the factor approach I have decided to use the findings from the Dutch and Italian EME to support the findings from the Danish EME as we also did in Kaltoft et al. (2007). I have decided to do this because we had one approach in the Danish EME, and discussing all three approaches (one from each EME) against findings from the literature is much more beneficial and adds a lot more to the discussion, than discussing just one approach. In the case of the other factors, the Danish EME itself gives me empirical data from three dyads, and I have found this useful enough to discuss the findings against the literature.

4.1.3 Approach

Important aspects of the approach adopted to implement the strategic relationship include the way in which the process is facilitated, who directs the process (if any direction is given at all) and the focus of the process (operational or conceptual). In their contribution to supply chain learning theory, Bessant et al. (2003) touch upon the first aspect, i.e. the implementation phase. These authors identify three distinct and generally (but not necessarily) sequential steps:

- Set-up phase (converge around commitment to action).
- Operating phase (establishing the learning framework).
- Sustaining phase (keeping momentum).

As part of the CO-IMPROVE project, we developed implementation guidelines for companies considering to engage in collaborative improvement. The phases we proposed are:

- Stage 0: Collaborative improvement project set-up.
- Stage 1: Introduction and readiness assessment.
- Stage 2: Action planning and action learning.
- Stage 3: Evaluation and distillation of learning.

At first sight, the CO-IMPROVE and Bessant et al.’s approach seem to be consistent but differences appear when looking into the details of each step of the two guidelines. The general difference between the two is that the CO-IMPROVE guidelines have divided the set-up phase into two. This is done to distinguish between the actual set-up phase (identifying the supplier, the participants and facilitators) and the introduction phase (overview of the collaborative improvement concept and introduction to action learning). Both the CO-IMPROVE and Bessant et al.’s (2003) guidelines are proposed as sequential steps but Bessant et al. add that the steps are not necessarily sequential in reality. The CO-IMPROVE guidelines, however, are set up to support a large project (implementing collaborative improvement, that is), not just one small improvement project, and are therefore designed to occur chronologically.

Bessant et al. (2003) have identified a number of enablers and disablers of the process. A structured and organised approach is of the enablers, while a slow project start-up, lack of results, and quick loss of interest are disablers. Our research fully agrees with this. Before exemplifying this, I will briefly present the three approaches identified in CO-IMPROVE:

- Bottom-up learning-by-doing: move from practical level to concept and strategy level, learning from experience. This approach was used in the Danish EME.
- Top-down directed: focus on assessment and goal alignment to develop the foundation for improvement projects. This approach was used in the Italian EME.
- Laissez-faire: a non-directed approach, with equal focus on concept building and experience from practice. This approach was used in the Dutch EME.
Kaltoft et al. (2007) has detailed information on the three approaches. Going back to Bessant et al. (2003), an example of the disablers we identified is the fact that the top-down directed and laissez-faire approaches did not create immediate results and were detrimental to the initial stages of the process. In contrast, the bottom-up learning-by-doing approach was specifically focused on creating quick results, and gave the participants instant motivation for continuing the process (see Kaltoft et al. (2007) for more details).

From the knowledge about the implementation of TQM put forward by Cao et al. (2000), four areas emerge that need attention for the process to evolve successfully:

- Change of process.
- Change in functions/structure.
- Change in values/culture.
- Change in power within the organisation.

Cao et al. (2000) argue that these approaches towards a change process are not independent, but interrelated, and a change process typically addresses characteristics of all four categories. In fact, all four changes must be addressed in order to implement a change such as TQM (Cao et al., 2000). This systemic view is aimed at an intra-organisational change process, but is relevant for and comparable with the CO-IMPROVE focus, i.e. inter-organisational change. The top-down directed approach especially focused on changing values and culture, the laissez-faire approach focused on changing the power or rather eliminating its role, whereas the bottom-up learning-by-doing approach focused on changing processes, functions and structures. It was evident in all cases that, despite results achieved, a change in approach was needed at some stage of the process, in order to produce results at an even higher and more intense level. Eventually, all three EMEs in the project did to some extent focus on all four areas proposed by Cao et al. (2000). Without being too specific, the present author would argue that an inter-organisational change process will raise areas of attention beyond the four introduced by Cao et al. (2000) such as trust issues, joint vision and history, which will all be analysed further in this chapter.

Igle (2000) has identified four approaches to implementing TQM:

- Strategic (requires high level of planning and commitment to ensure success).
- Philosophical (rather than technical, emphasis on involving and empowering individuals).
- Selective adoption (cherry-picking the parts of TQM desirable).
- Continuous improvement (learning from past experience).

Igle’s (2000) strategic implementation approach is comparable to the approach applied in the Italian EME involved in CO-IMPROVE, which for instance focused on planning collaborative improvement, assessing the collaborative improvement maturity level and committing the participants to the process. Focused on learning from mistakes and experience, the Danish EME leaned more towards Igle’s (2000) continuous improvement approach. Igle’s (2000) selective approach is not applicable to CO-IMPROVE, since the concept was new and underdeveloped; therefore, cherry-picking was not possible. Cherry-picking, however, was done at “methods-and-tools” level; several existing tools and methods were introduced to and used in the different EMEs, including project management tools, kanban, TPM, and other tools.

According to Igle (2000), it is necessary to address strategic and continuous improvement aspects early on, in the planning stage of the adoption and introduction of a new organisational or performance measurement programme. This conclusion correlates very well with the CO-IMPROVE findings. Kaltoft et al. (2007), concludes that the chosen approach definitely has influence on the results experienced, and that a mixture of the three approaches used in CO-IMPROVE is recommendable. The strength of the bottom-up approach is that it creates immediate improvement results. Its potential weakness is that it may run out of steam after a while, due to lack of project management, continuous improvement skills and joint vision.
The strengths of the top-down approach are that it provides the fundament of theoretical knowledge, goal alignment and assessment of improvement areas. Its potential weakness concerns the difficulty to translate knowledge and vision into action. The potential strength of the laissez-faire approach is that it may create a shared vision and goals, genuine collaboration and learning. However, if there is not enough commitment (will, time, resources) and/or trust, this approach does not even start to work.

A number of researchers have published theory on the availability of resources, which I regard as relevant to, and part of, the chosen approach. Bringing together resources is regarded to provide a collaborative advantage (Huxham, 2000). On the other hand, differences in resources may create differences in organisational purpose and, consequently, the collaborative advantage may suffer (Vangen et al., 1994; Eden and Huxham, 2001; Huxham, 2000). Commitment of resources is a sign of interest in the collaboration (Huxham, 2000). All members need to contribute resources, but the amount may depend on the partners’ relative size or potential benefits accrued to the members. Members contributing more also have more influence (Merrill-Sands and Sheridan, 1996). For some reason, sharing benefits and risks did not arise on the agenda in the Danish EME, whilst in the Italian EME sharing of benefits was agreed upon at the beginning of the project. Six months after completion of the project, all participants in the Danish EME, except supplier two, expressed that the benefits were higher than the resources used (even though none of them could quantify either of the two). Furthermore, they said that this conclusion played an important role for them in deciding to continue with the process of developing continuous collaboration, and also to start a new process with other companies.

Finally, I will present two factors related to the concept of approach, which have not been operationalised in any way in Boer et al. (2005) or Kaltoft et al. (2007). The first is mutuality: there has to be mutual benefits, risk sharing and respect for the trading partner (Barratt, 2004). I regard this as being part of the overall philosophy behind collaborative improvement, but certainly a factor worthwhile to be considered. This should be done to avoid misunderstandings and inappropriate situations with one partner gaining most benefits or one partner suffering from most of the risks. In many collaborative relationships, it is important to make sure that mutual benefit and risk sharing are part of the approach. The other factor is supply chain metrics: measures of overall supply chain performance, or sharing performance metrics with supply chain partners (Barratt, 2004). In CO-IMPROVE Denmark, an assessment of the partners’ continuous improvement (CI) maturity was instigated. For this purpose, the CIRCA CI self-assessment tool developed at Brighton University (see e.g. Caffyn, 1999) was used. Unfortunately, we did not repeat the exercise, so we could not measure progress made in terms of CI maturity. The assessment tools did, however, play a role in the process, though, through the dialogue they created based on the topics addressed in the assessment exercises. Anyway, I absolutely agree with Barratt’s (2004) point and would recommend metrics to be considered as part of the factor approach.

This section clarifies that the relatively few publications we found about the factor approach support our CO-IMPROVE findings and vice-versa. The different classifications of approaches and implementation steps described in the literature largely conform to each other, and to the three approaches we identified. Furthermore, whatever approach is chosen, it has great consequences for the success of the process. The strength of the bottom-up approach is that it creates immediate improvement results. Its potential weakness is that it may run out of steam after a while, due to lack of project management and continuous improvement skills and lack of joint vision. The strengths of the top-down approach are that it provides the fundament of theoretical knowledge, goal alignment and assessment improvement areas. Its potential weakness concerns the difficulty to translate knowledge and vision into action. The potential strength of the laissez-faire approach is that it may create a shared visions and goals, genuine collaboration and learning. However, if there is not enough commitment (will, time, resources) and/or trust, this approach does not even start to work.
We see four major lines for further research:

1) Are companies using other approaches not identified in our study? If so, what are the strengths and weaknesses of those approaches?

2) Is it correct of us to make a proposition that a combination of the three approaches produces the most effective implementation of collaborative improvement? Would it be sensible to apply such a combination from the beginning, or do companies need to go through a learning process anyway, so that it may not actually make a difference how they start as long as they end up combining activity and learning and, from that, understanding, direction and a genuine willingness based on trust and commitment?

3) The study was performed in three EMEs, with SIs from three and suppliers from five West-European countries, all active in specific segments of the assembly industry (cars, aircraft, and agriculture). A main question is whether the results presented apply to SIs and, especially, suppliers in other economic areas (e.g. Eastern-Europe and Asia), in other assembly industries (e.g. electronics, domestic appliances), and also for example (semi-)process industries (e.g. food, pharmaceutical, chemical) industries.

4) The study has focused on dyads, not networks, and the first year and a half was spent on attempts to get collaborative improvement off the ground. Further research is needed in order to identify successful approaches to get from the level of dyads to that of networks, and to find out if the approaches described and analysed in the present paper hold for later phases of collaborative improvement, i.e. with more mature partners.

4.1.4 Vision

Many authors in various areas of literature have contributed with insights and thoughts on vision. In this section the contributions thought most relevant for the present research are presented. By vision in a collaborative improvement setting, we mean the way the future joint business relationship and the benefits that can be achieved hereof are envisaged together, with an emphasis on together.

Based on a survey of six UK supply chains, Bessant et al. (2003) identified a number of vision related enablers and disablers of supply chain learning. According to these authors, enablers are:

- Crystal clear objectives.
- Methods of performance assessment and contracts.
- Helping the suppliers continually to recognise benefits of supply chain learning.
- Visible benefits and increasing awareness of the strength of the collaboration.
- Create ability to see and share joint benefits.

Initially, the CO-IMPROVE EMEs lacked these enablers. None of them had a clear joint vision and therefore they did not have clear objectives and ideas on how benefits could be shared. After approximately six months into the process, the approach was changed to make the benefits more visible and increase the awareness of the strength of a healthy collaborative improvement relationship. This had a valuable effect as new improvement initiatives were started, but we also concluded that the discussions taking place after the intervention matured.

Disabling factors are (Bessant et al., 2003):

- Lack of internal vision (incompatibility between the SCL manager’s vision and objectives of particular parts of the company).
- People protecting their own interest (not able to have joint vision and see benefits for the individual company).
- Failure to understand problems.

The two latter factors had detrimental effects on the collaborative improvement in CO-IMPROVE. Protection of own interests caused a lot of political behaviour especially from the suppliers’ side. Supplier two and perhaps supplier three accepted to join the project, but the true reason for accepting it was that in
doing so they avoided sending the wrong signal by declining the SI’s offer to join. As a result, the suppliers tried to seem interested but were reluctant to commit themselves fully to the project. Failure to understand problems or rather the concept of (and barriers to implementing) collaborative improvement slowed the process down, again because the suppliers simply did not understand the benefits of a true collaboration.

On a similar note, Merrill-Sands and Sheridan (1996) concluded that the success of collaboration depends on the presence of a shared goal and vision for the alliance. Furthermore, problems to be addressed by the collaboration must be clearly defined and shared by all members (Merrill-Sands and Sheridan, 1996). Finally, collaborations with a shared goal and vision appear to be better at preventing and dealing with conflicts (Merrill-Sands and Sheridan, 1996). In fact, Merrill-Sands and Sheridan (1996) use the term purpose and three aspects of purpose are significant for success. Firstly, the aims of consortia need to correspond with the strategic objectives of the member organisations (Merrill-Sands and Sheridan, 1996; Bessant et al., 2003). We observed this in CO-IMPROVE when one supplier wished to establish a stronger IT link with the SI. The purchasing manager from the SI could see the benefits of this, but was not able to implement the project since the IT department of the SI was in a stronger position on this matter and due to a different IT vision decided to terminate this particular improvement project. Secondly, if commitment is to be sustained, the alliance needs to provide on-going evidence of benefits to members (Merrill-Sands and Sheridan, 1996). This point involves evidence of benefits. However, I do not regard this as an aspect of vision, but rather as related to the achieved results. Merrill-Sands and Sheridan’s (1996) last point is that it is important to define a series of short-term goals which lead to overarching-goals. In the Danish EME, we advised the practitioners to choose the first improvement project to be a short-term and easily achievable project. This was done to create a feeling of success and prove to all partners that working together was actually possible and beneficial.

On a more operational level, Barratt (2004) has found, through other authors, a number of key activities that must happen or be in place if collaboration is to succeed:

- Joint decision-making, e.g. forecasting (McCarthy and Golocic, 2002; Ireland and Bruce, 2000; Sabath and Fontanella, 2002).
- Process alignment, i.e. collaboration necessitates adopting a process focus (Barrat and Green, 2001).
- Cross-functional activities, i.e. no restriction within or between organisations (Forrester and Drexler, 1999; Lee and Whang, 2000; Ellinger, 2001).
- Development of supply chain metrics, to avoid constituent parts of the supply chain to operate in different directions (Lambert and Pohlen, 2001; Lummus and Vokurka, 1999; Simaturpang and Sridharan, 2002).

Considering these aspects of a collaboration in the initial phase of the process will raise important points to be discussed and could potentially be very beneficial for the process as a whole. This was not done initially in the Danish EME, but partly so in the other two EMEs and to some extent done further into the process in the Danish EME.

According to Huxham (2003):

\[
\text{… it is a general understanding that the collaboration should have a common aim}^2, \\text{but is difficult in the beginning to agree on common aims, due to a variety of organisational and individual agendas.}
\]

Huxham suggests developing a goal taxonomy aimed at identifying the kinds of goals that are present in a collaborative setting, but suggests that in some cases it is better to get started on some action without fully agreeing on joint goals/visions. This is precisely what we did in the Danish EME and the benefit from this

\[^2\text{We call this joint vision}\]
was that the practitioners experienced a whole new fashion of working together with their business partners (through many years) – it opened their eyes to the benefits of collaborative improvement. Six months into the process a workshop was held to establish a collaboration vision, but this was not so successful simply because most of the practitioners still did not have a full understanding of the concept (only the benefits) of collaborative improvement. Another attempt at the end of the project (i.e. after 18 months of action learning) was more successful.

To wrap up this section, it seems that having a joint vision is crucial to the success of (the development of) the collaboration. This will benefit the process as all participants have the same goals, aims and sense of direction, and it will also reduce conflicts. However, whereas Merrill-Sands and Sheridan (1996) and Huxham (2003) have identified vision as a specific factor, other authors have touched the area with several points, so it cannot be concluded that vision is a well-established factor in the area of collaboration. It seems, however, that there exists consensus regarding the use of the term vision. Future research would be beneficial for developing tools and settings that could support companies and/or facilitators to develop a joint vision; tools such as rolling back the future; settings such as workshops. The development of good guidelines that can be used to implement vision into action plans is also important for future research.

4.1.5 Trust

Trust is a much debated and explored topic within many areas of research. In our article “Factors affecting the development of collaborative improvement with strategic suppliers” Boer et al. (2005), we have reflected on trust via adjacent literature and in this part of the thesis, I will further reflect on that factor using the collaboration literature and other closely related research areas such as TQM.

Based on a thorough literature study, Barratt (2004) has concluded that the consensus in regards to trust is that this factor can contribute significantly to the long-term stability of an organisation. Lee and Billington (1992; in Barratt, 2004) expands this argument by suggesting that effective co-ordination of the supply chain is built on a foundation of trust and commitment.

Initially we thought that trust was a must for success. However, our research in CO-IMPROVE has shown differently: collaborative improvement can take place with hardly any trust existing. In fact the relationship that arguably achieved the most beneficial and quickest improvements was the relationship of dyad two with very little trust existing between the partners. Huxham (2003) found the same results as we did in CO-IMPROVE. Referring to Das and Teng (1997) and Lane and Bachman (1998), Huxham (2003) states that many practitioners as well as academics argue that trust is a precondition for successful collaboration. However, her research suggests that suspicion, rather than trust, is commonly the starting point, and in CO-IMPROVE we found exactly the same. The most reasonable approach towards lack of trust is to cope with the situation and attempt to create the ability to build trust where this is possible (Vangen and Huxham, 2003). This is in contrast to much of the literature published previously, which argues that the presence of trust is essential for a collaboration to be successful (Vangen and Huxham, 2003). When lack of trust exists, it is mostly mutual, and the only choice as far as the collaboration is concerned is to get on with it. Others argue differently, but Vangen and Huxham’s (2003) observations do not suggest that lack of trust inevitably leads to failure. According to Bryson (1988; in Vangen and Huxham, 2003), the best strategy to build trust is the “small wins” approach. Huxham (2003) proposes the trust building loop shown in Figure 17.
According to the trust building loop it is (sometimes) better to get started with some action before developing the trust level. The trust building loop aligns itself well with the “small wins” approach; the idea behind the loop is to gradually build trust by achieving results together. The results strived for should correlate realistically to the level of trust between, and the capabilities and capacities of, the partners.

Porras *et al.* (2004) is a good representative within the collaboration literature claiming that trust is a prerequisite for successful collaboration. The authors state that trust is a crucial and essential component if collaborative relationships between organisations are to be established. Again, CO-IMPROVE and also Huxham (2003) show different results. On a less disputable note, Porras *et al.* (2004) claim that where trust exists, organisations are more willing to collaborate with other organisations on a reciprocal basis. Trust is not regarded as a static but rather dynamic phenomenon that evolves throughout the process. In CO-IMPROVE we experienced that the trust level in each dyad continuously went up and down, but we identified no correlation between the length of the relationship and the trust level. All three dyads had been business partners for approximately 20 years, and in one case the trust level was high whereas it was low to very low in the other two dyads. Referring to Bidault and Jarillo (1997), Porras *et al.* (2004) continue with identifying different sources that trust can be based on:

- **Contracts** establish a foundation for developing trust.
- **Ethics** provide the rules and values for actors to behave in different circumstances.
- The role of *time and experience* is important because trust increases with the number of transactions made by participants.
- **Familiarity** relates to participants knowing each other before a transaction.

In CO-IMPROVE the dyads did not sign a specific collaboration contract beyond the “normal” yearly contract; a contract procedure started before CO-IMPROVE. We did not see behaviour in terms of contracts influencing the trust level in a positive way, it rather influenced the relationship negatively, e.g. when the SI did not respect contractual agreements in terms of FMEA\(^3\) procedures, the supplier lost faith in the SI. Furthermore, we experienced especially supplier two to lose faith in the SI due to ethical issues. This happened when the SI did not inform supplier two of the fact that they wanted to reduce the turnover of the supplier by 80%. This was especially devastating news since the SI purchased more than 50% of the supplier’s total turnover. The supplier heard the news from a third party and regarded this act by the SI as

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\(^3\) Failure Mode and Effects Analysis
unethical. The role of time and experience and also familiarity did not seem to play a particularly positive role in CO-IMPROVE.

Furthermore, organisations will tend to share resources and information more openly with other participants, as well as tend to reduce opportunistic behaviour through mutual understanding and goodwill of parties (Porras et al., 2004). Previous opportunistic behaviour has a negative influence on the trust and the life within the network. Therefore, opportunistic behaviour has to be debated and it must be made clear that this behaviour was an exception (Porras et al., 2004). Similarly, Bessant et al. (2003) found that practicing an open-book type relationship influences trust positively. Merrill-Sands and Sheridan (1996) agree with these viewpoints by stating that trust (which they regard as being part of the factor of membership) can be built through completing transactions successfully and demonstrating capability to fulfil agreements (Merrill-Sands and Sheridan, 1996). Bergquist et al. (1995; in Merrill-Sands and Sheridan, 1996) studied 75 partnerships, and concluded that trust is critical.

Trust is a thoroughly researched and well-established factor in many areas including the collaboration literature. Whether trust is a prerequisite for developing a collaboration or is simply beneficial when existing, appears to cause debate. In our research, we have seen great improvements on the operational level in a relationship with a very poor trust level. We therefore conclude that trust is not a prerequisite for improving collaboratively, but it may play a role in the further development of the relationship towards what has been termed a true collaboration. Future research could reveal at what stage of the process trust becomes necessary, in order to develop the relationship further. Another important issue when dealing with trust in dyads is that of risk and risk management. I have hardly located any findings on risk management in the collaboration literature, but this is an important aspect for future research. Relevant questions to ask would be how trust and risk issues correlate with each other, and, if possible, how trust is developed in a high risk environment.

4.1.6 Power

In CO-IMPROVE we have identified power as a very important factor, since it was often brought up by the practitioners during, and especially between, workshops. The suppliers in particular had many considerations in this regard, and this was due to the nature of business not many years back, when the SI, like many other customers, would use power to achieve what they desired. Power also came to life without being mentioned explicitly, for example in the form of the SI directing the choice of improvement projects in the way they desired.

A fairly common view of power is presented in Jonsson and Zineldin (2003), who state that “power and justice are fundamentally social structural phenomena”. Power is a member’s ability to influence the perceptions, behaviour and/or the decision-making of other members and exercised through authority and/or imposing sanctions (Jonsson and Zineldin, 2003). Discussed further into the article is dependency, which is related to power. Dependency indicates to which extent the customer depends upon the major suppliers for services, product warranties, advertising, response to emergency orders and timing of new product development (Jonson and Zineldin, 2003). Huxham (2003), on the other hand, states that most people would argue that power is in the purse-strings, i.e. money or control of financial resources equals power. However, Huxham and her team observed that the power of exit should not be underestimated, i.e. the option of leaving the collaboration, especially when there is no contractual agreement. In CO-IMPROVE, supplier three considered this option numerous times in internal discussions following a cost-benefit analysis of the collaboration, which did not quit turn out favourably for that supplier. As Jonsson and Zineldin (2003) state, power is a social construct, and in dyad three we observed that the supplier initially perceived the SI to be in a power position. After the cost-benefit analysis (see above), they became aware of the power of exit and even further into the project they realised that the SI was not so powerful at all—
the SI actually depended on the supplier. The realisation (that the SI was not so powerful) came to life when the supplier had the opportunity to buy a new machine perfect for producing a specific product group for the SI. Supplier three wanted the SI to sign a three year contract before purchasing the machine and used power to achieve this by hinting at a price increase of its products.

Huxham (2003) developed an approach towards understanding power, which involves the identification of points of power that altogether make up the power infrastructure. “Point of power is where power is actually enacted in influencing the way in which collaborative activities are negotiated and carried out” (Huxham, 2003). Huxham (2003) has several examples of points of power, of which some primarily relate to non-for profit collaborations. One example is naming the collaboration since this is likely to define the goal of the collaboration. Another example relating to both business and non-for profit collaborations is the arrangement of meetings and deciding who will join these meetings. One person, or more, has a certain level of power at each of these points of power. Another example is persons with power at meetings, i.e. chairing or facilitating meetings, as well as the person who choose the location or timing of the meeting. Points of power can change – those who are powerful during a meeting might not be powerful between meetings (Huxham, 2003).

Huxham (2000) has argued that collaborations work best if the individuals involved in any management committee or similar structure perceive themselves as being of approximately the same status. This can be difficult to achieve if the organisations involved are of different sizes or if collaboration is much more important to one party than another (Huxham, 2000). We have seen this in CO-IMPROVE in several ways. One example is that the SI was under a lot of pressure from one of their customers, a huge company and a major player in the market, to reduce cost and improve quality. This pressure made it very beneficial for the SI to engage in CO-IMPROVE and improve the relationships with its suppliers. The suppliers did not feel the same pressure, though, and found it difficult to see what benefits CO-IMPROVE would have for them. Another example concerns the fact that the SI is a very large company compared to the suppliers involved, and in the past this has been used in power games. According to the SI, and confirmed by our observations, this behaviour belongs to the past. But the suppliers are still expecting the SI to use power. In terms of different aims, this has already been discussed under the factor of vision (the initial reason for supplier two and perhaps also supplier three to join was that declining the offer would send the wrong signal).

Power is the ability to make things happen. In Nielsen et al. (2004), we reported that the suppliers’ implementation success was often higher than the customer’s success. The explanation for this is the managing directors’/owners’ high position in the company versus the purchasers’ and their managers’ relatively low organisational position and, thus, power.

Like trust, power is a very widely researched phenomenon in many areas, including collaboration studies. Huxham (2003) has added to the common perception the power of exiting, which we indeed found plays a role in CO-IMPROVE. Power is dynamic and can be executed at many levels, e.g. company or individual level, in the defining phase of the collaboration and later on, and both at and between meetings. There is a broad agreement to use the term power, and the findings from CO-IMPROVE are very relevant to the findings identified in the collaboration theory.

4.1.7 Individual behaviour

Individual behaviour is mainly political behaviour but also implies opportunistic behaviour and showing commitment. Bessant et al. (2003) identified the action of protecting one’s own corner, a form of political behaviour, as a disabling factor. We have seen this numerous times in CO-IMPROVE: see Nielsen et al. (2004).
Barratt (2004), who has merged commitment with resources, states that participants must be prepared to commit resources to the collaboration, especially in the start-up phase, but with a long-term perspective. In CO-IMPROVE, the practitioners were not contractually bound and they did not even have discussions about the resources the participants committed to the project. In hindsight, however, it seems that all participants used a fair amount of resources, primarily in the form of time. Supplier three, however, was very persistent in its attempts to reduce the frequency of workshops from monthly to bi-monthly, arguing that monthly workshops took up too much time.

According to Jonsson and Zineldin (2003), commitment is a result of the development of a collaborative relationship between two companies, and is related to the trust and time dimensions of the relationship. Commitment cannot be built on promises but only on the successful use of factors such as adaptation, communication, bonds, degree of cooperation, length of relationship and quality (Jonsson and Zineldin, 2003). Especially the factor of adaptation is very relevant to and overlapping with commitment. Adaptation is the willingness to customise (e.g. products, deliveries, and contracts) and provides evidence that a partner is trustworthy, cares about the relationship, and is willing to cooperate and make sacrifices (Jonsson and Zineldin, 2003). An example of this from CO-IMPROVE is the SI’s attempt to improve the delivery process. In dyad three the supplier showed great commitment to change internal procedures but also identified a couple of procedures that should be changed within the SI. This made it evident to the supplier that the SI did not have the needed commitment to change internal procedures and at the beginning of the project, the SI even had difficulties admitting internal insufficiencies. As a result, the supplier’s commitment dropped. In dyad two, the purchaser taking care of the relationship analysed the SI’s internal delivery process and from this analysis admitted to insufficiencies and tried more or less unsuccessfully to change them. The lack of success was not due to the purchaser, but was to blame on the IT, and responsibility could be placed in another department. This, however, proved to the supplier that commitment was crucial and improved the commitment at the suppliers’ part.

The present author has not been able to trace sources within the collaboration literature that describe opportunistic behaviour. The authors in this line of thought seem to think that opportunistic behaviour does not belong to a collaborative relationship. However, we have identified behaviour in the CO-IMPROVE dyads that is opportunistic. The reason for this could be that we studied the initial phase of the process, and the reason for opportunistic behaviour to occur in this phase is that the practitioners had to get used to working together in a close relationship: old habits die hard ... Supplier two at times had an opportunistic attitude (“we don't need them, they need us”), quite possibly because the supplier could not foresee the benefits of collaborating with the SI. The supplier did not trust the SI either and even expected the SI to be opportunistic, and did not initially wish for the SI to get a clear insight into the production processes for fear that the SI would engage in industrial espionage.

Although she does not provide hard evidence supporting this, Huxham (2003) has a rare but interesting perspective on a factor called leadership, which we believe falls under the category of individual behaviour. A successful leader operates from two perspectives: the spirit of collaboration and thuggery. In other words: “partnership means going behind people’s backs in a trustworthy sort of way” (Huxham, 2003). Surely, if asked to characterise the SI, suppliers two and three will to some extent agree with this, but I do not expect any of the participants to describe their own behaviour in these terms. From a research point of view, the present author would argue that plenty of the behaviour observed had a genuinely good meaning or aim, but with that said, quite a lot of political behaviour was observed as well, perhaps even on the verge of “thuggery”.

Individual behaviour is not a factor recognised beyond CO-IMPROVE. The label covers a number of behaviours such as political behaviour, showing commitment, and opportunistic behaviour. Political behaviour is not a much-published theme within the collaboration theory, whereas commitment has
attracted several published findings. Our findings in CO-IMPROVE primarily concern lack of commitment from the participants, while the literature mostly focuses on the benefits from a committed collaboration team. Collaboration literature on opportunistic behaviour is scarce. I conclude that the factor of individual behaviour is not well recognised in the collaboration literature but had a lot of influence on the development of collaborative improvement in CO-IMPROVE. As, in addition, the three sub-factors of individual behaviour, i.e. political behaviour, opportunistic behaviour, showing commitment, are all very well established in adjacent literature, there is enough reason to keep this factor in our model. As mentioned, all participants used a fair amount of resources in the CO-IMPROVE project. However, we concluded that the spending of resources is not equivalent to commitment. It is possible to be committed, e.g. a manager announcing his/her commitment to a project, without actually appearing at any meetings. Appearing at meetings is a form of involvement. www.wordreference.com gives the following definitions:

- **Commitment**: the act of binding yourself (intellectually or emotionally) to a course of action. Synonyms: allegiance, loyalty, dedication.
- **Involvement**: the act of sharing in the activities of a group. Synonyms: engagement, participation.

So both definitions have a positive connotation, but there is a difference, though. An example could be a member of project who participates (is involved) but is not dedicated and loyal to the project (committed). Figure 18 shows the different combinations.

![Figure 18: Matrix showing the different scenarios in terms of commitment and involvement.](image)

In the following the different scenarios will be described with empirical examples.

**Committed/involved**
We have found that a person who is involved and committed in a collaborative improvement process will have a positive direct influence on the process. We observed several examples of this. One is the owner of supplier one, who attended all meetings, and participated with great enthusiasm and commitment. He quite clearly had a direct influence in a positive manner.

**Not committed/not involved**
In the other extreme, a situation with no commitment and no involvement could occur. This scenario would create a situation with no influence, or in some cases an indirect but negative influence. In CO-IMPROVE,
we experienced the owner of supplier three who announced his commitment to the project, but also announced that he would not take active part in the project. Initially, this had a somewhat positive effect on the SI. Towards the end of the project, the SI announced that they would like to involve the owner in the process, which, however, never happened, and it then became clear to the SI that the owner was neither committed nor involved. When realised, this influenced the process negatively and the SI had doubts that the supplier was interested in maintaining their strategic position with the SI.

**Committed/not involved**

We have empirical evidence which shows that the combination of commitment but no involvement exercises indirect positive influence (or no influence at all), since the member is not physically present at the event, but is capable of influencing others taking part. One example from CO-IMPROVE is the example given above (not committed/not involved) in which the owner from supplier three initially announced his commitment, but would not be involved. This had a positive influence. Another example is the Plant manager of the SI, who was never involved in CO-IMPROVE, but was committed to the overall idea of collaborating closely with suppliers. His commitment (as well as the rest of the top management’s commitment to supplier collaboration) was announced by the procurement manager (who was involved in CO-IMPROVE) to all participants. His commitment was even more evident to the owner of supplier one, since they shared a personal relationship. The commitment of the Plant manager had an indirect positive influence on the process.

**Not committed/involved**

On the other hand, being involved but not committed exercises direct influence, due to the physical presence. The Managing Director of supplier two demonstrated less commitment at some workshops by taking no part in discussions, but he turned up at every workshop. So, without definite observations on the matter, we believe that “not being committed/involved” will directly influence the process negatively. This is quite possibly because of the uncertainty of this behaviour; an actor can show up at every meeting (involved) without really contributing in a constructive manner (committed).

According to various authors within collaboration theory, the factor of individual behaviour has great relevance, even though the term itself is hardly used within this body of literature. Rather, the term as we have described it contains a number of the factors found in collaboration literature. Consequently, I have decided to continue using the term. In relation to the operationalisation of individual behaviour in the articles, I added involvement, an aspect often mentioned in the collaboration theory and, in hindsight, one that appeared to exercise significant influence on the development of collaborative improvement in the cases we studied.

4.1.8 Communication

The factor of communication is characterised by the way in which the participants in the project talked about CO-IMPROVE, the frequency with which they interacted, their communication skills, and the specific topic addressed. The factor emerged from our research and appeared important because it was influenced by a number of the other factors, such as approach, competence and especially individual behaviour, which at times resulted in a form of communication that was not appropriate. At other occasions, it was carried out in such a motivating and open way that it was an enabler for further progress.

Several authors referenced to in Merrill-Sands and Sheridan (1996) state that open and frequent communication is critical to successful collaboration (Kanter, 1994; Powell et al., 1996; Werner and Bremer, 1991; in Merrill-Sands and Sheridan, 1996). Lack of communication appears to be a chronic problem, due not only to physical barriers but also to problems regarding the substance of communication (Merrill-Sands and Sheridan, 1996). Based on a review of 75 alliances, Bergquist et al. (1995; in Merrill-Sands and
Sheridan, 1996) found that frequent communication is important for effective conflict management and frequent updates about the ongoing activities in the partnership are critical to success. Successful partnerships cannot be controlled by formal systems, but require a dense web of interpersonal connections and internal infrastructures that enhance learning (Merrill-Sands and Sheridan, 1996). Frequent communication was one of the goals of the approach in all of the EMEs, and this was achieved by creating the monthly workshops as the backbone of the project. At the workshops, the participants would update each other on the achievements and the learning accomplished, which Bergquist et al. (1995; in Merrill-Sands and Sheridan, 1996) regard as critical to success. Bessant et al. (2003) found extensive communication via fax and e-mail an enabling factor. We tend to agree with this. However, after completion of the project we asked the CO-IMPROVE participants about this particular topic, and they expressed that the results could not have been achieved without frequent face-to-face communication. The substance of communication, mentioned by Werner and Bremer (1991; in Merrill-Sands and Sheridan, 1996), was also found important in CO-IMPROVE. We realised that the development of the collaboration suffered at some point due to lack of substance in the communication between the partners. Substance lacked simply because the participants did not fully understand the benefits of working together and did not know where to take the relationship and what to discuss to improve the dyad(s) they were involved in on a relationship level.

Werner and Bremer (1991; in Merrill-Sands and Sheridan, 1996) caution against too much communication; if the consortium tries to respond to all the needs of all its members, the agenda can become too diffused. As researchers we did not find this problem in CO-IMPROVE, the practitioners, however, expressed a desire to change the frequency of the workshops from monthly to bimonthly, arguing that the monthly workshops were too time-consuming.

Information sharing is highlighted by a number of authors as a fundamental need to increase performance in a collaboration with a particular emphasis on the transparency and quality of information flow (Barratt, 2004). Information sharing or rather trying to create a learning environment was one of the objectives of the action-learning phase of CO-IMPROVE.

It is important to openly develop clear and broad lines of communication to foster information sharing and to create a shared understanding (Barratt, 2004). A number of authors identify a need for a culture of openness and honesty (Spekman et al., 1998; Hogarth-Scott, 1999; Stank et al., 1999b; in Barratt (2004)). Such openness and honesty contribute to the development of trust, respect and commitment, as a result of improved certainty and reliance on each other (Barratt, 2004). A culture of openness and honesty was achieved in dyad one and the results were, as described by the above authors, trust, respect and commitment. In the other two dyads, openness was limited and the opposite results were evident. The risk of having a narrow interface became evident in dyad three in which improvements of the relationship have occurred, but when the purchaser was replaced, the achievements deteriorated and the process had to be started all over again.

A broad interface, rather than a single point of contact between organisations, is beneficial for two reasons. One is to develop an atmosphere where innovation is encouraged; the other reason is that a relationship based on two contacts could be catastrophic if one of the persons deserts the project (Barratt, 2004). This is supported by Jonsson and Zineldin (2003) who state that the essence of any relationship is communication and interaction between at least two parties that are in contact with each other. It is communication in one form or another that links individuals and companies together, as it is the people, not IT, who can communicate effectively with each other in an exchange of values (Jonsson and Zineldin, 2003). The frequency, duration and content of the contact between partners involved in a relationship, are some of the measures of communication (Jonsson and Zineldin, 2003). Communication in a collaboration has a higher frequency, more bidirectional flows, informal modes, and indirect content than in a
transactional relationship (Jonsson and Zineldin, 2003). Periodic lapses in communication may encourage participants to dissociate themselves from the responsibility for the partnership objectives and follow their own agendas instead (Jonsson and Zineldin, 2003). In CO-IMPROVE we identified additional benefits (other than published by the above authors) from a broad interface. This became evident in for, example, dyad two where the managers taking care of the relationship could not get along with the purchaser of the SI and therefore experienced difficulties in improving the relationship; however, improvements were easily achieved between the technicians of both companies working together. The reason was that the technicians had no problem whatsoever working together. Furthermore, they had an exciting common goal to achieve, i.e. an improved product or process.

Communication is one of three aspects of social relations in networks, the other two being exchanges/transactions and values/attitudes (Zineldin, 1998). Improving the quality of communication requires that organisations or individuals attend both to what they disseminate (or say), i.e. technical information, and how they disseminate it, i.e. functional information, as also as to how well they receive the reaction of others. The nature of communication affects the duration and depth of the relationship (Zineldin, 1998). The following quote from Zineldin (1998) nicely illustrates the kind of communication a good collaborator should strive for in order to create a learning environment:

*We were created with two ears, two eyes and one mouth. Could it be we were meant to listen and observe/sight twice as much as we speak? Yet good listening is essential to any communication and hence to any relationship. Listening, understanding, and engaging in feedback to what others are saying, improve the communication and relationships. Having the intention of summarizing the other collaborator’s point of view can have a dramatic effect on the quality of a relationship. Good listening and learning provides partners with opportunities to discover not only the differences between them, but also the range of common ground they share.*

In the Danish EME, an environment in which everybody could speak freely and be heard was pursued through frequent workshops. In these workshops everybody could contribute to the agenda beforehand and incorporated into every agenda was a slot for everybody to speak. It was quite clear that the suppliers, especially supplier two, needed to get used to the situation before speaking freely, or at least more freely than in the beginning of the project. The degree to which the participants spoke freely is difficult to determine, but in our perception the SI and supplier one spoke more or less freely, whereas supplier two often did not express its attitude at all. Somewhere in between these extremes, supplier three kept silent at times and seemed to suppress its true opinions.

The factor of communication is touched upon by many authors, but only Merrill-Sands and Sheridan (1996) have identified this as an actual factor. The other authors clearly identified, but merely as a point of interest, the influence of communication on a collaboration process. Most of these authors dealt with collaboration in terms of face-to-face interaction. One of the objectives of CO-IMPROVE was to develop and implement a software system that could support the process, which was regarded as a failure in the Danish EME, but as a relative success in especially the Italian EME. The participants in the Danish EME could not relate to the benefits of the software, partly because the distances between the SI and the suppliers were between 1½ - 3½ hours by car. The main reason was the fact that all partners gained benefit from face-to-face meetings in a way that IT could not have made possible, even if meetings were infrequent as can be imagined (especially/for instance) with suppliers in China.

It is quite clear from CO-IMPROVE and supporting literature that communication is important in the process of establishing and maintaining a collaborative relationship. Unfortunately, many difficulties have been identified, such as problems in the substance of communication, how communication takes place, and what
is communicated. Even too much communication can cause problems. Many authors have touched upon the theme of communication, though not as a factor per se, but merely as a point of some importance. In conclusion, the terminology communication is not an established factor as yet. We will, however, keep communication in our model; the factor is mentioned in the literature and, more importantly, our findings suggest that it profoundly affects the process.

Our results regarding the possible role of IT in the communication between partners are inconclusive, and the literature did not help us much further. Future research could therefore be directed towards finding out more about technological support for communication in collaborative environments.

4.1.9 Competence

The factor of competence concerns the capability to implement, develop and sustain the process of collaborative improvement. These competences spread from individual and organisational continuous improvement skills to project and change management skills, but also include skills like being able to communicate precisely and without upsetting the partner(-s).

Bessant et al. (2003) identified a number of competence-related enablers and disablers of TQM, which are also useful when dealing with a collaborative improvement process. The main enabler recognised by us is continuous improvement skills, such as periodic revision of objectives and measurement systems. After about six months of action learning, the Danish EME identified a strong need for implementing a regular “continuous improvement” routine, i.e. revision of results achieved and learning from that. The disabling aspects of competence identified by Bessant et al. (2003) are the existence of inadequate knowledge and resources, which is very comparable to the CO-IMPROVE situation. Bessant et al. (2003) also recognise a social incompetence, i.e. arrogance from the customer. The customer in the Danish EME admitted to being arrogant in the past and unfortunately, supplier two and three could not completely lose this perception of the SI. As researchers, we did not observe arrogance, but the suppliers’ perception, based on previous experiences, could well have influenced the process.

Beckett et al. (2003) stated that companies must learn to learn, and that this might require external assistance. When asked about this, the CO-IMPROVE participants accredited a large part of the success of the process to neutral facilitation by the researchers, which was an integral part of the Danish approach. Initially, the workshops were organised and facilitated by the researchers, but the practitioners became more and more part of the planning towards the end. The improvement activities taking place between the workshops had usually been initiated at those meetings. They were very much facilitated by the PhD researchers, who attempted to maintain momentum by following up on deadlines and engaging in face-to-face interaction both between the SI and the suppliers, but also at individual meetings.

Not many authors have contributed to the knowledge of the need for competences or the consequences of a lack thereof in a collaborative improvement process or similar. As a result, it can be concluded that the factor of competence is not an established factor in the literature. However, the few contributions which the present author was able to locate, agree with the findings of CO-IMPROVE, but do not add additional insight, though. The literature also agrees with the use of the term competence. The completeness of the factor is regarded as very low as yet.

Future research is needed to develop a better understanding of the competences actually needed in a collaborative improvement process and, in particular, if and when in the process different competencies are needed. The results of that will provide major input to the development of tools to recognise lack of competencies and develop the right competences.
4.1.10 Commercial reality

By *commercial reality* we mean the occurrence of events which neither of the participants have any influence upon, such as fluctuation in demand, governmental changes and decisions and environmental forces.

Bessant *et al.* (2003) identified a couple of disabling aspects of commercial reality, i.e. external problems that obstruct the disclosure of information (e.g. legal procedures and poor protection of property rights in other countries). This is something we did not experience in CO-IMPROVE.

The collaborators cooperate and operate within a large context and a large social system in which they are influenced by the environment surrounding them, such as economic, legal, political, scientific, technological and ecological aspects (Zineldin, 1998). Many authors have stated that the surrounding environment of rapid and radical changes has resulted in an emphasis on the importance of building and keeping a close relationship between companies, customers and other business partners (Aijo, 1996; Berry *et al.*, 1983; Faulkner, 1992; Grönroos, 1990; McKenna, 1991; Webster, 1992; Zineldin, 1995; in Zineldin, 1998). Some of the critical economic and political factors that must be taken into consideration are (Zineldin, 1998):

- The market structure
- The competition level and intensity within a given industry
- Regulations and constraints set by the national and international governments
- The organisation’s position within the manufacturing channel and social system
- Internationalisation and globalisation of the market
- Interest rate
- Inflation
- Unemployment
- Business cycles
- The degree of dynamism within the relationship
- The degree of political stability

A collaboration relationship must have the ability to reconfigure itself in order to adjust to changing environmental conditions (Zineldin, 1998).

In CO-IMPROVE we encountered some, but not all of the aspects listed by Zineldin (1998). The main occurrence within the factor of commercial reality was fluctuations in demand and price-based competition in existing markets, which forced the SI continuously to look for better (in terms of quality) and cheaper suppliers. In the past, this had led the company to impose price reductions and remove the turnover from suppliers two and three. Although most of the turnover was given back to them later, these suppliers’ trust in the SI had suffered. Also during the period reported here, the SI told supplier three that they might be forced to further reduce prices, and they actually took away the turnover from supplier two.

Very few authors have identified what we call commercial reality as a factor that affects the process of collaborative improvement and the terminology is also not established. The major contribution in this area is by Zineldin (1998), who has identified this factor as environmental forces and has listed a large list of aspects within this factor. Since no or few contributions can be used for comparison, the decision as to whether the terminology used in CO-IMPROVE is appropriate is solely based on our observations. We also believe that this factor has shown sufficient importance to the process; we will therefore keep it in the model. Future research may shed light on a broader spectrum of aspects of this factor. We have identified the commercial need to find another supplier and take the turnover away from the existing supplier, as the most important event, but as Zineldin (1998) has illustrated, there are many other aspects to this factor. Furthermore, in CO-IMPROVE we had no other way of dealing with this factor than to get it out in the open.
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and talk about it. Perhaps future research could identify other ways of handling this delicate factor, or even develop tools that would help the participants to overcome, avoid or deal with this factor.

4.1.11 Partner characteristics

This factor involves company characteristics such as strategy, structure and size. The present author has not been able to locate any publications reporting, let alone operationalising the factor. Barratt (2004) has published a “pointer” on the matter, though, using the label corporate focus. “With many distractions such as shareholders, the supply chain and any collaborative initiative are likely to be seen as unnecessary expenditure” (Barratt, 2004). To my mind, in a true collaboration it is not recommended to focus so much on corporate results, especially not at an early stage. Rather, the focus should be on mutual benefits, i.e. achievements on a collaborative level. Zineldin (1998) has also identified the importance of cross-functional teams. According to the author, cross-functional teams provide a constant and continuous interface between all the functions within the organisation and with the outsiders. The team will ensure that no problems arise when dealing with other collaborations inside and outside the system. In CO-IMPROVE we likewise discovered that managerial problems between e.g. a purchaser and the owner or caretaker of a supplier, had absolutely no effect on two specialists (i.e. a quality responsible from each company) working together to solve a specific problem. As an example, the relationship between the purchaser and purchasing manager of the SI and the managers from supplier two was not healthy, but when the quality department of the SI was asked, they thought very well of the supplier and enjoyed collaborating with them.

In CO-IMPROVE we identified the influence from three partner characteristics, especially in the initial phase of the process:

- Company strategy.
- Company structure.
- Company size.

Company strategy, comparable to corporate focus, can affect the process. In CO-IMPROVE the SI implemented a new supplier audit system following a strategic decision on corporate level to be used with all suppliers. As a result of the audit, suppliers two and three did not reach the level of approved supplier⁴, which went against the initial decision of the SI to make all three partners strategic suppliers. This created issues to be dealt with. The SI had to consider what arguments could be used to justify to the global top-managers that these particular suppliers would still be strategic though scoring rather low. The suppliers were worried that the SI would put great emphasis on this score, although the SI tried many times to explain that the score was one thing, but the discussion and actions of how to get to “the next level” was much more important. The suppliers also worried about the content of the audit, because all the tools, methods and procedures important for a high score were the SI’s perception of world class. So, to be regarded as world class by the SI, the suppliers would have to become almost like the SI in terms of manufacturing processes, quality inspection, and statistical analysis.

To explain the influence of company structure, we can use supplier one and the SI as examples. The SI was not particularly organic and consequently not very capable of changing. This was observed a number of times. One example is the audit process described above. The audit was a strategic decision and came from the very top of the SI, as did the actual audit and the way it should be carried out. The suppliers made several remarks regarding the content of the audit, amongst others that it was developed for American companies and that the legal aspects of the audit clearly revealed this. Another comment concerned the process of the audit, which was carried out in a top-down manner. An American auditor who had never before visited the companies was given the sole responsibility and authority to decide on the final score.

⁴ The audit has three levels: Unsatisfactory, Satisfactory, Certified
Some members of the SI agreed with the inconsistencies, but they were not able to get any change accepted by the organisation behind the audit (company structure). Supplier one, on the other hand, is best characterised as an organic organisation. Together, the SI and supplier one decided that the lean philosophy from the SI, which they called TPM, should be rolled out to the supplier. The structure (and also improvement culture) within most of the supplier company was changed within a fairly short period. The same fast implementation was possible when new improvement initiatives were decided within the dyadic relationship. The reason is that the organic company structure would be suitable for quick changes.

Company size, the third part of the factor of company characteristics, also influenced the process. One example is the considerably larger size of the SI compared to the suppliers. This gave the SI a perceived advantage in terms of power. Size in terms of turnover is perhaps even more important. I have addressed the impact of that characteristic under the factor of power. Another effect of company size is that large companies like the SI, has more resources to offer to a project like CO-IMPROVE. Finally, the SI was observed to have better access to specialist knowledge in a larger array of areas than the suppliers, which is an advantage when dealing with improvement activities. Resources, however, are dealt with under several of the factors in the present chapter.

In conclusion, partner characteristics have shown to be very important in CO-IMPROVE. Unfortunately, there is no literature to support our findings, so the relevance of our findings beyond the CO-IMPROVE setting is difficult to establish. Nonetheless, I will keep the factor in the model – it has shown to be important in our research, and I see no need to change the terminology we have used. Future research would be beneficial to shed light on the dynamic nature of partner characteristics. What happens if a company changes its strategy? Which changes in strategy will influence the collaborative improvement process, and how do changes in company structure affect the collaboration? Another interesting area concerns the difference between the company level and the individual level. In Kaltoft et al. (2004), as well as in the background chapter of this thesis, the importance of the individual is emphasised. However, how do partner characteristics influence the individual(-s) representing the company?

4.1.12 (National) Culture

In the contingency model, culture is limited to national culture. Culture is a factor much described in various areas of literature. However, in the collaboration literature and adjacent areas, the influence of (national) culture is to my knowledge not described at all. It became quite clear in the CO-IMPROVE project, though, that national culture affected the process and especially the implementation approach adopted in the three EMEs. As a result, the factor of culture as we used it only associates with national culture.

The authors referred to in this section have published material on other cultural aspects that influence the process of collaborative improvement or similar. In most cases I can relate our findings to the literature. Bessant et al. (2003) identified a number of culture-related disablers. One disabler is the absence of a proactive culture, both in relation to the broader problem of supply chain development and the more specific challenges that arise when promoting supply chain learning. Cultural differences between companies and within parts of the same company and failure to change culture are other disablers identified by Bessant et al. (2003).

Barratt (2004) addressed a factor called collaborative culture, and found that most existing corporate cultures are not capable of supporting collaboration neither internally or externally. Functional thinking is rife and also supported by organisational structures and performance measures, which are aligned to functional activities rather than supply chain processes (Barratt, 2004).
According to Beckett et al. (2003), most companies have developed a management style that makes them unique but needs to be changed or shared when collaborating with other companies. This resembles the conclusions of Bessant et al. (2003). Beckett et al. (2003) also state that effective collaboration requires a common language and acceptance of interdependency with other companies. We have found through the empirical data from CO-IMPROVE that national culture plays an important role, especially in the initiation phase in which the fundamental approach is developed. Since none of the above authors has contributed with knowledge within national culture, we have nothing to counter argue our views or to establish whether the terminology should be altered. There are, however, many contributions from adjacent areas of literature. Hofstede (1980) is probably amongst the most referenced, which tells us that (national) culture is in fact important. Future research could be beneficial to establish the influence of other aspects of culture than national base. The literature review presented above suggests influence from proactive culture and cultural differences (Bessant et al, 2003), collaboration culture (Barratt, 2004), and management style and common language (Beckett et al, 2003). Future research could also establish whether national culture is stronger or weaker in the industries and countries involved in CO-IMPROVE compared to other industries and countries. Another interesting area is whether the practitioners are aware of the influence from this factor and if so, how the managers and/or facilitators involved should deal with the factor, especially if the cultural differences are big and/or if cultural aspects are barriers in the process of developing collaborative improvement.

4.1.1.3 Other factors

The model of factors developed from the CO-IMPROVE cases, see Figure 16, is an attempt to portray a complete picture of the factors influencing the development of collaborative improvement. This model, we believe, presents the most important factors we found in the CO-IMPROVE cases, as well as their interplay. Surely, other but similar processes have experienced a different course of events. In this section, I will analyse the factors identified by other researchers, which are not included in the contingency model, and discuss why other authors have identified factors not identified by us.

Membership structure

In a number of her (joint) publications, Huxham has discussed the importance of the membership structures of collaborations. Membership structures are (Huxham, 2003; Huxham and Vangen, 2000; Huxham, 2000):

- Ambiguous (members do not know who they collaborate with and why).
- Complex (hierarchies within a collaboration can be complex, and members of the collaboration can be members of other collaborations).
- Dynamic (structures of collaborations can change, member responsibility may change or members may join or leave).

In CO-IMPROVE we have seen ambiguity due to the mixed signals sent by the SI, which refers to why members collaborate. The companies have been trading for 20-30 years. The persons in charge of the relationships have been in charge for quite a few years in two out of the three cases and they are very familiar with each other in all three cases. Consequently, we did not observe any ambiguity in terms of the members not knowing who they collaborated with. As to Huxham’s (2000) complexity, the participants in CO-IMPROVE were not members in other collaborations. Collaborative improvement within this particular network presented a new form of trading and a new level of integration, and since it is new they do not have similar collaborations elsewhere or with others. The collaboration hierarchy in CO-IMPROVE was designed to be fairly simple and flat. The CO-IMPROVE group in Denmark consisted of four researchers, four representatives from the SI and one or two representatives from each supplier. At some point, we also had a consultant connected to the project to perform assessments and advise where needed, as well as a researcher from another university whose primary objective was to monitor the action learning process (including the role of the researchers in that process). All the members of the collaboration had a clear
assignment in the project and the role of the various partners was also clearly described and actually became quite natural due to the assignment. The CO-IMPROVE project was led by a project manager with clear cut responsibilities. The Danish team was led by one of his colleagues and the division of responsibilities between him and the project leader was also quite clear, and so were the roles of the two PhD researchers. Besides this, the job positions in the respective companies determined the responsibility of the company representatives in the collaboration. However, these formal aspects hardly ever played a role. All participants had the opportunity to speak freely and the hierarchy within the project was not complex and therefore not an issue, let alone a problem. The last item in Huxham’s (2000) membership structure is the dynamic nature of collaborations. In CO-IMPROVE, member responsibility did not change during the process, nor did the structure of the collaboration. However, towards the end there was one change in membership structure. The purchaser taking care of supplier three was transferred to another position within the SI, and a purchaser not familiar to the supplier was assigned as a replacement. This is discussed in more detail in the interplay section later on in this chapter. It is enough to report here that this ‘move’ created a lot of problems; the slowly improved relationship between the SI and supplier three deteriorated to the extent that it had to be built up again from scratch.

Membership structure is also discussed by Merrill-Sands and Sheridan (1996). The selection of members in the initial phase is crucial and affects success (Merrill-Sands and Sheridan, 1996). Collaborations are more likely to experience success when the members bring complementary skills, knowledge and resources to the collaboration and explicitly recognise their interdependence (Merrill-Sands and Sheridan, 1996). Complementarities in terms of for instance good chemistry are also argued to be important by Kanter (1994; in Merrill-Sands and Sheridan, 1996).

In CO-IMPROVE, it was left to the three SIs to decide which suppliers they wished to involve. The Danish SI clearly made a strategic decision by involving suppliers they regarded as strategic for their purposes. The SI genuinely believed in the three suppliers and could see the beneficial values of collaborating with these suppliers. The suppliers decided whom they would involve in the project. This means that we did see strategic considerations at both the overall project level and the company level regarding which individuals would join the project. The importance of membership structure, however, is not to be neglected and we can certainly identify with the enabling and disabling factors described by the authors referred to above. As an example it was quite clear that the members in dyad two did not enjoy each other’s company, and this resulted in political behaviour at both sides of the dyad – see the subsection on individual behaviour above.

Information technology
The role of information technology (IT) is much discussed in the modern world of collaborating. IT provides a powerful tool to profile the base of the existing collaborators and to create and retain stronger relationships within it, as well as to find new collaborators (Zineldin, 1998). Zineldin’s statement is much shared by us. However, IT technology played a minor role in CO-IMPROVE, especially in the Danish EME. IT might not be necessary in the initial phase and the participants regarded the use of email and other simple available tools sufficient. Obsession with IT technology is the largest obstacle towards successful collaborations (Barratt, 2004). However, when the volume of information grows too large, technology can move a collaboration closer (or back) to real time exchange and utilisation of shared information (Barratt, 2004). These references are all quite recent, and they may well reflect the changing role of IT in collaborations. Anyway, I will not analyse the use of IT in CO-IMPROVE in detail. The overall conclusion from the Danish EME was that since the companies geographically were located relatively closely together (3.5 hours driving distance at most), existing IT tools, such as e-mail and fax, were sufficient. We attempted several times to implement a software tool developed for this particular purpose as part of the CO-IMPROVE project, but without any success. The participants valued face-to-face contact too much and did not see software as a tool for replacing this form of interaction or even as means to support the collaborative improvement process.
Process
The crucial role of process in ensuring effective collaboration is frequently underestimated (Merrill-Sands and Sheridan, 1996). The notion of process includes (Merrill-Sands and Sheridan, 1996):

- Cultivating commitment (all participants must feel committed and a sense of ownership).
- Defining roles and responsibility (clear agreements on roles, responsibility and rights).
- Maintaining flexibility and adaptability (remain flexible to cope with the dynamics of a collaboration).
- Managing relationships (attentively manage the differences in organisational culture and power).
- Cultivating management skills (cultivate skills needed to manage a collaboration).
- Using a skilled facilitator.

I do not regard process as a separate factor – process is the result of the interplay between the factors and will be further described in the forthcoming discussion of interplay and collaborative improvement.

Supplier reputation or history
According to several authors presented in Jonsson and Zineldin (2003), supplier reputation is a very powerful factor. Supplier reputation is the extent to which firms and people in the industry believe that a supplier is honest and interested in customers (Ganesan, 1994; Doney and Cannon, 1997; in Jonsson and Zineldin, 2003). It can either damage an organisation’s image and customer relationship, or give a boost in the market (Jonsson and Zineldin, 2003).

In terms of perceived reputation, it was quite obvious that the suppliers’ perceptions of the SI were based on many years of doing business together and it required a lot of effort for the SI to change this. A good example of this is a situation with the owner of supplier three, who had taken care of this particular relationship for many years. When the sales manager, his wife, took on the task, he expressed that due to the history of the SI “bullying” the supplier, he did not trust the SI to have genuinely changed. It appeared that the sales managers’ task and therefore the objective of CO-IMPROVE for this supplier, was to prove the trustworthiness of the SI. The owner was persistent in his view of the SI throughout the project, in spite of several actions that proved the opposite (at least in the short term). Amongst others, however, the sales manager changed her mind of the SI for the better. At the very end of the project (after 18 months) the SI signed a three year contract for a large group of components and this action finally changed the mind of the owner, who now expressed that faith in the SI had increased. This example illustrates how influential a reputation really is and also that it takes a lot of time and resources to improve a reputation. In CO-IMPROVE, we have also seen examples of how easy and fast a good reputation can be ruined. In dyad two, the relationship slowly improved throughout the project. Towards the end, however, the SI decided to replace the purchaser whom the supplier had a very good relationship with. This decision was not communicated to the supplier. They heard it from a third party, and the new purchaser did not take contact with the supplier, either. The supplier feared that the new purchaser was in the process of finding an alternative supplier. As a consequence, the relationship deteriorated to less than it was when CO-IMPROVE started and when the supplier and the new purchaser finally met, they had to build everything from scratch again, including a personal relationship.

Another example regards dyad two and three. The SI had previously removed large portions of turnover from the suppliers, and gradually given it back to them. As a result of this, the suppliers thought throughout CO-IMPROVE that the SI would do this again, and on top of this suspicion came the fact that the SI was ambiguous about its motives of joining this project.

The model presented in the Framework chapter (Figure 16 page 44) has been developed over time and has therefore slowly changed and matured. In one of the first versions, we had included a factor labelled history, which we excluded from the model published in Boer et al. (2005). History and reputation are two sides of the same coin, if two (or more) companies have had a long-term relationship (see Table 6): the
reputation of any of the partners is a product of the joint history of the partners. Based on discussions with peers in various research environments, the examples described above and the findings reported in Jonsson and Zineldin (2003), I propose to reincorporate history in the model. History is an exogenous factor, which has developed throughout the development on the continuum, i.e. at arm’s length level as well as at the collaboration level. In instance of the Danish CO-IMPROVE cases, the companies have engaged in business with each other for 20-30 years, which really has made long-lasting impressions on each other.

<table>
<thead>
<tr>
<th>Dyad one</th>
<th>Dyad two</th>
<th>Dyad three</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
<td>About 25 years</td>
<td>About 30 years</td>
</tr>
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</table>

Table 6: Number of trading years together.

It would be very interesting to see how dyads with absolutely no history develop a collaborative improvement process and, more particularly, to consider which role reputation plays in such a context.

4.1.14 Conclusion on factors

The above analysis shows that the number of factors affecting the development of collaborative improvement is limited. The authors listed in Table 5 have all described one or more of the factors we included in our model, but none of them describe the whole set of factors. One aim of this chapter is to address the terminology we used in the model, another the relevance of the factors included and lastly the completeness of the set of factors. I will now address each of these issues.

Terminology

One of my objectives is to establish whether we used terminology which is comparable to that used in the existing literature. In some cases, it is quite obvious that our terminology is adequate. Examples in place are the terms power and trust. Several authors within and outside the field of collaboration literature use the same terminology and hardly any of the authors use other terms. In other cases, however, it is more difficult for two reasons. One being that there are no collaboration related publications on factors such as national culture and partner characteristics, and existing literature therefore offers no ground for comparison. The other reason is that the terminology used is diverse and multifarious, and leaves no specific directions. In cases like this, it is really important to identify what is meant by each factor, so that other authors or users (practitioners) would be able to compare and relate different publications easily. Through the extensive description and discussion of existing terminology compared to our empirical data, I conclude that the terms used in the contingency model are for the most cases compatible with that literature. In some cases there are, however, differences in the use of terminology and no real indications of a norm/standard. In all cases, I decided to stick to the terminology we used in the articles.

Relevance

In our articles we discussed the CO-IMPROVE findings quite extensively. Even more topics for discussion have risen to the surface from studying the existing collaboration literature. Only in a few instances have I had to conclude that we did not observe findings put forward in the literature in CO-IMPROVE. We also identified factors that have not or have hardly been reported by others. Examples in place are competence, commercial reality and partner characteristics. The present author has not been able to identify any contributions on the factor of national culture (few contributions on culture, but not national). I also identified four factors not identified in the contingency model. One, i.e. membership structure, I have incorporated that into individual behaviour. IT technology may be relevant as well, but has not been studied for the purpose of this thesis. A few authors identified process as a factor, which we regard as the result of the interplay between factors. The last factor not included in the contingency model is labelled supplier reputation. We did have a factor in our model labelled history which we removed, but then (with
the identification of reputation) came to realise that the factor is too important to leave out, and so we have included it again.

Completeness
As stated in the Background chapter, when presenting the thesis research questions, completeness is theoretical – can research ever be complete? In terms of factors that come into play when implementing a collaboration with the emphasis on improvements, the research seems quite developed, i.e. its completeness is high. I conclude this based on the number of factors identified in the literature, and the consensus there is after all regarding the findings on each factor. When analysing the factors, the present author was able to include four factors that are not directly incorporated in the contingency model, i.e. membership structure, IT technology, process and history/reputation. The thesis excluded IT technology, and did not regard process as a factor in the model either, but as embedded in the factors distinguished in the model. So, in effect two factors are left, which are both now incorporated into the contingency model. The literature review also broaden attention to involvement, which we have now added as part of the factor of individual behaviour. As my extensive literature study produced only two relevant factors that were not initially part of the model, I regard the revised model as highly complete.

4.1.15 The revised contingency model
The revised model now comprises eleven factors instead of the previously ten. All these factors played a role in all CO-IMPROVE dyads, but none of them has decisive influence; it is their interplay that determines the development of the collaboration. This also means that the positive influence of some factors can neutralise or even overcome the negative influence of others. For example, commitment (individual behaviour) together with friendship-based centrality (power) and trust may more than compensate for a supplier’s high replaceability (power). Some factors, in particular (lack of) vision and competence, as well as (mis)trust, seem stronger than others. Finally, the same factors can be beneficial and detrimental to collaborative improvement, depending on the setting in which they play their roles. An example is commercial reality, which can be perceived and handled as a problem, but also as a challenge. The next section will analyse the interplay between the factors in much more detail.
4.2 Discussion of Interplay between Factors

Several factors that are important in a collaborative improvement process were identified in Boer et al. (2005). That article also includes an initial discussion on the interplay between some of the factors. The article was written 14 months from the initiation of the collaborative improvement projects. In this section we extend the explanation of the model by a thorough explanation of the interplay between the factors, or in model terms, explain each arrow. We look at the process in retrospect, with a total of 17 months of collaborative improvement activity within the EME, and with the results of a meeting with each participant approximately six months after completion of the project. At that meeting, the company representatives appeared to speak much more openly to the researchers. The conclusions presented here are therefore grounded in the work of a much longer period of time and involve considerably more in-depth knowledge than in Boer et al. (2005).

As written in the Background chapter, collaboration literature on interplay between factors is scarce. The contributions we did find focus on interplay between pairs of factors, and do not produce an extensive picture of the overall process and all the factors interplaying in that process. In effect the discussion will primarily evolve around our own empirical findings.

This section is first and foremost, but not only, focused on improvements of relationships (not improvement projects), and in this respect dyads two and three experienced major dips in the process towards a collaborative improvement relationship. After completing the project, both practitioners and academics concluded that dyad two ended up at the same level or perhaps even slightly worse compared to the level before CO-IMPROVE. Dyad three improved the relationship only marginally whereas dyad one experienced a steady process and the relationship improved to a much more mature collaboration level.
4.2.1 Explanation of the interplay

To differentiate the individual factors in an abstract and complex process such as a collaborative improvement process, and further, to try to explain the interplay between these factors, can perhaps appear artificial to the reader and was certainly quite difficult for the researchers. Nevertheless, doing this will give the reader, academic or practitioner, a more in-depth understanding of the process we have gone through and a greater possibility of relating the individual stories told and interplay “arrows” described in this section, with collaborative interactions experienced or read about. The key factors involved in CO-IMPROVE will be considered below in the following order: approach, communication, partner characteristics, trust and individual behaviour. In explaining the meaning of these five factors, the influence of, and interplay with, the rest of the eleven factors will be explained. Further detail on the critical factors and process of collaborative improvement can be found in Middel et al. (2003) and the four articles this thesis is based on.

Approach
The collaborative improvement process experienced a change of approach approximately six months into the process (see Kaltoft et al., 2004 for more information). Therefore, some of the factors interplaying with approach will be addressed twice, relative to the initial and new approach, respectively, with the initial approach focused on the project level and the new approach focused on the relational and EME level. See Figure 13 for the explanation of the levels.

Culture → approach (initial): The Danish culture of face-to-face interaction, whether it is in business or other environments, is very much based on dialogue, breaking out of the meeting into working groups and presenting the results in plenum afterwards. The Danish practitioners’ attitude towards academia tends to be “we know better, don’t come and tell us how to do what we have done for many years” and therefore when academia interacts with Danish practitioners, improvement suggestions and such have to be presented with care and well into the intervention process. The trade culture between the specific companies within the EME involved in this project has been very close, but all companies, and particularly the SI, had a strong desire to open up the relationships by sharing information previously not shared. In the process of opening up the relationship, before CO-IMPROVE, the companies had engaged in more and more face-to-face meetings, which seemed appropriate due to short geographical distances. The conclusion drawn from the above considerations was to commence the process with a workshop approach, involving three dyads working in dyad groups but presenting their work in plenum (at EME level). The initial focus of the approach was directed at the bottom level of the business model on Figure 13. The approach was labelled bottom-up, learning by doing, which meant focusing on the known operational levels and slowly moving into the more conceptual areas of collaborative improvement at which stage researchers would have to teach/educate the practitioners.

Vision → approach (initial): Initially, the companies that joined CO-IMPROVE all lacked an understanding of the concept of collaborative improvement, and therefore had no vision of the collaboration in these terms. Looking at the process in retrospect, it was very beneficial for the process that the initial approach focused on the operational level and tangible improvement projects, which the companies could relate to relatively easily. However, the researchers intended to slowly direct focus towards the conceptual level of collaborative improvement, thus further developing the operational level as well as the relationship level. This did not occur due to lack of vision and therefore the approach stayed at the operational level for quite a while, in spite of the researchers’ efforts.

Approach (initial) → communication (topics): Two key factors interact with communication in slightly different ways: approach interacts with the communication topics whereas individual behaviour interacts with the way of communicating. The communication before CO-IMPROVE was mainly arm’s length based,
Discussion and focused on transactional aspects and improvements can be characterised as short-term or “fire-fighting”. This changed, at least during the workshops, where longer term improvement projects were identified and implemented within the EME. The approach therefore affected the communication during workshops from short-term to long-term aspects, e.g. from “how can we improve the delivery level of a particular product” to “how can we improve and sustain the overall quality level by implementing kanban”. This change of approach and new form or level of communication partly affected the communication between the workshops to involve longer term initiatives, but fire-fighting still absorbed a lot of the communication agenda.

**Approach (new) → vision:** The fact that the relationships between the companies did not develop on the dyadic relationship level (Figure 13), made the researchers propose to change the approach, meet less frequently and develop improvement projects involving more participants and pursuing greater impact. The CO-IMPROVE project participants acted as a steering committee as well as active participants. The workshops no longer involved working with the improvement projects but focused more on steering the projects as well as equipping the participants (of the steering committee) with the competences and knowledge needed to develop the relationship level. The new approach very slowly developed the practitioners’ conception of collaborative improvement and in the very last workshop (in which the topics were relationship vision and evaluation of the process as a whole) it was evident that an understanding of relationship vision was slowly developing.

**Approach (new) → communication (topics):** The new approach changed the topics discussed during the workshops, from operational improvement to vision, collaboration, the future of the relationships, and skill and competence development. The communication between the workshops also changed slowly towards these same topics, but due to the organisational setup (such as the purchaser handling quality problems), fire-fighting was still dominating the daily interactions between partners (as mentioned above).

**Communication**

**Competence → communication (topics and way of):** The initial competences of the participants, as described in the previous section, were not sufficient to successfully and efficiently handle improvement projects. As a result, the communication focused on basic improvement problems (e.g. quality or delivery improvement) and at times, frustration was evident. After the new approach as described above had been implemented, the participants slowly increased competencies in terms of project management and continuous improvement skills, hence the quality and topics of the communication changed accordingly. Towards the end of the CO-IMPROVE project, an increased collaborative improvement maturity level was reached, including significant changes in topics discussed and communication between the participants, relative to the start of the project.

**Partner characteristics**

**Partner characteristics → collaboration progress:** The partner characteristics of CO-IMPROVE, described under empirical settings, did not change during the process and can therefore not explain any of the progress made in the collaboration. A major change occurred towards the very end, though, when the purchaser taking care of supplier three left that position and a new purchaser took over the relationship. The relationship deteriorated due to this change for several reasons. One reason was the fact that the SI did not officially inform the supplier of this replacement, which made the supplier very uncertain as to why they were unable to contact the “usual” purchaser. On top of this, the new purchaser was very busy in his new job, and for a long period did not find time to contact the supplier, let alone arrange a meeting, which made the supplier even more suspicious. When finally contacted, the now suspicious supplier tried to identify signs of the new purchaser’s opinion of the supplier and his vision of the future collaboration. Unfortunately, the supplier did not pick up the right signs, and the relationship suffered from this. At the
end, the dyad had to be re-built from scratch and many resources had been wasted. However, what did change according to partner characteristics was the impact of improvement projects. Initially the improvement project members consisted of one or two representatives from the supplier, one purchaser from the SI and one researcher. Later into the collaboration process, especially after executing the new approach, additional project members were involved in specific improvement projects. These members might not have had any knowledge of the project CO-IMPROVE but had indirect influence on the progress of the collaboration.

**Trust**

In explaining the interplay between trust and commercial reality, this section is divided into two parts, one describing dyads one and three and the other describing dyad two. The reason is that dyad one and three displayed quite similar forms of interplay in terms of these two factors. Trust is also interplaying with individual behaviour, which will be described in the following section.

**Commercial reality → Trust:**

**Dyads one and three:** Commercial reality had a positive effect on trust between the participants in dyads one and three. This was due to the SI’s improved performance in the market place and the fact that the SI decided to demonstrate trust in the suppliers and allow them to grow with the SI. Supplier three even realized that they received turnover because the SI decided to phase out a foreign supplier and give supplier three the opportunity to produce these components, new to that supplier. This decision increased the supplier’s faith in its strategic position with the SI. After the completion of CO-IMPROVE, supplier three was offered to buy a new machine able to produce a large part of the new components but the supplier was determined to make the purchase beneficial for all partners. As a result, they proposed a three-year contract guaranteeing the components to “belong” to the supplier for three years and guaranteeing a set low price for the SI during the same period. This was unusual because all other contracts had a duration of one year. Nevertheless, the SI decided to sign the contract and this increased the trust between the partners. Supplier one experienced a steady growth with the SI and had developed a healthy, trusting relationship with the SI which continued to improve during the period of the CO-IMPROVE project. During CO-IMPROVE the SI decided to search the Chinese market for potential suppliers and succeeded. The SI informed the two Danish suppliers and also told them that it would not affect their turnover because their prices were competitive. Furthermore, the close geographical distance was valued by the SI. When this was proven to the suppliers, the trust in the SI further increased.

**Dyad two:** The SI announced at an early stage of CO-IMPROVE that they were in the process of finding an additional supplier for the foundry components delivered by supplier two. This was devastating news to that supplier since the SI purchased more than 50% of the supplier’s turnover and wanted to reduce this by 80%. (Commercial) reality was that the process took more than two years (realised after CO-IMPROVE ended) to execute before the turnover was actually removed. However, the fact that the removal was announced at an early stage and not executed immediately created an uncertain situation for the supplier and in the end the mistrust increased.

**Individual behaviour**

Individual behaviour, which is political and/or opportunistic behaviour as well as commitment and involvement, plays a core role in the development of collaborative improvement. It is influenced by vision, or lack thereof. Above all, however, individual behaviour has a dynamic relationship with trust and power in that it ‘produces’ changes in the factors, while the factor of individual behaviour at the same time is affected by trust and power.

**Vision → individual behaviour:** Initially supplier two and three lacked a vision on collaboration and relationship development, whereas supplier one was quite visionary in terms of its relationship with the SI,
but they had not expressed this directly to the SI. The vision of the SI was to roll out their production philosophy to the suppliers but they had difficulties expressing their long-term vision on the development of the relationships with the suppliers – see Kaltoft et al. (2004) and Nielsen et al. (2004) for more detail. However, the SI did not communicate the decision to try and establish a strategic relationship with the suppliers and this created a lot of uncertainty and, in effect, a lot of political behaviour, as none of the participants understood the future direction which the business partner was heading towards. The dominant form of political behaviour expressed by the suppliers was to appear interested but acting reluctantly. A clear example was a meeting at which the SI offered supplier two to become its knowledge centre in foundry technology. The supplier declined the offer on the spot because they were afraid that this was a subterfuge for industrial espionage by the SI and the supplier was also unwilling to make such a long-term commitment. Supplier two even engaged in what is best characterised as opportunistic behaviour (“we don’t need them, they need us”). The commitment in terms of establishing a collaborative improvement relationship from the supplier’s aspect was at times quite low possibly because the vision of a strategic relationship was basically non-existing. The commitment to improve quality and delivery was quite high. Involvement was high at both relationship and improvement level. In dyad one, the supplier’s vision on collaboration was not fully realised since the SI did not have the same vision and the companies had not expressed any actual collaboration vision to each other since they did not know what that implied and how to establish a relationship supporting a joint vision. In dyad one this did not create political behaviour, since the development of the relationship was already heading towards the level of a full partnership (see Bhide, 1989 for definition). Both the supplier’s owner and the SI’s purchaser were committed and involved. However, the supplier thought that the monthly frequency of the workshops was too high, and proposed to reduce this frequency. When all participants had been part of CO-IMPROVE for a period of 17 months they had a better grasp of what a collaborative improvement relationship implied and they discussed the future vision of each dyad in much more mature terms than previously.

Power ↔ individual behaviour ↔ trust: We have gathered the analysis of power, individual behaviour and trust into one section, since these three factors are much interwoven with each other.

The power relation between the SI and the suppliers is described in detail in Nielsen et al. (2004). In this section, I will describe how power affected individual/political behaviour. Even though the SI had decided upon developing a collaborative improvement relationship with its suppliers, they still had somewhat of a power attitude towards the suppliers. This became most evident when it was time for the project partners (practitioners) to select improvement projects. The SI immediately put itself in charge of the selection and did not leave any of the selection up to the suppliers. This promptly created a political response from suppliers two and three (they acted reluctantly but tried to appear interested) because it illustrated to them that the SI was still “the big bad company” that made the important decisions and could not be trusted in the long run. The trust level of suppliers two and three was low and stayed low, especially in dyad two.

One example concerns the power games played in dyad two around the quality improvement activities. Much time was spent on arguing about when a quality problem occurred, if it was in fact a problem, how serious it was and what the consequences could be. An improvement project was initiated to establish what exactly a quality problem consisted of and when a process inspection procedure should be commenced. The result, based on numerous discussions between different members of the two organisations involved in this dyad, was a very clear definition of quality and defects, a template that could very easily determine whether a quality problem had occurred. Both companies could then direct the resources to where they were most needed, instead of debating if in fact a quality problem had occurred. The power behaviour in dyad two was the strongest we have observed. This especially came to the surface when the SI replaced a purchaser who had a good social relationship to the supplier, established over many years (see Kaltoft et al. (2004) for more details). The ‘friendly’ purchaser was replaced by a purchaser who was very focused on improving the operational performance rather than building up a social relationship.
The relationship suffered from that, the trust level dropped and a great deal of political behaviour emerged at both sides, such as attempts to apply pressure to get the partner to act in the desired direction and, on the other hand, avoiding this pressure. Supplier two’s lack of vision and commercial reality lead the SI to take away but also occasionally to give back turnover, create political behaviour in the form of the supplier appearing interested but acting reluctantly to the SI’s clearly expressed interest in developing a strategic relationship with that supplier. This, in turn, caused the SI to never fully trust supplier two either and in effect they continued looking for possibilities to replace that supplier. Six months after completion of the project supplier two told us: “CO-IMPROVE has made us realise with great certainty that we cannot trust the SI”.

Before CO-IMPROVE the trust level between supplier one and the SI was high. This only improved during the project. Supplier one and the SI never engaged in power games and the trust between them was genuinely good, so political behaviour did not occur in this dyad.

**Individual behaviour → power, trust, communication (way of):** The fact that some of the participants engaged in individual behaviour and some did not, had a considerable effect on the trust level and use of power, but also on the way of communicating. This section will go into these details.

None of the participants in dyad one displayed overt political or opportunistic behaviour. They were both committed and involved, which altogether created a healthy collaboration environment with hardly any use of power, a high level of trust between the partners and a sound way of communicating. Dyad two experienced a lot of political behaviour from both sides, and this affected the purchaser’s opinion to the extent that he openly admitted that he did not like the two key representatives of the supplier on a personal level. As a result, the purchaser took on a power position and was determined to find an alternative supplier. Trust also suffered from this, and both partners mistrusted each other regarding long-term commitments. This was openly admitted by the supplier and expressed through the actions of the SI. Whether it was due to mistrust or part of a political game is difficult to say, but at an early stage of the project the supplier would not give the researcher access to its manufacturing facilities. The reason given was that they believed the research to be part of the SI’s industrial espionage activities. The SI used pressure and reasoning with the supplier to get the researcher into the company, as the SI saw a major advantage in having a neutral person involved in the relationship.

The way the partners communicated suffered clearly from the individual behaviour and use of power. Communication was strictly business-oriented, focused on transactional aspects (see Kaltoft et al. (2004)), and even became quite aggressive at several times. A quote from the supplier gives evidence of this; “The situation got so intense sometimes that things were said that should never have been said”. This quote refers to the use of language and sentences that were not appropriate in a business relationship. The initial environment in dyad three involved political behaviour and the use of power, but as trust increased the use of power and political games decreased. In the beginning of CO-IMPROVE the SI communicated very openly; yet there was a considerable power and political load in the dyad. The supplier was hesitant, closed and expressed distrust, but also in this dyad, communication improved throughout the project to a level of openness not previously engaged in by this supplier.

**History**

**History → collaboration process/progress:** History exercised influence on many of the other factors, which is why I decided to illustrate in the model that history interplays with the process/progress as a whole. Initially, the trust between the SI and supplier two and three was quite low. This was due to an event in the history of their relationship when the SI had first removed large portions of turnover from these suppliers and then gradually given it back to them. At the start of the project, history came back to mind because the SI was quite ambiguous about its motives and the suppliers were not sure why the SI had invited them to participate in CO-IMPROVE. A history of good relationship has, on the other hand, increased the trust relation between the SI and supplier one to a high level. The relationship is based on personal friendship
between the owner of the company and the purchaser and plant manager at the SI. The two companies have always collaborated in a very open way. The dependence of the supplier on the SI for its turnover has steadily increased, to such a high level, though, that it may actually have become unhealthy for that company. History also influenced individual behaviour. In the past, the SI had not shown to be all too trustworthy. So, when the CO-IMPROVE project was initiated, supplier two and three did not expect this to have changed. As a result, supplier two was involved but did not show much commitment to the project; rather they engaged in political behaviour. Six months after the completion of the project, the supplier told us that their initial concern had been the SI’s trustworthiness, which they had experienced to be low over and over again during their many years of trading. We observed that history influenced power as well. This was most evident in dyad three in which the supplier perceived the SI to be the most powerful of the two partners. Towards the end of the project, the supplier realised that this was perhaps not reality after all, and as a result they used a bit of power to persuade the SI to sign a three-year contract with the supplier on a portfolio of components.

4.2.2 Discussion of the findings

The analysis presented in this section extends the knowledge of collaborative improvement processes extents to the considerably less understood area of the interplay between the factors affecting the development of collaborative improvement. We found that the interplay between the factors was important for all three dyads but in a detrimental manner in some cases while beneficial in others. First I will discuss the few references found on the matter of interplay between two factors not in the model. Then I will discuss a model illustrating interplaying factors, developed for marketing purposes, not collaboration purposes.

Bessant and Caffyn (1997) wrote that a continuous improvement process, despite its attractions, quite often fails due to the unperceived difficulties in taking an organisation through such a change process. It seems that it would be stating the obvious when proclaiming that implementing continuous improvement on an intra-organisational level (i.e. collaborative improvement) is equally difficult. We would even argue that intra-organisational change is more difficult simply because two or more organisations in a change process together have to manage internal as well as external difficulties. This view is supported and exemplified by Barratt (2004), i.e. to implement internal changes a company must understand internal processes, and perhaps not many companies fully understand that. However, in a collaborative improvement process, internal as well as external processes must be identified and comprehended. Another example is the lack of a joint performance measurement system, which may create conflicting behaviour in that the participants may drag the process in different directions (Barratt, 2004). We have identified the same phenomenon in CO-IMPROVE, where dyad two engaged in a quality improvement project to identify what exactly a quality problem was instead of disputing whether it was a problem. As a result, members from both organisations had the same knowledge of the component, the same tool to determine quality problems and the same objective (i.e. to reduce the quality problems) in which they succeeded.

Several authors have identified the need for a joint objective or vision, or the consequences of the lack hereof in a collaboration. Ackermann et al. (2003) identified this (lack) as conflicting goals, Medlin et al. (2002) used the term future orientation and Huxham (2003) characterises it as common aims or vision. The model in Boer et al. (2005) has identified this factor as vision and through the CO-IMPROVE project it became quite clear that the lack of joint vision created a great deal of political behaviour. Especially supplier two and three simply did not have such a vision, and when the SI did not express its collaboration vision in unambiguously clear terms, the supplier reacted with a certain reluctance to take the relationship towards a true collaboration, although it tried to seem attracted to such a relationship.
During the process of implementing collaborative improvement in the three dyads, the approach was changed from focusing on the operational level to focusing on the strategic level and from “just-do-it” to equipping the participants with actual competences such as project/change management skills. The change of approach enhanced the development of a shared vision. Before CO-IMPROVE and in the first 6 months or so of the project, the CO-IMPROVE practitioners all lacked a vision on the relationship level. The new approach focused on this aspect, amongst others, and dyad one developed a long-term vision for the relationship. The two other dyads did not manage to develop the same comprehension of collaborative improvement. This change of approach also caused a minor interplay reaction with the communication in dyads one and three, but created a radical change in dyad two where the level of political behaviour and amount of power games increased considerably. The factors that influenced the increase of political behaviour were quite clearly the supplier’s decreased trust in the SI and power used by the SI. In dyad one, the trust level went up during the process and power was not used before and during the process, the participants did not engage in opportunistic and political behaviour and they were very committed and involved. In effect, the communication developed to involve even healthier and mutually beneficial aspects.

The new approach also focused on developing competences, and this did indeed occur in all three dyads. Commercial reality had a big negative influence in dyad two and positive, albeit minor, effects in dyads one and three. The influence in dyad two occurred because the SI decided to announce that turnover would be removed from the supplier, and this created a series of knock-on events, i.e. the trust level decreased dramatically causing the political behaviour to increase; both partners engaged in heavier power behaviours and communication suffered greatly. In the other two dyads, it was quite clear for the suppliers that the turnover increased and this caused the trust level to increase. The lack of vision and the fact that the SI did not express a clear vision for the collaborative improvement process, which was very evident in the first part of the process, caused suppliers two and three to act in a hesitant and insecure way. They were uncertain of the SI’s intentions for inviting the suppliers to participate in CO-IMPROVE. Supplier one had a much more entrepreneurial attitude and expected to benefit from the project.

4.2.3 A MODEL FOR COMPARISON

As mentioned previously we have not been able to find a model within the collaboration literature that attempts to depict the overall situation of implementing a collaborative improvement process or similar. The present author has, however, been able to identify a model that is very similar in content but rather different from a theoretical perspective, namely a marketing model. This model, see Figure 20, is used for comparison because of the similarities and therefore relevance to the model developed in Boer et al. (2005), which is the backbone of this thesis.
To offer some background the background of the model, I will present part of the abstract from the article by Anderson and Weitz (1989):

*This descriptive field study concerns a basic requirement for building long-term relationships, which is the expectation by a marketing intermediary that the relationship will last. Hypotheses about the continuity of relationship are developed from the literature on social exchange, bargaining and negotiation. These hypotheses are framed as a simultaneous equation system, which is estimated via three-stage least squares on 690 relationships (dyads) involving manufacturers and their independent sales agents (manufacturers’ representatives).*

Despite the similarities, there are a few differences that I would like to point out, besides the focus of the two models, i.e. marketing versus collaborative improvement. The Anderson and Weitz (1989) model is based on quantitative data, our model on qualitative data. Anderson and Weitz (1989) have aimed their model at factors that stabilise relationships and are developed according to three major elements: trust, continuity and communication, whereas the contingency model is aimed at illustrating the overall picture of an implementation process. Apart from that, the models are comparable.

Both models have to a large extent identified the same factors, in some cases with different terminology, see the following table:
As illustrated in Table 7 a great deal of the same factors are identified. Anderson and Weitz (1989) have identified a factor called perceived continuity which we have not included. The article does not offer much explanation of this term, other than it being a function of trust, imbalance of power, communication, stakes, reputation and age of the dyad. The contingency model offers new factors such as partner characteristics, commercial reality and individual behaviour. Looking at the interplay, i.e. the arrows, there is great consensus to be found in the two models, such as the link between trust and history (reputation and age of relationship) and communication and competence. There is equally much dissimilarity, though, which I think is due to one main difference between the two models. Anderson and Weitz (1989) have identified all the relationships, whereas we have identified the main interplay between the factors.

The last point to be pinpointed is the positive and negative correlation in the model by Anderson and Weitz (1989) which is not found in the contingency model, but very much so in the description of the interplay. One of the main conclusions in Boer et al. (2005), is that in some cases the factors and their interplay were beneficial, contributing to the success of the collaboration, while in others they caused failure and reversal of the collaborative relationship. So according to our research we could agree and disagree with many of the correlations presented by Anderson and Weitz (1989). It is, however, indisputable that a negative reputation and power imbalance have negative influences on the process. Another example is goal congruence, which we regard being part of vision. Anderson and Weitz (1989) write in the text explaining their model that a pervasive problem in relationships is disagreement over goals, but if agreed to it has a positive effect and can even undermine the need for contracts. Our findings confirm this.

In conclusion, the model of Anderson and Weitz (1989) is very comparable to our model and there seems to be consensus for a large part of the factors as well as the interplay between the factors. The purpose of using this model in the present thesis is to validate our findings. I have validated each factor in the first part of the thesis, and discussed the interplay in the last part without having any collaboration theory to support the discussion. The model developed by Anderson and Weitz (1989) offers an opportunity to execute some form of validation, although the model is from a different body of theory. But since the two models share a great deal of similarities, the model developed in Boer et al. (2005) can be regarded as theoretically

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<td>perceived competence</td>
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Table 7: Comparison between the contingency model and the Anderson and Weitz model.
Discussion

validated. At the same time, the research and the model still leave plenty of space for future research which will be presented in the conclusion.

4.2.4 Conclusion on interplay

The objective of this research question was to describe how the interplay between the factors in a collaborative improvement relationship impacts on the process in terms of success and failure. One system integrator and three suppliers provided the empirical setting, and the research method used was action research.

Some of the influential factors that we identified stem from adjacent research areas whereas others are identified from the CO-IMPROVE field data. The literature review carried out was focused on identifying the factors stemming specifically from the collaboration literature and also tried to identify publications discussing the interplay between the factors. The conclusion is that a large number of authors have published factors affecting the process, while only a few have identified the interplay and the ones who have, only compared a small number of factors. From the literature, we did not find an overall picture of all, or a large number of, factors affecting the process, their interplay and how that affects the process of developing collaborative improvement over time.

The specific research question formulated for this section was:

How does the interplay of key factors in a collaborative improvement process affect the success or failure of the collaboration?

The in-depth answer to this research question can be found throughout the description of the case findings. In summarising the conclusion, we state first of all that it is quite evident that the factors interplay with each other and highly influence the process towards collaborative improvement. The eleven factors played a role in all dyads as did the interplay between certain factors, but in some cases the factors and their interplay were beneficial, assisting in the success of the collaboration, while in others they caused failure and reversal of the collaborative relationship. As an example zero commitment will always have a negative affect, and high commitment will always influence the process in a positive manner. But some factors can have a positive effect in some situations and a negative effect in other. As an example the system integrator decided, due to commercial reality (lower prices on foundry products in other countries) to reduce the amount they purchased of one supplier’s product by 80%. This caused the trust level to deteriorate, opportunistic and political behaviour to increase as did the use of power and all this affected the communication deeply. In the other dyads, commercial reality happened to increase the turnover with the suppliers involved, and in effect a positive reaction was experienced. We also experienced how a factor can play a negative role during one part of the process and have a positive effect later on. Vision is an example in place. All participants lacked a clear relational vision at the start of the process and in the case of dyad two and partly in dyad three this caused political behaviour. Especially supplier two engaged in political games because they did not know the vision of the SI and its reasons to join CO-IMPROVE and ask the supplier to join. Later on in the process the SI’s intentions became quite clear and the participants began to understand the potential benefits of a collaborative improvement relationship much better. This reduced the political behaviour and added to the success of the process.

We have identified the most important factors and the types of interplay between these factors in the development and success of a collaborative improvement relationship. However, further research is needed to establish whether these factors are relevant in other empirical settings, and whether they interact in the same way. The research could be strengthened by a quantitative approach to develop more generally applicable conclusions in this area. In the CO-IMPROVE project we had the same participants as members in the project throughout the whole process, and further research is needed to establish how a change of membership would affect the further process. Many companies engaging in a collaboration seem
to experience difficulties and barriers on a way to a smooth and successful journey. Further research is also needed to develop a tool or method to establish with which companies such a process could be beneficial to collaborate with and what sort of immediate barriers the engaging companies will come across.

4.3 Collaborative Improvement progress

As can be seen in the contingency model, see Figure 16, the result of the influence of and the interplay between the factors is collaborative improvement progress. This section will discuss progress in terms of two types of outcome, i.e. improvement activity and relational outcomes. First, however, I will discuss the new way of working together that is required in a collaborative improvement relationship. This new way involves not only transactional aspects with improvement outcomes but also social aspects with relational outcomes. The better the balance between the transactional and the social aspects of a collaborative improvement relationship, the higher is the likelihood of success.

4.3.1 Balancing the focus between transactional and social aspects

Our findings (also presented in Kaltoft et al. (2004)) suggest that the partners engaging in a collaborative improvement relationship have to manage a balance of two types of behaviour. This has proven to be difficult since the partners from CO-IMPROVE had a transactional relationship in the past. This relationship was purely focused on increasing earnings by reducing costs and improving quality, delivery and flexibility performance, but not executed as inter-organisational activities. Today, the partners have to work together to achieve the improvements, and to get ever better in collaborative improvement. In order to be able to do this successfully, the partners also have to develop and continuously strengthen the social aspects of the relationship by creating an environment based on challenging, likeable and trusting behaviours. Figure 21 illustrates the balance needed, and also which factors come into play if an imbalance is present.

![Figure 21: The balance between social and transactional aspects of the relationship.](image-url)
With a balance between the social and transactional aspects of the relationship one can expect an environment focused on improvement and problem solving in a collaborative manner, lower transaction costs and higher performance. If, on the other hand, a relationship has too much transactional focus, the relationship will:

- Focus on what is good for ‘me’ rather than for ‘us’.
- Develop towards an arm’s length relationship instead of a partnership.
- Have a short-term, not a long-term perspective.
- Focus on firm, not joint, mission, vision, strategy and performance.
- Communicate in a directive way rather than through dialogue.

In effect, collaborative improvement will not take place due to low trust and company-focused behaviour.

If the imbalance is caused by the social aspects the partners will:

- Accept their situation instead of identifying possibilities of improvement.
- Prefer the situation they know and are familiar with and not seek change, thus avoiding risk but also opportunities.
- Praise rather than critique each other.
- Have complete trust in each other instead of a trustworthy yet challenging relationship.
- Engage in an ever slower and less effective relationship instead of developing the capability to respond quickly and efficiently to improvement opportunities.

The result is comparable to a marriage in which the partners are satisfied but bored because the relationship is a routine without any excitement or new initiatives.

The balance is important for the development of collaborative improvement to progress successfully. In CO-IMPROVE we have experienced situations in which an imbalance has occurred. The three mini-cases from CO-IMPROVE presented in Kaltoft et al. (2004) exemplify the difficulties in balancing the focus on the transactional and social aspects. Dyad one experienced a steady, fast and for both companies healthy development with only few difficulties and crises. In dyad two, supplier two and the SI representatives each experienced a slow development with major dips, at some point even crises, little improvement of the social aspects of the relationship but considerable improvement of the transactional aspects. In dyad three, supplier three and the SI started out with a good social relationship but little focus on the transactional improvements, improved both forms of the relationship, but was moved back on square one.

4.3.2 Achieving collaborative improvement progress

As part of the approach in CO-IMPROVE we tried continuously to monitor and adjust the balance between the two foci. Initially, however, we focused primarily on the transactional aspects. This was done to create quick results so that the practitioners would experience small successes in collaborating with each other and realise that improving collaboratively is in fact possible. We quickly initiated a number of improvement projects (see Figure 22) and did indeed experience the desired quick results.
Figure 22: Accumulative number of improvement projects started in each EME.

Figure 22 only illustrates the Danish EME. Kaltoft et al. (2007) also shows the data from the Dutch and Italian EMEs. Several new improvement projects were soon initiated, and we slowly started putting more emphasis on the social aspect of collaborative improvement, without forgetting the transactional aspects, though. As can be seen in Figure 22 the number of initiated improvement projects stagnated. The stagnation happened because the practitioners simply did not have the skills to handle a larger number of, or larger-scale projects. The scale of improvement projects was important partly because the practitioners became bored only doing small projects, and partly because it became difficult to identify new “small-scale” projects. A new level of improvement projects was needed. To initiate new improvement results, the decision was made to focus on the aspects that would create new/additional transactional results. This happened shortly after the decision was realised (see Figure 22, December 02) to focus the workshops more on the social aspects. We still had several themes that can be characterised as transactional, but these were on a skill-building level, not on an improvement project level. This example is further described in Kaltoft et al. (2007), and is also exemplified using the Dutch and the Italian EME.

As stated in the beginning of this section, a balance between transactional and social aspects is important and our empirical data from dyad one support this. That dyad experienced great results both on the relational level and on the improvement level, and in this dyad we observed a healthy balance between the two foci. The question is then, how is it possible in dyad two to experience such great results on the improvement level, when the focus of the purchaser was purely on the transactional level, and the relationship level suffered greatly from this?

4.4 CONCLUSION ON DISCUSSION

In this chapter, I discussed the ten factors from the original contingency model (presented in Boer et al. (2005)). These factors are: approach, vision, trust, power, individual behaviour, communication, competence, commercial reality, partner characteristics, and national culture. I discussed the factors by describing the findings presented in the collaboration literature and adjacent literature, and by comparing those findings with our findings from CO-IMPROVE. In the discussion I scrutinised the terminology used, and assessed their relevance as well as the completeness of our model; issues raised as research questions in the Background chapter. The conclusion reached can briefly be presented as follows: there is no reason to change the terminology used in the model, and the relevance of all the ten factors is high. Furthermore, the completeness of our model is very good, after I added history.

The second part of the research questions involved the interplay of the factors and how the interplay affected the process of implementing collaborative improvement. I found very little sources on this matter within the collaboration literature, so most of the discussion was based on our own findings. However, I could use one model for comparison, a model from the marketing literature. Briefly stated, my conclusion
is that interplay has great influence on the process. In order to get detailed insight into the interplay between the factors included in the model, the reader is advised to read the sections covering this research question.

Finally, I also discussed the fact that working collaboratively together requires a balance between the transactional aspects and the social aspects of working together. Our research clearly showed that too much of either type makes the success of the collaboration less likely.

The following chapter will conclude the thesis, and reflect upon the findings, the process, the research and the learning I have achieved.
5. Conclusion

Many companies have gradually moved from vertically aligned operations (Hayes and Wheelwright, 1984) to horizontally aligned operations (Ghoshal and Bartlett, 1995), a change implying that co-ordination is shifting from the hierarchy to the market place with emphasis on collaboration with other companies. One form of collaboration with companies is the so-called Extended Manufacturing Enterprises (EMEs) (Frohlich and Westbrook, 2001). In effect, the battlefield of competition is increasingly moving from the level of individual firms to that of EMEs (Busby and Fan 1993; Stock et al. 2000). Consequently, new approaches must be developed not only to enhance the business performance of EMEs, but also, and in particular, the inter-organisational continuous improvement of their performance, relative to that of other EMEs.

The EU-funded research project CO-IMPROVE (collaborative improvement Tool for the Extended Manufacturing Enterprise) addressed this need. Focusing on the learning required to enhance collaborative improvement of EME performance, the objective of the project was to develop a business model, a portal-based software system and implementation guidelines.

The project involved four universities from Denmark, Ireland, Italy and The Netherlands, two software vendors in Greece and Sweden, and three EMEs consisting of three systems integrators located in Denmark, Italy and The Netherlands, respectively, and three to four suppliers each, located in these countries and, in the Italian and Dutch cases, in Austria and Germany as well.

Developing a collaborative improvement relationship between companies is a protracted and complex process and, according to some surveys, the failure rate is as low as one to three (Bergquist et al., 1995). This failure rate is affected by a whole range of factors. The research presented in this thesis was aimed at identifying these factors and investigating their interplay and influence on the progress and success of the development of the collaborative improvement. Firstly, this thesis presents our findings regarding the identified factors, their interplay and influence. Secondly, it analyses and discusses these findings in comparison to the literature and thirdly, it reflects upon these findings (in general).

5.1 Contribution to Theory

5.1.1 Focus of thesis

Figure 23 depicts the focus of the PhD:
- Empirical focus: dyadic relationships, i.e. the relationship between a customer and a strategic supplier.
- Theoretical focus: collaborative improvement is the theoretical umbrella with, on the one hand, the continuum going from arm’s length to collaboration and, on the other hand, various forms of collaborating, i.e. network, EMEs, supply networks and dyads.
- Methodological focus: action research is the overall methodology of the research.
- Instrumental focus: instruments used to bring about change are facilitation and intervention.

Additionally it is important to point out that four articles forms the foundation of this thesis. The main report not only discusses the findings presented in the articles, but also further elaborates on the findings and attempts to present new knowledge on the matter of factors and their interplay and the way both influence the process of implementing collaborative improvement.

The four foci, from Figure 23, delimit the research to the dyadic level (not e.g. whole supply chains or EMEs), relationships between production companies (not e.g. service industry), only develop collaborative improvement theory (not e.g. network theory), using action research as the methodology (not e.g. survey studies) and only field activity (no e.g. document study). The thesis has two main research questions and to lead up to the thesis research questions, I will present the central framework underpinning the thesis, starting with the articles (authored by myself and my colleagues) this thesis is based on.

5.1.2 Summary of the articles and the research framework
Kaltoft et al. (2004), deals with the two kinds of behaviour needed when engaging in a collaborative improvement relationship. One kind is the transaction-aimed behaviour which is aimed at achieving
improvement results, e.g. improved quality and delivery. However, engaging in such intense inter-organisational improvement interaction requires an environment that encourages learning and knowledge sharing and is characterised as friendly, trustworthy and socially enjoyable, i.e. the social aspects of a collaborative improvement relationship.

Boer et al. (2005), takes the knowledge of collaborative improvement one step further and develops and discusses a contingency model that contains the major factors influencing the collaborative improvement process. The factors within the model are developed from well-established literature, such as virtual organisation theory, supply chain management theory and transaction cost theory. The model is illustrated in Figure 24 and provides the starting point for the discussion in the body of this thesis.

In Kaltoft et al. (2007), and Nielsen et al. (2004), we study some of these factors in depth to further discuss them in relation to well-established literature. In Kaltoft et al. (2007), we find the advantages and disadvantages of each of the three approaches and suggest a combination of two of them, namely bottom-up learning and top-down directed approach. In Nielsen et al. (2004), we contribute to the existing knowledge by showing how power, trust and political behaviour play a major and different role on the various levels of a collaboration, i.e. the virtual dyad level, the steering committee, the internal organisation and the improvement project teams. The present thesis then builds further on the findings from the articles.

### 5.1.3 Research Questions

The first research question is aimed at checking the terminology used, the relevance of the factors and the completeness of the set of factors included in the framework. The aim of this question was to check our set of factors in comparison to other publications identified in the collaboration literature. For that purpose, I first had to establish whether the terminology used in the model correlates with existing terms used in the collaboration theory. Next, I tried to conclude upon the relevance and completeness of our findings relative...
to the published results. Did we identify factors not presented elsewhere or dismissed as irrelevant? Did we miss factors identified by other researchers?

### Thesis research question 1; factors

- Are the factors included in the framework comparable and useful to existing collaboration literature:
  - Terminology: is the terminology we used in the framework comparable with terminology used in other publications on collaboration?
  - Relevance: are our findings relevant according to other collaboration theories?
  - Completeness: do other collaboration theories suggest factors not included in our framework?

The second question deals with the interplay between the factors. The aim of this research question is to explain the interplay between the factors or, in model terms, to attempt to explain the arrows in Figure 25. Unfortunately, the findings regarding interplay cannot be discussed in comparison to the literature, as interplay between factors affecting collaboration and developing collaborative improvement is a white spot in the literature.

### Thesis research question 2; interplay

- How does interplay between the key factors in a collaborative improvement process affect the success or failure of the collaboration?

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**Answer to thesis research question 1; factors**

**Terminology:** In some cases, it is obvious that we used suitable terminology, since many other authors within the collaboration literature use the same; examples are power and trust. In other cases, this is more difficult to establish, for two reasons:

- There is no collaboration theory addressing the role of some of the factors, in particular partner characteristics and national culture.
- Various terms used for the same factor or our factor contained several factors found in literature: for example I regard resources, mutuality and supply chain metrics as part of our factor labelled approach. My analysis, however, did not provide any reasons for changing the terms used in the contingency model.

**Relevance:** We have identified factors which are very rarely or not at all addressed in the collaboration literature; examples are partner characteristics, commercial reality, competence and national culture. Partner characteristics and national culture are unique to our findings. There exists few instances of factors addressed in the literature which are not relevant and, consequently, not covered in the four articles underpinning this thesis. One of these factors, IT technology, is not relevant, due to the delimitation of the thesis; another example is process which we did not regard as a factor, but as the dependent variable in the
model. Membership structure and history/supplier reputation are factors not originally part of the contingency model, but these two are now incorporated; history as a new and separate factor, and membership structure as part of individual behaviour.

Completeness: With these two factors now incorporated in the model, the set of factors seems rather complete. I did not find any literature suggesting additional factors, other than IT and process which, for reasons mentioned above are not included.

From the analysis and discussion, several changes, other than the ones mentioned above, were implemented into the model. The factor of resources was found as a factor in literature and is now incorporated into approach. The factor of individual behaviour is an umbrella factor which, in the original model covered commitment, political behaviour and opportunistic behaviour. I decided to extend the range of this factor to also include involvement. Structure, i.e. whether an organisation is organic or geared to change according to the environment in which it operates, was added to the factor of partner characteristics.

The new and updated model is shown in the following:

![Updated Contingency Model](image)

Figure 25: The updated version of the contingency model.

**Answer to thesis research question 2: interplay**

The second thesis research question is quite complex and demands an in-depth answer, to which most of the discussion chapter in this thesis is devoted. It is quite clear, however, from the empirical data from CO-IMPROVE that the factors indeed do interact with each other. The most important observation being that influential interactions are occurring according to the contingency model.
Some of the factors interact in such a way that they sometimes have detrimental influence on the process, and at other times beneficial influence. Vision is an example in place. All participants lacked a clear relational vision at the start of the process and this induced political behaviour, especially by the suppliers because they did not know, understand or trust the intentions of the SI. Later in the process, the SI’s intentions became quite clear and the participants began to understand the potential benefits of a collaborative improvement relationship much better. This reduced the political load of the suppliers’ behaviour and added to the success of the process.

Using collaboration theory, I validated each factor in the first part of the thesis. This answered the first research question. Next, I discussed the interplay between the factors. I did not find a model supporting me in the collaboration literature and used a model described in the marketing literature instead. The model, developed by Anderson and Weitz (1989), is very comparable to our model and there seems to be consensus on a large part of the factors as well as the interplay between them. Consequently, I regard the model developed in Boer et al. (2005) and adapted in this thesis as theoretically validated.

5.1.4 Collaborative progress

Collaborative improvement requires a new way of working together. And to experience a smooth successful progress we have concluded that a balance between the transactional and the social aspects of a collaborative improvement relationship will more likely create a successful process, than if the majority of the focus is on either one of the two. This view is developed in CO-IMPROVE and is supported by literature. We have developed a model that illustrates the benefits of a balance as well as the consequences of an imbalance.

![Figure 26: The balance between social and transactional aspects of the relationship.](image)
So we conclude that a balance between the focus on transactional and social aspects is important and our empirical data from dyad one support this. Dyad one experienced great results both on the relational level and on the improvement level, and in this dyad we observed a healthy balance between the two foci. The question is then, how is it possible that dyad two experienced such great results on the improvement level, when the focus of the purchaser was purely on the transactional level, and the relationship level suffered greatly from this?

5.2 Managerial implications

The CO-IMPROVE project has produced a number of deliverables that I would recommend managers to study if they desire to commence a process of implementing collaborative improvement with strategic partners. To get access to the publicly available deliverables, two options are available. One possibility is to contact the present author or any of the other partners involved in CO-IMPROVE; the other is to go to the following web-site: www.i2s.gr/coimprove/co-improve.html. The main deliverables are:

- The Business Model, a document that describes the CO-IMPROVE conception of what a collaborative improvement relationship is and how to organise, manage and support the capturing, storage, retrieval, transfer and dissemination of knowledge generated as part of collaborative improvement in an EME context.
- The CO-IMPROVE portal, which supports the Business Model and is a tool that will enhance the process as well as learning, but also supplies the user with tools and other support functions that will assist the user in the process.
- The Implementation Guidelines, tangible guidelines that will help the user with the implementation of the process and the software.

The Business Model document and the Implementation Guidelines and the CO-IMPROVE software can be found through the webpage mentioned above or through the current author. Studying the Implementation Guidelines is recommended to managers looking for assistance in implementing a collaborative improvement relationship.

5.3 Critical reflections on the research and thesis

A major influence of the development of a research process is the choice of methodology. In the case of the research presented and discussed in this thesis the methodology, i.e. action research, was decided before commencing the actual research by the developers of CO-IMPROVE, rather than the present author. Nevertheless, I decided to join the research project due to my interest in the topic and this particular way of researching. This means I had to accept the consequences of studying the objective of the research from an action research perspective.

One of the consequences concerns closeness to the empirical field. I experienced it as of great advantage, if not necessary, to be emotionally detached from the actors in the case companies when drawing conclusions. It is, however, extremely difficult to become fully emotionally detached from actors with whom one interacted so regularly and intensively. I am sure this has affected our conclusions in one way or another. We tried to overcome this problem by having two PhD researchers very involved and very knowledgeable from the field study, whilst having a professor and an associate professor less informed of the cases to discuss the results with.

CO-IMPROVE had yet another mechanism to ensure that the action research process would occur according to the methodology: one of the partners was a university not involved with any of the EMEs and, as experts in action research/action learning, they observed how the action learning/action research was performed in each of the EMEs.

In order to validate our findings, we also presented our conclusions regularly to the other two EMEs and
universities, and invited their comments. Occasionally, this led to corrections, re-interpretations and/or further refinement of our conclusions.

A very interesting aspect of the project was that it allowed me to be involved in dyadic relations and experience the interaction between the practitioners as well as how they reacted to each other separately. The interesting aspect about this is to experience, observe and/or take part in the same situation but in different settings talking to different people. So I could literally spend a day with the SI and talk to them about a given situation, then spend the next day with the supplier and talk to them about the same situation. My insight into that particular situation would naturally expand according to how many of the practitioners I talked to, and the number of different views presented to me. This would develop my perception of that situation to a very detailed level, and equip me with knowledge very useful in my discussions with each partner in the project. This level of detail and opportunity to discuss the given situation with a large number of people with different views gave me very strong, detailed and debated knowledge for an academic purpose as well.

Being involved as an action researcher also had a disadvantage, since the researchers could, even at times unaware of it, become part of political games. The practitioners tried to use the researchers to achieve what they wanted, without the researchers always being instantly aware of that. One explicit example is the fact that the practitioners admittedly used the researchers’ neutral position to interact with each other, or to inform their business partner(s) of their viewpoints. When engaging in action research there is a thin line of finding the balance between getting involved but perhaps not too involved, and even more so when working with dyads. This is because the presumably neutral researcher cannot allow himself to get too involved with one partner. If that partner, or the other partner involved in the dyad, becomes aware of that, it will affect the trust both partners have in the researcher.

Figure 27: Level of data gathered in the action research process.
Another aspect of action research is the amount of data gathered. In an action research project taking place in the dynamics of the business world, it is on the verge of the impossible to develop a detailed data collection plan, and to stick to this plan. A plan should be developed, but the researcher must be prepared to re-direct the research according to the process. This requires the researcher to constantly monitor and interpret the data collected and compare this to the research plan.

One of the consequences of an action research process is that data from various areas and sources are available, some of which appear to be useless, while other are very useful and many are in between. Figure 27 shows some of the various types and relative amounts of data I collected. With the terms ‘some’ and ‘relative’, I mean that the figure does not in any way present all types of data collected nor does it present an accurate measure of the amount of data collected. It is merely meant to illustrate and clarify the point I wish to make, namely that some of the data collected is useful and sufficient for an article (e.g. the topic of running a family business), some is sufficient for a thesis (e.g. the topic of collaborative improvement), and some are not adequate or sufficient for either (e.g. the topic of supply chain). A researcher engaged in action research must be able to separate large amount of data collected into what is useful, what could become useful and what is nice to know. It is important to consider some kind of separation in order to log the useful data, since it is impossible to log everything.

To successfully engage in an action research project demands a mix of the right skills, i.e. a well-developed understanding of human behaviour, communication skills, dialogue techniques, a sensible grasp of ethical behaviour, and analytical capabilities – skills that are mostly learned through practical experience. Thus, being a “new” PhD researcher fresh from the engineering school, it can at times be difficult to interact in an appropriate manner and still get the desired data. Fortunately, for me, most engineering educations at Aalborg University, mine included, involve a lot of practical interaction with companies, during which we develop some of the skills required.

A lot of choices are made both during the data collection period and during development of the thesis. Every choice has consequences. In the following, I will present some of the choices I made and describe the reasoning behind and the consequences of the choices.

During the PhD study, I was involved in the development process of the IT portal for CO-IMPROVE, but decided not to focus the thesis on that part of the project, although this theme should not be neglected as a theoretical and empirical contribution and great knowledge has been collected of the process. One of the consequences of this is that an aspect of the implementation of a collaborative improvement relationship is missing out and perhaps even an important factor. The decision was made partly because the usage of the IT portal in the Danish EME was minimal and partly in order not to open up yet another “book” of implications.

Another choice made is the decision of only using collaboration and similar theory to discuss the findings from CO-IMPROVE. A different choice could have been to focus on the most established theory within each of the factors to a greater degree than done in the articles. One consequence of making this choice is that it closed the opportunity perhaps to use theory which has proved itself to be established, useful, well-defined and well-tested, and certainly to contribute to the development of a less established, defined and tested theory, the collaboration theory, that is. A related consequence is that my decision to focus on using and contributing to the collaboration theory may also have reduced the opportunity to reach a broader audience. What I instead wish to achieve with this choice is to target the discussion of the findings to a very specific and relevant theory and perform a comparison with the findings from other collaboration cases. The desire is then to add considerably to the collaboration body of knowledge instead of contributing less in several theoretical areas.
Another choice of theory I could have made is to use (continuous) improvement literature, which perhaps would have been just as relevant as applying and seeking to contribute to the collaboration theory. The consequence of the decision to choose collaboration theory, is that although our focal process is the development of collaborative improvement, the analysis and conclusions presented in this thesis say more about the development of collaboration than about the actual improvement activities. I did not regard the thesis to contain both (primarily due to time and volume constraints) so a choice had to made. The choice was made to the collaboration theory's advantage because none of the continuous improvement theory is aimed at the inter-organisational perspective, and this was my main interest, to test the model within the inter-organisational (improvement to a small extent) setting and shed light on this aspect of theory.

Another aspect that leaves plenty of options for discussions, is the model itself, i.e. the factors, and perhaps even more so the interplay. The model was developed by the Danish CO-IMPROVE team and resembled the role of the factors and their interplay in the Danish EME. The model was then tested in the Dutch and Italian cases and the conclusion was that it was usable and to a large degree resembled the situation in these two cases as well. This does not mean, though, that the model is generally accurate and fits well with other situations in other dyads, but we have told a story, we have developed a model suited for this story and we believe that the model is usable in many other situations both in part and as a whole. This thesis has proved to a large extent that the model is relevant in parts, i.e. on the level of individual factors, but we have not been able to establish, due to lack of a large theoretical and empirical base, how relevant the model is as a whole, i.e. the interplay between the factors.

5.4 Future directions for research

Throughout the discussion in this thesis, I have ended each discussion of the factors with indications of future research, which I will recapitulate here. Subsequently, I will suggest further research from a more overall perspective.

In terms of future research with regards to the factor of ‘history’ it would be very interesting, although unusual, to see how dyads with absolutely no history together develop in a collaborative improvement process.

In the contingency model, we have included national culture, but how does the influence of cultural aspects other than national, affect the process? One example could be the collaboration culture mentioned by Barratt (2004). Corporate culture or, more precisely, differences in the cultures of the companies involved in a dyad or a network, is another candidate for further research. Future research could also establish whether the (national) culture is stronger or weaker in the industries and countries involved in CO-IMPROVE compared to other industries and countries.

In CO-IMPROVE we did not observe a lot of changes in terms of partner characteristics, but it would be very interesting to engage in cases with more dynamic partner characteristics, and observe the influence from this.

Lack of competencies created a radical decrease of momentum in CO-IMPROVE, so guidelines to the type of competencies needed, as well as when in the process they are needed, would be beneficial.

Although trust is not a necessity to initiate a collaborative improvement process, it will at some point be important, if not a prerequisite, to develop a true collaborative improvement relationship. Future research could perhaps shed light on when, during the process, trust is becoming important. Dealing with trust also brings about the issue of risk, and how participants in such a process deal with risk. Interesting issues such as how trust and risk issues correlate with each other, as well as examining if and how it is possible to develop trust in a high-risk environment could be worthwhile researching.
We concluded that the choice of a certain approach is a very influential factor and we see four major questions for further research in this regard:

1) Are companies using other approaches not identified in our study? If so, what are the strengths and weaknesses of those approaches?

2) Is our proposition correct that a combination of the three approaches produces the most effective implementation of collaborative improvement? And would it be sensible to try to apply such a combination from the beginning? Or do companies need to go through a learning process anyway?

3) A main question is whether the results presented here hold for Systems Integrators and, especially, suppliers in other economic areas (e.g. Eastern-Europe and Asia), in other assembly industries (e.g. electronics, white-goods), and also for example (semi-)process (e.g. food, pharmaceutical, chemical) industries.

4) The study has focused on dyads, not networks, and the first year and a half of attempts to get collaborative improvement off the ground. Further research is needed to identify successful approaches to get from the level of dyads to that of networks, and to find out if the approaches described and analysed in the present article hold for later phases of collaborative improvement, i.e. with more mature partners.

Facilitators and managers need tools and guidelines in order to successfully direct the resources and effectively foresee the process. An obvious area in which tools would be beneficial concerns the factor of ‘competencies’. Further research is needed to identify existing and/or develop new tools assisting facilitators and managers to recognise lack of competencies and develop competencies.

Future research would be beneficial to develop tools and approaches that support companies to develop a joint vision for collaboration, including workshops and more tangible vision development tools such as rolling back the future. The development of good guidelines that can be used to operationalise vision into action plans is also an important area for future research.

It could also be beneficial to identify ways of handling the delicate topic of commercial reality and perhaps even develop tools that would help the participants to overcome, avoid or deal with this factor.

Although this thesis did not include the use of IT-tools to enhance the process, this particular aspect was important in CO-IMPROVE. Future research could therefore be directed towards finding out exactly how a useful IT-software could look like, how it could be implemented successfully, when in the process it would be suitable to implement the software, and if the need for such software is industry-specific.

The interplay identified in the contingency model is not the only interplay we consider possible in a collaborative improvement process. It is the interplay we have identified as most common in our three EMEs and it is therefore regarded as the major interplay between the factors. The interplay suggested in our model could be further researched to establish if processes other than the collaborative improvement process or other industries, or perhaps even non-for profit collaborations, demand a new or changed model with a different interplay between the factors.

Using action research as our methodology, we have identified the role of the most important factors and the interplay between these factors in the development and success of a collaborative improvement relationship. One of the weaknesses of the research presented here, therefore, is the generalization of the results. Further research would benefit from a quantitative approach, to reach more widely applicable conclusions and provide the basis for the development of tools helping practitioners prevent or overcome the many difficulties and barriers which companies engaging in a collaboration process seem to experience.
5.4.1 **An attempt to predict the future of collaborations**

After having been deeply engaged in an area of theory and practice over a three-year period, it is natural to reflect upon the future development within that area. I will therefore share my take on future forms of collaboration. I will do this both from my own perspective and also based on inspiration I got from the latest reports or conversations with colleagues.

First, there is a continuum of close to loose interaction. I believe we will see two extremes or directions within collaborative relationships. One extreme is aimed at developing and maintaining a long-term relationship with very close interaction. In this type of relationship, continuous collaborative innovation is the key factor keeping the relationship in place. This requires a high degree of mutual trust, which is based on a long and beneficial collaboration history in which there is no role for power-based political behaviour. The other extreme is loosely coupled, short-term collaboration, which I expect to be a possible solution for many companies in the future. These collaborations are created with the very specific purpose of solving a concrete problem or to create a particular solution. It may take companies many attempts to learn to complete such short projects successfully, but when they master this ‘plug-and-play’ capability, they can quickly adapt to a new partner’s way of working, solve the problem or create a solution, and move on to the next short-term collaboration. Trust is not so much an issue in this type of quick win-win situation, for two reasons. One is the time aspect: there is simply no time to build up trust or perhaps even to establish that the partner is not to be trusted. The other reason is that quick win-win situations require specialists to focus on a specific assignment, and as we experienced in CO-IMPROVE, political behaviour and, consequently, trust are hardly issues between specialists. For them, interest in a particular assignment is much more important.

As Figure 27 shows, many other areas of learning may occur in the course of a PhD process like the one reported here. Furthermore, many different activities have to be performed: collecting and interpreting data, interacting with colleagues and practitioners, advising students, teaching, reading, writing for different purposes just to mention a fraction of the things learned through the process. It is very ambiguous to end the report of a learning process like a PhD. On the hand, it is great to finally conclude a three-year project. On the other hand, there is so much more to dig into, i.e. the future research, and so many questions that are not completely answered, i.e. the critical reflections. So after having performed research within this area for three years, I hope to be able to continue working with this area in the future.
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**CO-IMPROVE DELIVERABLES**
Business model
CO-IMPROVE portal
Implementation guidelines
See [http://www.i2s.gr/coimprove/co-improve.html](http://www.i2s.gr/coimprove/co-improve.html) for further information.