

Collaborative Improvement – Interplay but not a Game

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PREFACE

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 Coghlan, 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.*,

2000; New and Mitropoulos, 1995) and *supply networks* (Christine *et al.*, 1999, Lamming *et al.*, 2000). 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, coalition, network, or, with more negative connotations, conflict, competition, co-optation, 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 Merril-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:

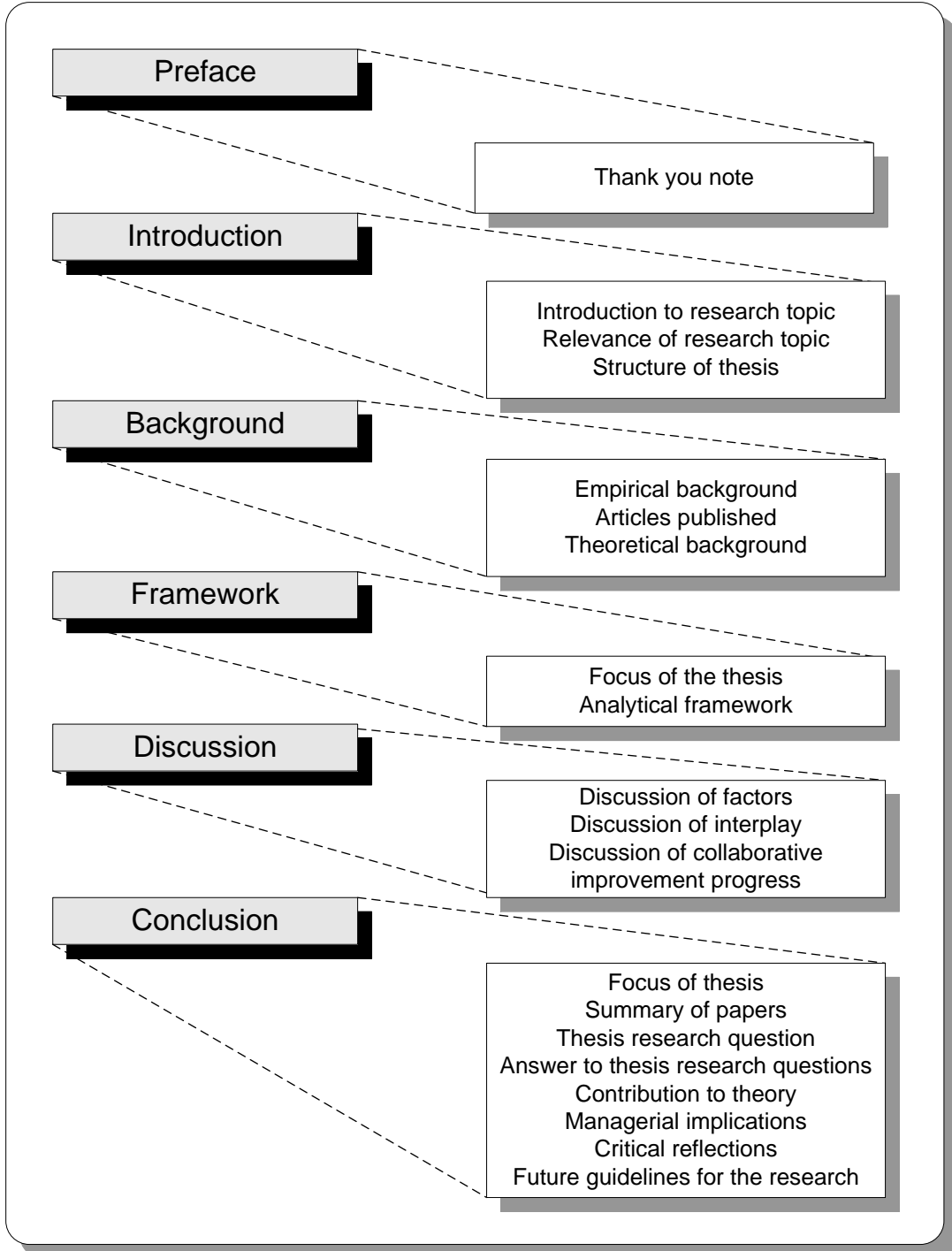


Figure 1: The thesis structure.