

“From Continuous improvement to Collaborative improvement: Scope, Scale, Skill and Social Networking in collaborative improvement”

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Abstract

More than ever, companies are challenged to improve their performance and respond quickly and accurately to changes within the market. As competitive battlefield is moving towards the level of networks of organisations, the individual firm is an inadequate entity for identifying improvements. Therefore the concept of continuous improvement must be applied and used in inter-organisational settings, leading to the concept of collaborative improvement. However the process of applying and transferring CI to inter-organisational settings is fraught with intra- and inter-organisational change issues and working practices. For companies to be able to effectively manage and organise the process of collaborative improvement knowledge and understanding on the process itself is needed.

Introduction

It is increasingly argued that the process of Continuous Improvement (CI) is becoming more complex. Market developments, including rapidly changing market demands, intensified international competition, and rapidly changing technology developments, (Kotler, 2000; Teece et al., 1997) are altering the rules of the game. These changes have created and imply large external dynamics for organisation. Not only have these dynamics created a situation in which companies have to respond quickly and accurately on changes within the market and constantly have to improve their performance, it also created new imperatives of competition between companies, increasingly moving from the level of the individual firm to that of a network of organisations. This results in questions for organisations and managers how to manage and organise network interactions on individual, organisational and network level (see also Groen et al., 2001).

Continuous Improvement (CI) is a consolidated concept in managerial theory and practice and is considered vital in today's business environments, but is mainly dealt with in the context of stand-alone companies. As firms are forced to re-examine, at a strategic level, the way they do business in order to add value and reduce costs it becomes clear that the individual firm is an insufficient entity for identifying improvements (Harland et al. 1999). Therefore CI must be applied and used in inter-organisational settings. In managing and organising the process of CI in the network, it is important to pay particular attention to the processual elements that influence the successful management and organisation of it. A deep knowledge and

understanding on and in-depth insight in the process of CI in inter-organisational processes is needed in order to be able to effectively manage and organise ant process, including that of CI (see also Boer and Gertsen, 2003).

The overall performance of the network is the result of the interaction between and the integration of inter-company processes (Cagliano, 2000). Our focus is on the interaction patterns in networks leading to changes and improvements between the companies involved within the network.

The paper is structured as follows. First we present a review of the literature in the field of continuous improvement related to the topic and scope described in this paper. Further we put a definition to the term Collaborative Improvement. Second, we will discuss the research issue of this paper and define the concept of Extended Manufacturing Enterprise (EME). Next to that, the adopted research methodology is elaborated and we will discuss shortly why this research methodology is applicable and appropriate in processual research on CI in an inter-organisational setting. Finally, the last section reflects on and discusses the relevance of the research and highlights challenges for future research.

Continuous Improvement and Collaborative Improvement

Incremental improvement, essentially in manufacturing, has been widely discussed by the literature on Continuous Improvement (CI) (see e.g. Imai, 1986; Bessant and Caffyn, 1997, Boer et al., 2000). Within the literature on CI incremental improvement is regarded as an important subject that deserves separate attention, and authors promote the importance of (cumulative) effect of improvements (De Lange-Ros, 1999).

The concept of Continuous Improvement (CI) was developed as a new field in Operations and Innovation Management in relation to the Japanese practice of *Kaizen*. A rich stream of literature bloomed, describing successful applications of *Kaizen* in manufacturing processes of Japanese companies. Among the contributors, Imai (1986, 1997) had a very strong influence. According to Imai, *Kaizen* is a "low cost common sense approach" characterized by a strong orientation to Processes, People and Standards (Imai, 1997). During the 80s, pushed by evidence of superior competitive advantages obtained in operations by Japanese companies, CI and related concepts (e.g., *Total Quality Management*, *Total Productive Maintenance* and *Lean Production*) were gradually introduced in the west. Contributions in literature were mainly aimed at describing tools and techniques and their application (Deming, 1986; Juran and Gryna, 1988).

During the 90s a rediscovered attention to the strategic importance of manufacturing and *operations management* and a new emphasis on human resources and their diffuse involvement in innovation and change processes contributed to attract management attention to the strategic and organizational principles of CI. A new stream of literature on CI emerged, characterized by a much higher emphasis on the role of management, setting the strategic, organizational and cultural conditions for the diffusion of CI to the overall workforce. An important contribution in this direction was the one by John Bessant and the CINet research network (Caffyn, 1998). Bessant et al. (1994) summarize the organizational factors which are needed to support continuous improvement; tools and techniques are only one of them, while organizational learning and knowledge management become key issues. CI was redefined as a "company-wide process of focused and continuous incremental innovation" which passes through different stages or maturity levels (Bessant and Caffyn, 1997) thanks to the progressive absorption of behavioral routines. Similarly, another definition describes CI as "*the planned, organized and systematic process of ongoing, incremental and company-wide change of existing practices aimed at improving company performance*" (Boer et al., 2000).

By now CI is a consolidated concept in managerial practice and literature. Based on a literature review on CI presented in De Lange-Ros (1999) several conclusions have been drawn. She categorizes existing literature on CI into three types.

First of all, she concludes that the first type of literature on CI can be typified as *attention literature*, which stresses the importance of incremental improvements. She states that this literature often discusses general prescriptive conditions for CI.

A second type of literature is *descriptive literature*, which describes a large variety of techniques that are used in practice. The strong feature of this literature is that it describes the different practices of incremental improvements (De Lange-Ros, 1999).

A third type of literature is based on an examination of what is going on in practice and then tries to build a theory based on the descriptions and categorizations of practice and is typified by De Lange-Ros (1999) as *theory building literature*.

In a more recent review by Boer and Gertsen (2003) they formulated a couple of intriguing challenges and questions for future research in the area of CI. Two of the challenges provided us with a starting point for this research:

- More *processual research* is needed, in the firm belief that the effectiveness of managing any process depend, including CI, a great deal on deep knowledge and understanding of that process (Boer and Gertsen, 2003).
- CI is no longer restricted to *intra-firm* processes but increasingly to *inter-firm* processes as well (Boer and Gertsen, 2003; Boer et al., 2000)

The concept of CI has to be transferred and applied in inter-firm processes of disparate companies within a network, leading to the concept of Collaborative Improvement (CoI). CoI is defined as: "*a purposeful inter-company process that focuses on continuous incremental innovation aimed at enhancing the overall performance of the disparate companies within a network*". It is simultaneously concerned with bringing about change in the network of disparate companies, developing the network capabilities towards collaboration, learning and improvement, and generating actionable knowledge on the process of collaborative improvement (see also Cagliano et al., 2004; Middel et al., 2004; Middel and McNichols, 2004).

But as stated before, there is still a substantial lack of empirically grounded contributions and theories on the concept of CI in an inter-organisational setting. However, the process of applying and transferring CI to inter-organisational setting is fraught with intra- and inter-organisational change issues and working practices. Table 1 indicates a couple of additional key components in the areas of strategy, culture, infrastructure, process and tools compared to the key components of CI, as identified by Caffyn (1998). The authors realise that the list depicted in Table 1 is not complete and that there are more additional key components, but the list gives insight into the difficulties of applying and transferring CI to the inter-organisational setting.

Table 1: Commonality/difference CI and CoI (source: Middel et al., 2004)

Area	Key components of CI	Additional key components to CoI
Strategy	<ul style="list-style-type: none"> • Clear strategic framework for CI • Long-term goals and short-term targets • Communication of CI strategy to all employees • Top management commitment • Long-term, company wide perspective 	<ul style="list-style-type: none"> • Shared goals and vision with regard to CoI • Mutual understanding of CoI-strategy of all the companies • Company/EME commitment towards CoI • Long-term optimisation instead of short-term orientation
Culture	<ul style="list-style-type: none"> • Shared belief in the value of small 	<ul style="list-style-type: none"> • Shared belief in prosperity through

	<ul style="list-style-type: none"> improvements • Belief that all employees have creative potential • Treating failure as a learning opportunity 	<ul style="list-style-type: none"> collaboration and improvement • Trust • Openness is sharing information, learning moments, and knowledge
Infrastructure	<ul style="list-style-type: none"> • Flattened hierarchy • Teamworking and flexibility • Devolution of decision making and empowerment • Effective communication channels • Commitment to training and personnel development • CI facilitators • CI 'vehicles' such as problem solving groups or CI teams 	<ul style="list-style-type: none"> • Effective communication channels • CI 'vehicles' such as problem solving groups or CI teams • Devolution of decision making • Commitment to exploiting and exploring improvement potential inside collaborative relationships
Process	<ul style="list-style-type: none"> • Formal CI/problem solving cycle • Capture and transfer of learning • Recognition and reward of CI activity 	<ul style="list-style-type: none"> • Capture and transfer of learning between and within companies • Benefit sharing
Tools	<ul style="list-style-type: none"> • Company 'toolbox' with a range of CI tools • 'Toolbox manager' 	<ul style="list-style-type: none"> • EME 'toolbox' with a range of CoI tools that are applied similarly within the EME companies

Attention within the process of collaborative improvement should be paid to the accumulation and development of knowledge, created through learning as part of the process, that offers competitive advantage and the long-term development of a capability for collaborative improvement. The improvement of the performance of the network is depending on the ability of the companies to learn from the inter-organisational collaboration and applying the created knowledge in their current work practices (both within and between the companies) and in the management of the inter-organisational relationship. In order for companies to be able to organise and manage the process of collaborative improvement in an inter-organisational setting they need to gain insight and develop understanding and knowledge on the process itself. This is in line with the advocacy for more processual research by Boer and Gertsen (2003).

Research issue

Firms are operating within networks, in which they collaborate with other companies to deliver final products to the market. Networks are often defined as patterned relationships between actors such as individuals, groups and organisations (Aldrich and Zimmer, 1986; Burt, 1992.). Others define networks as a set of interdependent actors, activities and resources (Hakansson and Snehota, 1995). As such, the network is a social construction and is built upon social relationships between actors (Hakansson, 1987). The interest in the topic of networks is concentrated on the way in which organisations manage and organise the collaborative improvement process.

The research objective of this paper is:

Gaining in-depth insight in and developing actionable knowledge on how to organise and manage the collaborative improvement process.

In this research the focus will be on the Extended Manufacturing Enterprise as a network of organisations. The concept of extended enterprise is rooted in the Supply Chain Management stream of the literature. The original focus of this stream was on customer-supplier relationships, widening the horizon of management attention from just the internal aspect of operations to the vertical relationships of the company (Kraljic, 1983). Recently, a new stream

of the literature on customer-supplier relationships observed that the study of the dyadic relation between one customer and one supplier does not allow to capture the overall advantage that could come from an integrated strategy of supply management. This approach suggests instead to focus on the overall set of relationships that form the “supply network” of a focal company (Lamming, 1993; Harland, 1996a). A supply network can be generally defined as a body of advanced relations characterized by an integrated strategy and management policy that the focal company maintains with a limited set of its suppliers (Bartezzaghi and Sassatelli, 2001). Similarly, the Extended Manufacturing Enterprise (Busby and Fan, 1993; Childe, 1998) is defined in terms of manufacturing companies that co-operate closely to maximize the benefits of the business they are involved in (see figure 1). In this idea the suppliers are viewed as a part of the principal company. Both the concepts of Supply Networks and Extended Manufacturing Enterprises are based on the notion of collaboration between companies, that is, working together, over an extended period of time, for the benefit of both (Ring and Van de Ven, 1992).

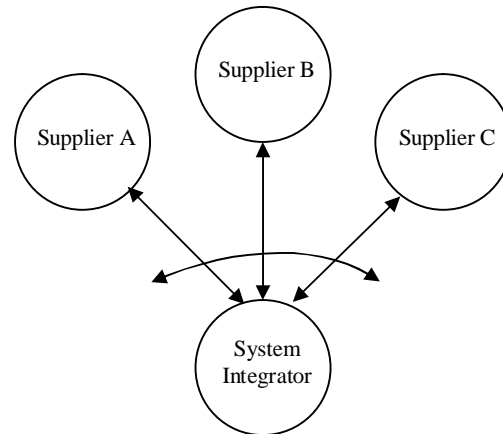


Figure 1 Concept of the EME

Sobrero and Schrader (1998) suggest that there are two dimensions, which are ‘fundamental’ to the management of inter-firm relationships: contractual and procedural coordination. Since the key of CI is development and learning (Boer et al., 2000), the focus will be on the procedural coordination, which is necessary for the exchange of information and organisational learning (Burns and Stalker, 1961; Nonaka and Takeuchi, 1995). Doz et al. (1989) state that actual coordination is achieved not through contractual means but by patterns of communication involving individual employees: *‘Top management puts together strategic alliances and sets the legal parameters for exchange. But what actually gets traded is determined by day-to-day interactions of engineers, marketers, and product developers’*.

In order for organisations and managers to be able to effectively manage and organise the process of collaborative improvement attention have to be paid to network interactions on individual, organisational and network level. Organisations and managers have to develop knowledge and understanding on the process of collaborative improvement to influence the process and the outcomes effectively. A framework for analysing collaborative improvement process starts with the assumption that actors act purposefully in interaction with other actors (Granovetter, 1992). They are functional actors in the sense that they pursue certain goals and show a tendency to optimise gratification (Parsons, 1951). Furthermore, interactions between actors are mediated through patterns of culturally structured and shared symbols (Parsons, 1951).

Goal orientation is reflected in joint strategies and goals towards collaborative improvement at realisation of certain possibilities and opportunities to fully explore an exploit the inter-organisational processes. The tendency to optimise refers to the economic concept of efficiency, which is related to economic capital. Every collaborative improvement initiative is undertaken to optimise and improve the performance of inter-organisational processes. The system of culturally structured and partly shared symbols is enabling pattern of maintenance

and change. The key to CI and CoI is development and learning and is enabled by a shared culture and symbols (see also Bessant and Caffyn, 1997).

We will use the network model of actors in a social system perspective (see Figure 1). Based on this framework each actor has four mechanisms that can be used more or less successful in the process of collaborative improvement, namely striving for goal attainment (Scope), optimisation of processes (Scale), maintaining patterns of culturally structured and shared symbols (Skill), and interaction between actors (Social Networking) (see Groen et al., 2002). All four mechanisms work concurrently and influence the process and progress of the

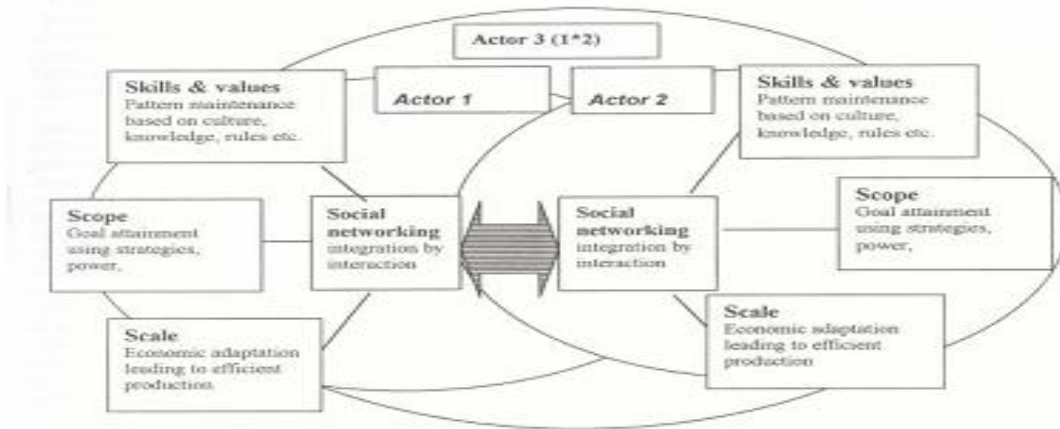


Figure 2: Network model of actors

collaborative improvement process. As explained by Groen et al. (2002), one of the basic hypothesis in social system theory is that only when all four mechanisms are developed sufficiently, can a social system last. Actors develop a structure of collaborative improvement based on actions and usage of the mechanisms in interaction with other actors. We describe how the System Integrator has used scope, scale, skill and social networking more or less successfully in the process of collaborative improvement and, so, develop a structure for collaborative improvement. Throughout the process there has been an explicit focus on evaluation and reflection of collaborative improvement processes with and between the involved companies and especially the results were reflected against the 4S framework.

Methodology

Action research has become increasingly prominent and represents a potential useful qualitative research method in the study of organisations. Action research is a cyclical process of diagnosing, action planning, action taking, evaluating and specifying learning (Lau, 1999). The action researcher aims to contribute both to practical concerns of people in an immediate problematic situation and to the goal of science by generating emergent theory. This approach provides the researchers with insights, which could not be gained in other ways, since contribution is being paid to practical concerns of people in an immediate problematic situation. It also makes clear, as Clark (1972) emphasises, that action research contributes to enlarge the stock of knowledge of researched system. Action research distinguishes it from common forms of qualitative research by not only applying to the social scientific knowledge but also to add to the body of knowledge (Myers, 1997).

But why is action research an appropriate method for researching for collaborative improvement in a network? Action research is appropriate when:

- The research questions relate to describing an unfolding series of actions over time in a group;
- The understanding of a member of a group how and why their action can change or improve the working of some aspects of a system plays a role;
- Action research is concerned to enlarge the stock of knowledge of the group.

Within this research the involved companies engaged in collaborative improvement projects, involving a process of diagnosing, fact-finding, implementation and evaluation of improvement actions on a dyadic level. The results of the improvement projects are presented and discussed in plenum to the other companies to evaluate and reflect on the process and progress of the collaborative improvement project. The findings of collaborative improvement projects in one dyadic relationship are tested in terms of applicability in other relationships. Throughout the process explicit attention is paid to learning and development and how this can contribute to the company's knowledge and that of the whole EME. Through this collaborative learning we are trying to build upon the knowledge of the members with regard to the object of improvement, knowledge on improvement processes, and knowledge on each other's companies, processes and goals in order to improve the collaborative improvement process.

Empirical Findings

Scope

For a company in the automotive industry today the main challenge is to constantly monitor the cost-structure in order to remain profitable. Continuous improvement and continuous cost reduction are integrated and explicit in the SI's policy and practices. The aim is to establish close co-operation and long-term agreements with a limited number of suppliers. As such, the SI looks for highly involved and dedicated partners that fully support the company in assembling and delivering to customers systems of top quality to agreed competitive prices at the promised delivery date.

The approach that has been chosen towards engaging companies in collaborative improvement processes was a so-called laissez-faire approach. The philosophy behind this approach is that collaboration and improvement in a network of companies is characterised by interdependence, shared goals and vision, trust, commitment, joint work and activities. Collaborative improvement initiatives should be initiated and selected by the whole group based on immediate practical problems or improvement opportunities. However, after a few months, hardly any improvement project was started between the companies. Although the companies supported the adopted approach, it did not lead to the required results with regard to collaborative improvement. The companies were not able to hold on to the enthusiasm and translate this enthusiasm into activities within the companies.

Scale

Companies are striving for optimisation of the situation in terms of financial capital (money). Companies are increasingly linking internal processes with external suppliers and customers and the overall performance of the network is the result of the interaction between and the integration of inter-company processes (Cagliano, 2000).

The 1-½ year of engaging companies in CoI processes has yielded operational outcomes on both sides. An overview of the operational outcomes of some of the CoI initiatives is given in Table 1.

Table 2: Operational outcomes

Collaborative Improvement Initiative	Improvement activity	Involved <i>(departments of SI and suppliers)</i>	Operational Outcome
SI – supplier 1	Redesign of a product, which can cause severe problems during malfunction in the system of the SI	Purchasing, Engineering, Sales, Quality	Cost reduction and increase of the quality of the product. The supplier is able to reduce internal scrape rate by 33%
SI – supplier 1	Proposal to produce an existing product of the SI of aluminum in plastic	Purchasing, Engineering, Sales, Quality	Expected outcomes are 50% cost reduction for the SI and increase in Sale for the supplier
SI – supplier 3	Cleanliness of products	Quality, Sales, Purchasing, Production	Increase in sales from SI to supplier. Reduction by reject rate by SI

Not all the improvement projects have yielded operational outcomes and therefore not depicted in the Table. Some improvement projects yielded learning outcomes that were also valuable to the SI, because the improvement of collaborative processes is depending on the ability of companies to learn from inter-organisational improvement processes and applying the created knowledge in their current work practices and in the management of collaborative (improvement) processes.

As explained by Groen et al. (2002), one of the basic hypothesis in social system theory is that only when all four mechanisms are developed sufficiently, can a social system last. A good example out of practice is the biased attention of the SI in one of the collaborative improvement projects on cost reduction. This had lead to a situation in which the supplier was not willing to share experiences, knowledge and learning moments with regard to product and improvement process with the system integrator.

Skill and Value

The research allowed insight into the process of collaborative improvement and to develop a better understanding of how companies can learn to collaborate on improvement issues and jointly improve both their operations. Throughout the process the companies have put a lot of emphasis on the fact that collaborative improvement is not additional to daily activities, but integral part of daily operational activities in and between the companies. There has been a strong advocacy with regard to the “skills and values” of CoI (see also Table 1) and through that build upon the knowledge of the participating companies with regard to collaborative improvement.

The companies were not used to step back and re-frame and due to operational priorities within the companies, reflection and evaluation as part of collaborative improvement was not performed. Since capturing knowledge from each improvement initiatives can reduce the actions required in future initiatives and through that others can learn from this knowledge repository (both in and between companies). By focusing on and paying explicit attention to

reflection and evaluation the progress and process of CoI was greatly stimulated and triggered.

Social networking

Companies tend to focus the collaborative improvement projects on problems, which have been encountered within the relationship on the areas of cost, quality and delivery. However, collaborative improvement activities can also concentrate on “creative” improvements, which are not related to problems but provide the companies with the same results and benefits. The companies have to and should pay explicit attention to fully explore and exploit the improvement potential within the inter-organisational relationships. Through communication and knowledge/information exchange a setting should be created in which both reactive solutions and creative opportunities are stimulated and triggered.

Within the process of collaborative improvement it appeared that internal networking is as least as important as external networking. The progress of CoI initiatives and ultimately the results of the project are to a large degree influenced by the intra-organisational processes. Due to a lack of internal interaction (communication and information exchange) between departments within an organisation and lack of integrating internal processes, collaborative improvement projects were negatively influenced in terms of project management, performance outcomes and learning outcomes.

Conclusions

As changes within the market are altering the rules of the competitive battlefield, increasingly moving towards inter-organisational settings, the process of CI is becoming more complex. Consequently, the process of CI has to be applied and transferred to networks of disparate companies, leading to the concept of collaborative improvement. However, there is still a substantial lack of empirically grounded contributions and theories on the concept of CI in an inter-organisational setting. The process of collaborative improvement is fraught with intra- and inter-organisational change issues and work practices. Consequently, in order to be able to effectively organise and manage the process of continuous improvement in a network of organizations companies need to gain insight and develop understanding and knowledge on the process itself. In order to explain and understand the process of collaborative improvement an action research approach has been adopted. The approach has been efficient and effective for both the researchers and companies, since it allowed in-depth insight into the process of collaborative improvement.

The overall performance of the collaborative improvement process is the result of the interaction between and the integration of inter-company processes. The focus of the research is on the interaction patterns in networks leading to changes and improvements between the companies involved within the network. Within the network of disparate companies each actor acts purposefully in the interaction with other actors. Actors in collaborative improvement processes are functional in the sense that they pursue certain goals and optimise the process in terms of economic capital. The network model of actors allows us to explain and understand the process of collaborative improvement in terms of how different mechanisms (Scope, Scale, Skill and Value, and Social Networking) are and can be used in order to influence the process and progress of the collaborative improvement initiatives. The model provided the researchers with a framework to analyse the process and how companies manage and organise the collaborative improvement initiatives accordingly.

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