MANAGING AND ORGANISING COLLABORATIVE IMPROVEMENT: A SYSTEM INTEGRATOR PERSPECTIVE

Rick Middel[1], Olaf Fisscher[1], Aard Groen[2]

[1] University of Twente, Department of Technology & Organisation, The Netherlands
[2] University of Twente, Dutch Institute for Knowledge Intensive Entrepeneurship, The Netherlands

h.g.a.middel@bbt.utwente.nl

ABSTRACT

More than ever, companies are challenged to improve their performance and respond quickly and accurately to changes within the market. Due to external dynamics competition is moving towards the level of networks of organisations, and, therefore, 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. In order to gain insight and develop knowledge on the process of collaborative improvement from a system integrator perspective, we will use the network model of actors. This paper will discuss some empirical findings on the scope, scale, skill and value, and social networking of collaborative improvement as part of the network model.

Keywords: collaborative improvement, continuous improvement,

1. INTRODUCTION

More than ever, companies are challenged to improve their performance and respond quickly and accurately to changes within the market. Due to external dynamics competition is moving towards the level of networks of organisations, and, consequently, the individual firm is an inadequate entity for identifying improvements. As companies adapt themselves according to the changes of market and competition, they, increasingly, link their internal processes with external customers and suppliers (Frohlich & West brook, 2001) in order to stay competitive. Consequently new approaches must be developed to enhance the business performance and, in particular, the continuous improvement of the performance between the partners within a network of organisations (Kaltoft et al., 2003; Middel et al., 2005).

Continuous Improvement (CI) is a consolidated concept in managerial theory and practice and is seen as vital in today's business environments. But a strong limitation of CI is that it is mainly dealt with in the context of stand-alone companies (Middel et al., 2005). Therefore the concept of CI must be applied and used in inter-organisational settings (Boer et al., 2000 and Rijnders, 2002). However, there is still a substantial lack of empirically grounded contributions and theories on the concept of CI in an inter-organisational setting. The concept of CI can hardly be applied in inter-organisational settings due to organisational, geographical and time related barriers, and, therefore, need to be transferred and extended to the level of collaborative continuous improvement, leading to the concept of collaborative improvement (CoI). Effectiveness of managing and organising any process, including that of CI and CoI,

depends a great deal on deep knowledge and understanding of that process (Boer and Gertsen, 2003). The objective of this paper is to gain insight and develop an understanding on the organisation and management of CoI processes from a system integrator perspective.

In this paper we report on a number of practical results over a period of 1-½ years based on a Dutch System Integrator in the automotive industry as part of a three years EU-research project CO-IMPROVE (Collaborative Improvement Tools for the Extended Manufacturing Enterprise (EME), G1RD – CT2000 – 00299). An action research approach was adopted to address the companies' improvement needs while creating knowledge and in-depth understanding of the process itself at the same time (Middel et al., 2006). This research took place in an inter-organisational setting involving a system integrator and three of its suppliers in the Netherlands.

This paper is structured as follows. First we would like to discuss the literature on CI in relation to the topic and scope of this paper. This section will explain the starting point of the research and present the differences between CI and CoI. In order to gain insight and develop an understanding of CoI processes we will discuss the network model of actors to explain and discuss the way in which organisations manage and organise collaborative improvement processes. In the next section we will elaborate the applied research methodology of action research and how this approach was adopted within the specific setting. Next, we will describe the results of 1-½ years of research from the perspective of the System Integrator. Finally, the last section reflects on and discusses the findings of the research and highlights challenges for future research.

2.   FROM CONTINUOUS IMPROVEMENT TO COLLABORATIVE IMPROVEMENT

Incremental improvement, essentially in manufacturing, has been widely discussed by the literature on CI (see e.g. Imai, 1986; Bessant and Caffyn, 1997, Boer et al., 2000). CI is the "planned, organised and systematic process of ongoing, incremental and company-wide change of existing work practices aimed at improving company performance" (Boer *et al*, 2000). CI has its early accounts going back to before the industrial revolution even started and scientific management was developed (Boer et al., 2000). The export of the concept from the USA to Japan and its development there, the influence of many other concepts, such as Quality Circles, Total Quality Management and Lean Production, the explicit attention of many authors to CI (Imai, 1986; Robinson, 1991; Bessant, 1997; Caffyn, 1998; De Lange-Ros, 1999), and the work of the CINet resulted in the development, exchange and dissemination of practical and theoretical research in the field of CI. By now CI is a consolidated concept in managerial theory and practice and is seen as vital in today's business environments.

In a literature review on CI, presented in De Lange-Ros (1999), existing literature on CI is categorised into three different types:

1. 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 shows the importance of incremental improvement and it directs attention to the subject..

2. 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).

3. 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.

The review of De Lange-Ros (1999) was based on papers, articles and books with regard to CI before 1997. 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 et al., 2000; Rijnders, 2002; Boer and Gertsen, 2003).

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 network capabilities towards collaboration, learning and improvement, and generating actionable knowledge on the process of collaborative improvement (see also Cagliano et al., 2005; Middel et al., 2005; Middel and McNichols, forthcoming).

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 some insight into the difficulties of applying and transferring CI to the inter-organisational setting.

Area	Key components of CI	Additional key components to CoI
Strategy	• 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	• 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	• Shared belief in the value of small improvements • Belief that all employees have creative potential • Treating failure as a learning opportunity	• Shared belief in prosperity through collaboration and improvement • Trust • Openness is sharing information, learning moments, and knowledge
Infrastructure	• Flattened hierarchy • Team working and flexibility • Devolution of decision making	• Effective communication channels • CI 'vehicles' such as problem solving groups or CI teams

	- and empowerment - Effective communication channels - Commitment to training and personnel development - CI facilitators - 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	- Formal CI/problem solving cycle - Capture and transfer of learning - Recognition and reward of CI activity	- Capture and transfer of learning between and within companies - Benefit sharing
Tools	- Company 'toolbox' with a range of CI tools - 'Toolbox manager'	- EME 'toolbox' with a range of CoI tools that are applied similarly within the EME companies

**Table 1: Commonality/difference CI and CoI (source: Middel et al., 2005)**

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).

3. RESEARCH ISSUE

Many firms are operating within networks, in which they collaborate with other companies to deliver final products to the market. The basic mechanism that characterises these kinds of network relations is collaboration. Collaboration between companies consists of working together, over an extended period of time, for the benefit of both (Ring and Van de Ven, 1992). Collaboration brings about the idea of interdependence between actors, shared goals and vision, information and technology exchange, joint work and activities (Lamming, 1993; Mohr and Spekman, 1994).

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.

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), we want to focus 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'.
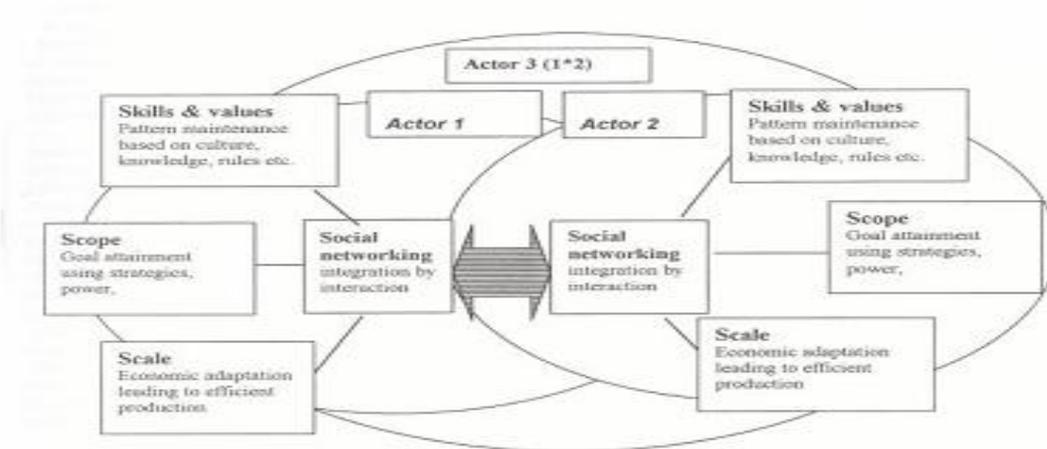
Figure 1: Network model of actors

In order to analyse the process of collaborative improvement within an inter-organisational setting, we assume that actors act purposefully in interaction in collaborative improvement process with other actors (Granovetter, 1992). As such each actor within this process is embedded in a socio-economic environment in a social and structural way (see Granovetter, 1992). 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 belief, values and 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 collaborative improvement process. As explained by Groen et al. (2002), one of the basic hypotheses 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.

4. METHODOLOGY

In order to be able to manage and organise the process of CoI effectively, managers need to develop an understanding of and create insight in the process itself. Accordingly, managers, but also researchers, are encouraged to use and apply approaches, methods and techniques that address the needs and concerns of, on the one hand, applied action towards improvement and, on the other, creating knowledge and in-depth understanding of the process. An approach that addresses the two issues of taking action and creating knowledge is Action Research (AR) (Westbrook, 1995; Coughlan and Coghlan, 2002). Action research is a cyclical process of diagnosing, action planning, action taking, evaluating and specifying 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. Several broad characteristics define action research (Eden and Huxman, 1996; Coghlan and Brannick, 2001; Coughlan and Coghlan, 2002;):

- Research *in* action, rather than research *about* action;
- Participative;
- Concurrent with action;
- A sequence of events and an approach to problem solving.

The research was undertaken through an AR approach where the researchers were both managing the project and studying at the same time (Coghlan and Brannick, 2001; Coughlan and Coghlan, 2002). This research engaged in significant work as it explored the experience of learning-in-action and so an opportunity for AR (Coghlan et al., 2004). As stated by Westbrook (1995) a main contribution of action research to learning, which is not available to other methods, is that when participants involve themselves in change experiments, they engage in non-trivial learning, and they think and reflect seriously on what they are doing.

The AR approach is adopted to facilitate and to stimulate the development of a capability for improvement and learning process within the EME. The AR approach was adopted in the EME over a period of 18 months through a cycle of 15 workshops. These workshops were organised on a monthly basis. The workshops were aimed at engaging companies in collaborative improvement activities, involving processes of diagnosing, fact-finding, implementation and evaluation of improvement actions. As the companies engaged themselves in CoI initiatives during and between the workshops, the action researchers faced the challenge of generating actionable knowledge on CoI. The action researchers wrote minutes and reflective notes of each workshop and documented results from assignments, reflected upon the documents offline and fed the information back to the companies within the EME during the workshops. Each workshop was preceded and followed by a meeting among the action researchers. In this way, the action researchers were able to understand the generated data, expose and test their assumptions and interpretations, and reflect and analyze upon the issues to generate actionable knowledge on CoI.

5.   RESEARCH BASE

This section reports on the context of the research by introducing the Dutch network: one system integrator and three of its first-tier suppliers. The System Integrator (SI) is a company, which is specialised in 'Motion Control'-systems for different markets, such as the automotive, truck, marine, medical and agriculture market. The company sees itself in a niche market, predominantly automotive and truck. The competition is known and it is intense with a main emphasis on price. The company observes a shift in the market towards a commodity market. In this new market, the order-winning criterion is price whereas quality and technology are qualifiers. For a company in the automotive industry nowadays, a main challenge is to constantly monitor the cost-structure in order to remain profitable. Recently, price pressure from the Original Equipment Manufacturers (OEM) has led to an increase of prices of raw materials and contracts on long-term delivery schedules. Therefore, the company has mounted a strategic objective to produce zero-defect products together with the lowest total cost from world-class suppliers to satisfy their requirements on quality, cost and delivery.

The suppliers selected by the system integrator to participate in the project all represent different types of relationships and deliver different categories of products. This selection means that information and communication can pass freely throughout the whole group without running the risk of giving away (or transferring) sensitive information to competitors. The underlying reason for the SI selection process has been the fact that these suppliers are perceived as strategically significant. Furthermore, they are highly involved in collaboration

as dedicated partners that fully support the SI in assembling and delivering the systems of the SI. The companies within the Dutch EME and a short description are listed in Table 2.

Company	#employees	Geography	Products
System Integrator	425	The Netherlands (East)	Electro-hydraulic systems for operating soft tops and retractable hard tops on convertible cars as well as opening/closing car trunks
Supplier 1	200	The Netherlands (South)	Plastic precision parts and assembled products for the automotive, medical and pharmaceutical industry. The company supplies the SI with plastic moulding products
Supplier 2	55	The Netherlands (East)	Fine-mechanical parts for high-tech industry. The company supplies parts for the pump for opening the roof
Supplier 3	160	Germany (West)	Cylinder-tubes for the automotive industry.

Table 2: Companies in the network

6. EMPIRICAL FINDINGS

This research started with engaging the involved companies 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 discussed and evaluated 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 network. Through this collaborative learning and improvement process we are trying to build upon the knowledge of the members with regard to the contextual factors of collaborative improvement, that play an important role and the different roles played by the System Integrator and its effect on the process and progress.

The companies have engaged themselves in CoI processes for a period of 1-½ years. It appeared that in the process of collaborative improvement various contextual factors, endogenous as well as exogenous, played an important role in the process of collaborative improvement. Some of the better-known factors are sense of direction, commitment, (relative) power, and trust. In addition, however, the research also identified a significant role, among others, for commercial reality, personal relationships, sense of urgency, and joint history (see Kaltoft et al., 2003). In the reminding of the section we will present and discuss some of the empirical findings from the perspective of the SI based on the four mechanisms Scope, Scale, Skill and Value, and Social Networking.

6.1 SCOPE

Companies are motivated to do certain things. This determines the scope of the social system. Within the process of CoI companies are not only motivated to attain their own goals, but also

through improvement and collaboration within a network improve and enhance the performance of the whole network.

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.

Initially, there was no mutual understanding of the concept of CoI. The companies lacked a shared vision on CoI and a sense of direction. The suppliers' initial expectation was that the CoI project involved just another way of imposing cost reductions and other improvements. This affected the level of openness between the companies and resulted towards political behaviour of the suppliers towards the SI. In fact, they actually waited for initiatives from the SI and did not show any sense of urgency. In the beginning of the project the SI has put a lot of emphasis in explaining and discussing their vision and sense of direction with regard to collaborative improvement. This appeared to be necessary to overcome the political behaviour shown by the suppliers at the beginning of the project.

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. This approach was chosen by the SI in order to enable the participants/suppliers to discover and become aware of the concept and the possible benefits of collaborative improvement.

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. Therefore the SI decided to change the approach towards a more active and directive role of the lead company. Within this role the lead company should start activities, generate discussion and encourage participation of all companies.

6.2   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 3.

Collaborative Improvement Initiative	Improvement activity	Involved (departments of SI and suppliers)	Operational Outcome
SI – supplier 1	Redesign of a product, which can	Purchasing, Engineering, Sales,	Cost reduction and increase of the

	cause severe problems during malfunction in the system of the SI	Quality	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 aluminium 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

Table 3: Operational outcomes

However, not all the improvement projects have yielded operational outcomes and therefore not depicted in the Table. Other outcomes of CoI initiatives were learning outcomes and are as valuable as operational outcomes, since CI and CoI is about development and learning (Boer et al., 2000) .As the companies engaged themselves in CoI initiatives, explicit attention was given to the diffusion of knowledge, experiences and lessons learned. Through a facilitating and an active role in improvement and learning process, the SI enabled the companies to keep learning to the forefront of the agenda. Through presentation at meetings, feedback by other participants, factory tours and coaching, a learning environment was created as part of the collaborative improvement process. The learning environment provided a setting of reflection and evaluation with a high degree of openness and trust. This allowed the companies to learn from inter-organisational improvement processes and apply 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 hypotheses 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.

6.3   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 SI has 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 from the side of the SI 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. A shared belief in the value of small improvements and the creative potential of actors is an important prerequisite for CI and CoI (see also Caffyn, 1998).

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 from the side of the SI the progress and process of CoI was greatly stimulated and triggered.

6.4 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 SI has 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.

7. CONCLUSIONS

Continuous improvement is a consolidated concept in managerial theory and practice and is considered vital in today's business. But a strong limitation of the literature of CI is the focus on the context of the stand-alone company. As competition is changing we need to transfer and apply the concept and practical elements of CI to the inter-organisational setting. In order to be able to effectively organise and manage the process of continuous improvement in a network of organizations we need to gain insight and develop understanding and knowledge on the process of CoI.

The network model of actors has provided us with a framework to explain and understand some of the dynamics and interaction within the process of CoI between the SI and their suppliers. The SI can use the mechanisms more or less successful to develop positions in relation to the suppliers and, consequently, influence the outcomes of the CoI initiatives for the whole network. On the other hand a biased attention to one of the mechanisms will negatively influence the process and progress of CoI.

The empirical findings presented in this paper indicate that the process of CoI is fraught with difficulties related to intra- and inter-organisational change issue and work practices. As insight and understanding developed over time by the SI and the other participants, several issues from the perspective of the SI can be highlighted to the successfully managing and organising CoI:

- Develop an understanding of the position of the other suppliers and create a sense of direction within the network.

- Create a learning environment in which companies can and do, openly, communicate and share information.

- Facilitate the process of CoI initiatives and learning through different interventions, such as presentations, feedback, factory tours, and coaching.

- Show an active and committed attitude towards CoI to keep momentum and progress in the CoI initiatives and create a sense of urgency throughout the whole process.

- Fulfil different roles in different stages of a CoI initiative and continuously assess if the roles played are satisfactory or needs to be adapted.

8. REFERENCES

Aldrich, H., Zimmer, C. (1986), Entrepreneurship Through Social Networks, In: Sexton, D. & Smilor, R.W. (eds), *The art and Science of Entrepreneurship*, Massachussets, Ballinger Publishing, pp. 3-23

Bessant, J., Caffyn, S. (1997), "High-involvement Innovation through Continuous Improvement", *International Journal of Technology Management,* 14(1), pp. 7-28

Bessant, J., and Caffyn, S. (1997), High-involvement innovation through continuous improvement, *International Journal of Technology Management*, Vol. 14, No. 1, pp. 7-28

Boer, H. et al. (2000), *CI changes: from suggestion box to organisational learning, Continuous Improvement in Europe and Australia*, Aldershot, Ashgate Publishing Ltd.

Boer, H., F. Gertsen (2003), From continuous improvement to continuous innovation, a (retro)(per)spective, *International Journal of Technology Management*, Vol. 26, No. 8, pp. 805-827

Burns, T., Stalker, G.M. (1961), *The management of innovation*, Pergamon, London

Burt, R.S. (1982), *Structural holes: the social structure of competition*, Harvard University Press, Cambridge MA

Caffyn, S.J. (1998), *"The scope for application of continuous improvement to the process of new product development"*, PhD Thesis, University of Brighton

Cagliano, R. (2000), Integration Mechanisms of Inter-company Processes, *Proceedings of the first world conference of production and operations management* (On CD-Rom)

Cagliano, R., Caniato, F., Corso, M. and Spina, G. (2005) "Implementing collaborative Improvement: lessons from an action research process", *International Journal of Production Planning & Control*, Vol. 16, No. 4 , pp. 345-355

Coghlan, D. and Coughlan, P. (2001), *Doing Action Research in your own organization*, Sage , London

Coughlan, P. and Coghlan, D. (2002), Action Research: Action Research for operations management, *International Journal of Operation & Production Management,* Vol. 22, No. 2, pp. 220-240

Coughlan, P., Coghlan, D., Brennan, L. (2004): Organizing for Research and Action: Implementing Action Researcher Networks, *Systemic Practice and Action Research*, Vol. 17, No. 1, pp. 37-49

Doz, Y.L., G. Hamel, C.K. Prahalad (1989), Collaborate with your competitors and win, *Harvard Business Review*, Vol. 67, No. 1, pp. 133-139

Eden, C., and Huxman, C. (1996), Action Research for the study of organizations, In Clegg, S., Hardy, C. and Nord, W. (ed), *Handbook of Organization Studies*, Sage Publications, London, pp. 526-542

Frohlich, M.T. and Westbrook, R. (2001), "Arcs of integration: an international study of supply chain strategies", *Journal of Operations Management* Vol. 19, pp. 185-200.

Granovetter, M. (1992), Problems of Explanation in Economic Sociology, In Nohria & Eccles (eds.), *Handbook of Economic Sociology*, Princeton University Press: Boston, NJ, pp. 453-475

Groen, A.J. et al. (2002), Creating and Justifying Research and Development Value: Scope, Scale, Skill and Social Networking of R&D, *Creativity and Innovation Management*, Vol. 11, No. 1, pp. 2-15

Hakansson, H. (1987) *Industrial Technological Development: A network Approach*, London, Croom Helm

Hakansson, H., Snehota, I. (1995), Networks in Technological development, London Routledge

Imai, M. (1986), *Kaizen. The key to Japan's Competitive Success*, London, McGraw-Hill Publishing Company

Kaltoft, R., Boer, H., Corso, M., Gertsen, F., Gieskes, J., Middel, H.G.A., and J.S. Nielsen (2003), 'Factors affecting the development of collaborative improvement with strategic suppliers', in Spina, G. (Ed.): *Proceedings of the EUROMA and POMS Conference 2003 – The Challenges of Integrating Research and Practice*, Vol. 3, pp. 601-610

Lamming, R. (1993), *Beyond partnership*, Pentice Hall, UK

Lange de-Ros, D.J., 1999, *Continuous improvement in teams, The (mis)fit between improvement and operational activities of improvement teams*, PhD Thesis, Enschede, Print Partner Ipskamp

Lau, F. (1999), Toward a framework for action research in information systems studies, *Information Technology & People*, Vol. 12, No. 2, pp. 148-175

Middel, H.G.A., R. Cagliano, F. Caniato, R. Kaltoft and J.S. Nielsen (2003), "Challenging EMEs to learn through collaborative improvement projects", in Spina, G. (Ed.): *Proceedings of the EUROMA and POMS Conference 2003 – The Challenges of Integrating Research and Practice*, Vol. 3, pp. 645-654

Middel, H.G.A., and T. McNichols (forthcoming), "Cultivating Collaborative Improvement: An Action Learning Approach", *International Journal of Learning and Change*

Middel, H.G.A., Gieskes, J.F.B., Fisscher, O.A.M. (2004), Driving collaborative improvement processes, *International Journal of Production Planning & Control*, Vol. 16, No. 4, pp 368-377

Middel, R., Coghlan, D., Coughlan, P. Brennan, L. and McNichols, T. (2006), Action research in Collaborative Improvement, *International Journal of Technology Management*, Vol. 33, No. 1, pp. 67-91

Mohr, J., Spekman, R. (1994), Characteristics of Partnership Success: Partnership Attributes, Communication Behavior, and Conflict Resolution Techniques, *Strategic Management Journal*, Vol. 15, No.2, pp. 135-152

Nonaka, I., Takeuchi, H. (1995), The knowledge creating company, *Harvard Business Review*, Nov.-Dec., pp. 96-104

Rijnders, S., 2002, *Four routes to continuous improvement, An empirical typology of CI implementation processes*, PhD Thesis, Enschede, Twente University Press

Ring, P.S., van de Ven, A.H. (1992), Structuring cooperative relationships between companies, *Strategic Management Journal*, Vol. 13, No.7, pp. 483-498

Roberts, E.B., Fusfeld, A.R. (1981), Staffing the Innovative Technology- Based Organization, *Sloan Management Review,* Spring, pp. 19-34

Robinson, A. (1991), *Continuous improvement in operations, a systemic approach to waste reduction*, Productivity Press, Cambridge Massachusetts

Sobrero, M., Schrader, S. (1998), Structuring Inter-firm Relationships: A Meta-analytic Approach, *Organization Studies,* No. 19, Vol. 4, pp. 585-616

Westbrook, R. (1995), Action Research: a new paradigm for research in production and operations management, *International Journal of Operations & Production Management*, Vol. 15, No. 12, pp. 6-20