

A PRELIMINARY STUDY INTO THE INSTRUMENTATION OF COLLABORATIVE IMPROVEMENT IN ORGANISATIONAL NETWORKS

Gerard Berendsen*, Ineke Pieters*, Ben Alders* and Matjo van Liere*

*HAN University, Netherlands

gerard.berendsen@han.nl

ABSTRACT

In striving for an excellent position regarding competitors in all aspects of management and operations, organizations benefit from establishing strategic cooperations. With allies they can be more successful in surviving the hyper competition. Despite the perceived benefits, real-life cases show that only half of the collaborations in alliances are really successful. Nowadays the effect of intra-organizational utilization of CI-tools is almost undisputable. But implications in an inter-organizational context are rather unrevealed. We assume that the use of CI-tools can be stretched out to the field of collaborative improvement. And that these tools support cooperating organizations in their goal achievement. We determine into what extent instrumentation contributes to a successful improvement of the collaboration. Therefore we carried out a survey in 2007. From this survey we derived the frequency, importance and effect of instruments also regarding the organization's collaborative maturity. The results give food to the assumption that the application of 'hard' CI-tools and techniques are of more relevance in achieving the goals of cooperation than 'soft' CI-tools.

Keywords: instrumentation, organisational networks, collaborative improvement

1. INTRODUCTION

Enterprises feel the pressure of improving their performance. The environment is becoming more dynamic and tempestuous. Markets are changing continuously, technological opportunities have increased and investments become more hazardous. Customers are becoming more unpredictable and more demanding. All these external factors force organizations to establish an excellent position regarding competitors in all aspects of management and operations: it is becoming more and more a question of hyper competition. And this seems to become more and more an impossible job for organizations without strategic collaboration (Van Aken, 1998; Van Aken et al., 1997; Nassimbeni, 1998; Douma, 1997; Littler & Leverick, 1995; Gieskes and Middel, 2003). Sustainable organizational cooperation leads to better business performance. This is experienced in constructing, automotive and commerce (Alders and Van Hulst, 2003; Hammer, 2001; Koudal et al., 2003; Rosenbrand et al., 2003).

Albeit organisations are challenged to respond in a highly effective and efficient way, there are some promising answers to this challenge: the sharing of knowledge, technology, experiences and means in the supply chain. Other answers appear to be to concentrate on core-activities or contract out non-core activities and to gain high-quality collaboration (Van Aken, 1998; Kornelius, 1997, Dijkstra et al., 1997).

Despite the perceived benefits, real-life cases show that only half of the collaborations in alliances are really successful (De Man and Duysters, 2007). And there seems to be no progress: for many years the percentage of successful alliances is stabilized around 50 percent (Wildeman and Kok, 1997a and 1997b; Bleeke and Ernst, 1991; De Man and Duysters, 2002).

1.1 CONTINUOUS AND COLLABORATIVE IMPROVEMENT

In the last 30 years the field of Quality Management has rapidly developed from traditional craftsmanship to Total Quality Management (TQM) (Bossink and Giekes, 1992; Garvin, 1984). Nowadays the focus is not only on intra-organizational processes but also on inter-organizational processes e.g. supply chains and networks (e.g. Boer and Gertsen, 2003; Boer et al., 2000), and the focus is expanded from manufacturing industries to the world of service industries (Stevens, 1993; Lemaire, 2003; Boomsma en van Borrendam, 1987; Vinkenburg, 1988; Wijchers et al., 1992; Berendsen en Gieskes, 1993; Berendsen et al., 2000; Maas, 1999).

Originally quality management systems were focussed on standardizing activities in an organisation but this is a rather instrumental approach strongly based on methods and techniques e.g. new systems, better guidelines, stricter supervision or new ISO standards. However quality is also a matter of human concern. This view is people and change oriented: a socio-dynamic approach where attention is paid to people's ideas, emotions and interests, and especially their—often latent—qualities (de Heer and Ahaus, 1995; Fisscher and Bossink, 1993; Fisscher, 1994; Van der Beij, 1999). These approaches combined (*instrumental* and *socio-dynamic*) refer to all organizational processes with structural attention for customer orientation, continuous improvement, leadership style, culture, teamwork and staff participation. In this paper we focus on the effect of means and instruments on collaborative improvement in an inter-organizational setting. These instruments can be categorised as 'hard' in case they can be linked to the instrumental approach, and 'soft' if linked to the socio-dynamic approach.

Continuous Improvement (CI) can be seen as an element of TQM. Boer et al. (2000) define CI as 'the planned, organized and systematic process of ongoing, incremental and company-wide change of existing practices aimed at improving company performance'.

Collaborative improvement (CoI) is according to Middel (2008) 'a purposeful inter-company process that focuses on continuous incremental innovation aimed at enhancing the overall performance of the disparate companies within a network'.

So CoI is about improving

- current intra- and inter-organizational processes and work practices
- improving individual and overall performance
- developing capabilities towards collaboration, learning and improvement.

CoI is therefore comparable with CI but CoI is extended tot the area of supply chains and organizational networks (e.g. Cagliano et al., 2005; Middel et al., 2005).

1.1.1 INSTRUMENTATION FOR IMPROVING COLLABORATION

The key success factors of strategic cooperation that are brought forward in literature are trust, communication and openness (Douma, 1997; Weenink et al., 1999; Wognum and Faber, 2003). Next to the contribution of these 'socio-dynamic' factors the daily processes in collaboration are supported by a variety of 'instrumental' factors, such as tools and instruments for forecasting,

planning and control more or less supported by ICT-tools (Koudal et al., 2003; Weenink et al., 1999; Pullens, 1999; Stegwee, 2000). Instrumentation is therefore considered to be a positive factor for successful collaboration. Nowadays the effect of intra-organizational utilization of CI-tools is almost undisputable (e.g. Dabhilkar and Bengtsson, 2004). But still very little is known about the use and effects of instruments for continuous improvement (CI), quality assurance and performance management to support collaborative improvement in inter-organizational settings (Middel et al., 2005), although there is substantial literature about instruments for incremental improvements as well as radical improvements in intra-organizational settings (e.g. Hyland et al., 2004; Readman and Bessant, 2004; Middel et al., 2004; Berendsen et al., 2003; Oosterhoorn, 2004).

Bossink and Gieskes (1992, 1993) gave an overview of instruments: According to these authors a concept is a general idea, a philosophy, on which improvement activities are grounded. Instruments are more concrete and tangible, like methods and techniques such as quality manuals, standards, Pareto-analyses, 'failure mode and effect analyses' and brainstorming. These tools have proven their value in systematic measuring, analysing and improvement of product quality and process quality (e.g. Koudal et al.).

Also information and communication technology (ICT) belongs to the group of instruments, because ICT is a driver for inter-organisational communication and coordination (Weenink et al., 1999; Pullens, 1999; Stegwee, 2000).

Considering the former we therefore define instruments as: *methods, techniques or (ICT-)tools that support organisational networks in achieving more effective and more efficient coordination and execution of their joint processes.*

Some studies emphasize the importance of problem finding and solving tools for CI (e.g. Hyland et al., 2004; Readman and Bessant, 2004; Middel et al., 2004; Berendsen et al., 2003) but it appears that only a very limited group of these tools is frequently used. And despite the mentioned benefits the use of CI instruments and tools can also be unsuccessful. This is the case when the organization is a low CI Maturity Organization (Bessant, 1997 and 1998).

1.1.2 MATURITY LEVELS

Collaborating parties need to gain certain capabilities such as knowledge of and experiences in collaboration, the right attitude and culture, shared and adjusted processes, ICT-systems and other supporting systems and have to possess a certain maturity in collaboration (Hammer, 2001; Douma, 1997; Weenink et al. 1999; Klein Woolthuis, 1999a en 1999b). Several authors have developed maturity models (e.g. Wognum and Faber, 2003; Alders and Smakman, 1999). These models make clear that at every level different and specific competences are needed from the involved partners.

Hyland et al. (2004) state that Continuous Improvement (CI) methods and instruments provide an important component of increased company competitiveness. And because firms increasingly rely on inter-company collaboration, CI is also an important concept for identifying and implementing significant improvements in an inter-organizational setting (Chapman and Corso, 2005). Although companies that have well developed improvement knowledge and skills are not necessarily successful in achieving improvements with collaborating partners because of more factors influencing the process of improvement (Boer et al., 2005).

CI capability have been reported by Bessant and Caffyn (1997). Their CI maturity model is not

widely spread in the Netherlands. Organizations in the Netherlands are more familiar with the INK management model that was introduced in 1992 and is also used as a tool for organisational self-assessment. It is based on the same principles as the EFQM Excellence Model. Both models are convenient for establishing the quality level of an organization (van der Beij et al., 1999; Stevens, 1993; Lemaire, 2003).

Bendell et al. (2005) proved in a longitudinal study over a period of 11 years and amongst 120 companies that when the principles of the EFQM Excellence Model have been implemented effectively performance improves in both short and long time periods. Similar results were reported for organizations that adopted the principles of Excellence as embedded in the Malcolm Baldrige National Quality Award Model (Hendriks and Singhal, 1997). Although no such studies are available for the INK Management Model, we assume that the impact on business performance is also applicable to this model. And that the use of the results of the self-assessment can be used as an indicator for quality management maturity.

1.2 SUPPLY CHAINS AND NETWORKS

In practice there is a difference between horizontal networks and vertical structured networks. The horizontal structured networks are concentrated around partners joining knowledge, facilities and goods e.g. in order to establish new products or a better market position. Vertical networks are supply chain oriented. The partners of these networks are active either in the role of supplier or customer (Gosset et al., 1998; Park, 1996).

In many industries R&D is already conducted as a collaborative process. Collaboration in continuous improvement of products and processes is considerably less common, because it requires a much deeper integration between companies along the supply chain and a change in culture that not only involves selected teams, but is extended to the key business processes within the participating organizations (Chapman and Corso, 2005).

Planning-, control- and feedback mechanisms are necessary to manage the underlying processes of cooperation and to succeed in goal achievement. These mechanisms form the infrastructure of cooperation (De Leeuw, 1990; Boer & Krabbendam, 1993). Based on this literature and on results of the FREE project (Wognum and Faber, 2003) a framework/preliminary model for collaboration between two partners has been developed. This preliminary model shows the different processes in relation to instrumentation that supports them, see figure 1.

The infrastructure consists of the following organizational aspects: goals and results, shared processes, input (resources, etc.), learning and improvement and coordination. Instrumentation is supporting these aspects. Therefore instrumentation is effecting:

- accomplishment and coordination of the shared business processes
- adjustment of capacity of people, means and knowledge and
- learning and improvement of (the results of) the processes in the network.

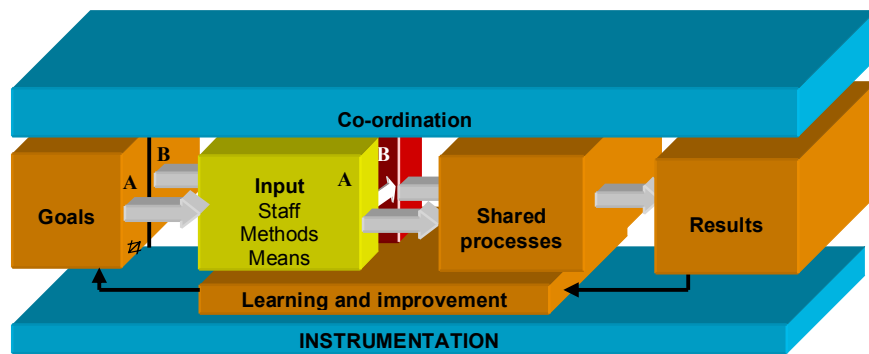


Figure 1: the infrastructure between organisation A and B; instrumentation supports the processes in the cooperation

Vertically structured networks are networks oriented around the supply chain. These networks strive for operational synergy. Networks striving for functional or strategic synergy generally have a horizontal orientation. Between these networks the meaning of ‘shared processes’ is different. The focus in vertical networks is on production processes associated with flow of materials (*supply oriented*), in horizontal networks the focus is on information or communication processes in which knowledge, skills or experiences are exchanged (*knowledge oriented*) and often observed in innovation oriented collaboration

In our research we pay attention to the different aspects of the model and the way that instrumentation is effecting these aspects. The aim of this paper is to get more knowledge of how organizations with a strategic cooperation in dyads or networks use CI-tools for problem finding and solving to improve their collaboration and how the application of such tools is contributing to the performance of the organizations involved. Therefore we have conducted a survey in 2007. In this survey we also paid attention to CI maturity levels and to the aim of the collaboration.

2. RESEARCH PROBLEM

In this study the central research question is: *Into what extent does instrumentation contribute to a successful improvement of the collaboration?*

Underlying questions are:

- what are the instruments for successful improvement of collaboration mentioned in literature
- what is the intended or perceived contribution of CI-tools to goal achievement of the collaboration
- what is the importance of CI-tools for collaborative processes
- what is the proven effect of CI-tools

3. METHODOLOGY

The theoretical research was started with an exploration of literature in the areas of alliances and organisational networks and the role of instrumentation in these cooperations with a focus on collaboration and continuous improvement.

The empirical research was started in 2004 with semi-structured interviews among 14 firms. These firms originate from different branches of industry. Aim of this interviews was a preliminary exploration of the nature and reasons for strategic cooperation between companies and the use and impact of TQM-tools for collaboration. The outcomes of this interviews were used to set up a larger survey that was carried out in 2007 and the beginning of 2008.

This survey consisted of two phases: phase 1 with a preliminary survey (completed by 165 respondents) and phase 2 with our main survey (completed by 79 respondents, 33 respondents claimed not to collaborate, 46 respondents claimed to participate in strategic cooperations)

In phase 1 we determined whether the organization already had one or more strategic cooperations and the nature of the cooperation: bilateral (dyadic) or multilateral shape (inter-organizational network). We also compiled key data regarding the respondent organization e.g. on CI maturity level, branch of industry and organization size. In the main survey we used separate surveys for organizations with and without strategic cooperation. This paper will focus on the survey results for organizations with strategic cooperation, completed by 46 organizations. CI Tools were categorized consistent with the categories in previous International Continuous Improvement Surveys (see e.g. Readman and Bessant, 2004; Middel et al., 2004). The data were analysed by using SPSS. Because of the low response rate within each category statistical tests were opted out as Chi Square and Mann-Whitney.

4. RESULTS OF THE SEMI-STRUCTURED INTERVIEWS

14 Dutch companies participated in the interviews. They came from different sectors and showed different maturity levels from not certified (3 respondents) via ISO 9001-certified (9 respondents) to INK awarded (2 respondents).

Almost all the companies report the use of Quality Control (incoming and outgoing inspection) when structural problems occur in the supply chain. Participants consider that this is adequate enough, nevertheless the problems seemed to be rather persistent: some were not resolved at all. The INK awarded organizations differ in passing on information about customer demands and standards through the supply chain. Starting point for these organizations is the perception of the customer. They explicitly communicate these perceptions to participants in the second to even the fourth degree in the supply chain, while this was not reported by other organizations. INK awarded companies also contrasted in the use of CI-tools. TQM-tools as brainstorming techniques, 7 basic quality tools and tools for risk analyses and control, were reported for evaluating the performance and improving their own activities. These tools were not mentioned by the other participants. But none of the participants claimed to use this instruments for collaborative improvement activities, INK awarded companies included. So the semi-structured interviews depicted that the use of CI-tools in individual organizations is largely restricted to basic CI-tools. And that the use of CI-tools is not observed in an inter-organizational context. The results of the semi-structured interviews have been used for the construction of the survey.

5. CHARACTERIZATION OF RESPONDING ORGANIZATIONS IN THE SURVEY

The respondents of the survey consisted of Dutch private companies as well as non-profit and not-for-profit organizations. We started with 165 respondents in the pre-survey. Only 79 (48%)

participants continued in the next phase of the survey. The participants that dropped out, indicated a variety of reasons such as ‘no time’, ‘difficulty of the survey’ and ‘no longer interested’. Almost 60 percent of the dropouts stopped without mentioning any reason.

The branch distribution shows that almost 65 percent of the participating and strategically collaborating organizations can be classified as private commercial organizations. The remaining consists of non-profit (23%) or not-for-profit (12%) organizations. The total population consist of industrial organizations (17 %), construction (11 %) and service organizations (39%). When we compare the results with the data of CBS (Statistics Netherlands) on employment per branch, we see in our respondents an overrepresentation of organizations in manufacturing, engineering and research and services. And an underrepresentation in health. The majority (73%) of the respondents have a managerial function: directors (25%), project managers (16%) and other managerial staff (32%).

When the focus of the network is knowledge oriented we see more multilateral relationships occurring than when the focus is supply orientated (see Table 1). This is to be expected. In a supply chain the relationships are more restricted to single customer-supplier-relationships while in knowledge oriented cooperations more than three or more participants are involved especially when the cooperation is focussed on more complex technology.

	Focus of the cooperation		Total
	Supply oriented	Knowledge oriented	
Bilateral/Dyadic (Partnership)	11 (79%)	3 (21%)	14 (100%)
Multilateral (Organizational network)	6 (22%)	21 (78%)	27 (100%)
			N = 41

Table 1: Appearance and focus of the cooperation

6. INFLUENCE OF MATURITY LEVEL

Referring to the familiarity of the respondents with the INK model, there is a difference between profit organizations and not-for-profit and non-profit organizations. The first category is less familiar (49%) than the other categories (89%). This is a well known phenomena in the Netherlands where governmental organizations have widely adopted this model (De Groot, 2007).

Responding commercial parties are almost equally distributed over supply oriented and knowledge oriented cooperations as non-commercial parties. And in our sample supply oriented cooperations perform at the same level as knowledge oriented ones. In both categories ca. 66% of the respondents claim to be successful in goal realisation (see Table 2).

The data show a slight difference between goal achievement at higher maturity levels (phase 3 and 4) according to the INK self assessment. But this difference is not significant. In other words: we can not proof that high maturity organizations do perform better than low maturity organizations.

Performance		Focus of the cooperation			Total
		Supply oriented	Knowledge oriented	Both	
Realisation of the postulated goals	(almost) completely	8	14	0	22
	To some extent / not at all	3	7	1	11
Total		11	21	1	33

Table 2: Relation between goal achievement and focus of the cooperation

7. USE AND IMPORTANCE OF INSTRUMENTS

Looking at the use of instrumentation in collaborative improvement we see the following results. The respondents of the 2007-survey perceive soft techniques as ‘face-to-face communication’, ‘supportive leadership’, ‘work in teams or workgroups’, ‘support form managerial staff’, ‘monitoring improvement activities’ and ‘process mapping tools’ as the most important and also as the most frequently used activities in improving collaboration (55% and more). ‘Use of slogans’, ‘Total Productive Maintenance’, ‘Formal Policy Deployment’, ‘suggestion scheme’, ‘promotion through competitions and awards’ and ‘Quality Awards’ are activities least frequently used (less than 20%) and these are also reported as the least important activities (see Table 4). Comparing our results with results from earlier studies we see analogies as well in the most important and most frequently used activities as in the activities less important and less frequently used. Main difference is the reported use and importance of ‘regular shop floor visits by management’. In our study only less than half of the respondents report the use of this method, whereas other studies report 90% or more (Middel et al., 2004; Hyland et al., 2004; Readman and Bessant, 2004). The difference is partly caused by the fact that in our survey non-profit and not-for-profit organizations are included. Only 18% of the non-profit organizations mention visiting the shopfloor as a frequently used activity.

Application of the tools is also dependent of the focus of the cooperation. We see a trend that almost all instruments are used more in a supply focussed than in a knowledge focussed environment. The top six of ‘hard’ instruments even seems to be substantially more exploited in the supply oriented cooperations. Also in the top six of ‘soft’ instruments there is a similar difference although less pronounced. The only two instruments differing from this trend are ‘suggestion scheme’ and ‘promotion through internal media’. These instruments are more preferred in knowledge focussed than in supply focussed cooperations. Because the first type is more innovation aimed and the second more production aimed. The results are to limited to elaborate on differences in use of instruments between this types, but the results give rise to the assumption that instruments for CI and CoI play an important role to guarantee ‘manufacturability’ in new product development. And therefore the concept of CI and CoI should also be studied in NPD processes for instance at the stage of supply chain developing, designing, prototyping or process engineering.

8. EFFECT OF INSTRUMENTS ON PERFORMANCE OF THE COOPERATION

We also established a relationship between the use of instruments and the performance of the cooperation. Therefore we grouped the respondents in categories with different success rates in

achieving the goals of the cooperation. They were classified into respondents who report to have (almost) realised their postulated goals and into respondents who reported to have achieved these goals to some extent or not at all. And these categories were linked with the reported frequency different instruments were used. We grouped these frequencies into the categories ‘(very) often’ used and ‘hardly or never’ used. In Table 4 we show the top 6 of the most frequently used ‘hard’ instruments. And in Table 5 we give an overview of the top 6 of the most frequently used ‘soft’ instruments. In both tables we link the performance of the cooperation to the use or the instruments.

Instruments reported (in % of respondents)	Type of instrument	Usage (very) often			Perceived importance (very) important		
		Total group	Supply focus	Knowledge focus	Total group	Supply focus	Knowledge focus
Face-to-face communication	soft	80%	83%	79%	83%	77%	87%
Supportive leadership	soft	78%	94%	68%	76%	94%	67%
Work in teams/work groups	soft	77%	83%	75%	67%	71%	67%
Support from managerial staff	soft	69%	82%	65%	71%	77%	71%
Monitoring improvement activities	hard	57%	78%	42%	76%	82%	71%
Process mapping tools	hard	55%	78%	36%	66%	88%	52%
Use of ISO 9001, or any other standard	hard	54%	78%	39%	51%	71%	39%
Problem identification tools/checklists	hard	52%	72%	36%	61%	77%	52%
A general problem solving format (PDCA-cycle)	hard	49%	67%	39%	58%	75%	48%
Promotion through internal media	soft	48%	44%	54%	40%	38%	44%
Risk analysis	hard	47%	67%	35%	61%	82%	48%
Regular shop floor visits by management	soft	43%	44%	42%	50%	59%	42%
Creativity tools/Idea generation tools	hard	26%	29%	26%	61%	65%	57%
Use of slogans	soft	19%	22%	17%	8%	6%	9%
Promotion on notice boards	hard	17%	28%	9%	15%	12%	17%
Use of Total Productive Maintenance	hard	15%	31%	5%	25%	57%	5%
A suggestion scheme	hard	12%	11%	13%	13%	13%	13%
Formal policy deployment	hard	11%	29%	0%	13%	40%	0%
Promotion through competitions and awards	hard	9%	11%	8%	10%	18%	4%
Quality awards (e.g. INK- Award)	hard	7%	12%	4%	8%	21%	0%

Table 3: The use and perceived importance of instruments in incremental improvement of the cooperation

Looking at the effect of process mapping tools in table 4, we can observe the following. A majority (76%) of the respondents who claim to be successful (*goal realisation is ‘(almost) completely’*), report the frequency of process mapping tools as ‘(very) often used’ in realising incremental improvements in the cooperation. At the same time a majority (82%) of the respondents who claim to be not successful (*goal realisation is ‘to some extent or not at all’*) report the use of process mapping tools as ‘hardly or never used’. Therefore the use of process mapping tools seem to contribute to the performance of the cooperation in a positive way. The same conclusions can be drawn from the results regarding the other top 6 ‘hard tools’ although the differences are less prominent between the performance categories.

Looking at the top 6 ‘soft’ instruments in Table 5 we see less striking results. Only three out of the six instruments seem to contribute to the performance of the cooperation in a positive way: ‘supportive leadership’, ‘support from managerial staff’ and ‘promotion through internal media’.

Performance:	Instrument: process mapping tools			Instrument: monitoring of improvement activities			Instrument: ISO 9000 or other system standard		
<i>we realise the postulated goals</i>	<i>(very often used)</i>	<i>hardly or never used</i>	N	<i>(very often used)</i>	<i>hardly or never used</i>	N	<i>(very often used)</i>	<i>hardly or never used</i>	N
(almost) completely	76%	24%	21	65%	35%	23	64%	34%	22
To some extent or not at all	18%	82%	11	36%	64%	11	36%	64%	11
	total		32	total		34	total		33

Performance:	Instrument: risk analysis			Instrument: Problem identification tools/checklists			Instrument: A general problem solving format (e.g. PDCA-cycle)		
<i>we realise the postulated goals</i>	<i>(very often used)</i>	<i>hardly or never used</i>	N	<i>(very often used)</i>	<i>hardly or never used</i>	N	<i>(very often used)</i>	<i>hardly or never used</i>	N
(almost) completely	59%	41%	22	52%	48%	21	55%	45%	22
To some extent or not at all	27%	73%	11	36%	64%	11	36%	64%	11
	total		33	total		32	total		33

Table 4: Relation between performance and used 'hard' instruments in improving the cooperation: top six of most frequently reported 'hard' instruments

Performance:	Instrument: Face-to-face communication			Instrument: Supportive leadership			Instrument: Support from managerial staff		
<i>we realise the postulated goals</i>	<i>(very often used)</i>	<i>hardly or never used</i>	N	<i>(very often used)</i>	<i>hardly or never used</i>	N	<i>(very often used)</i>	<i>hardly or never used</i>	N
(almost) completely	83%	17%	23	81%	19%	21	73%	27%	22
To some extent or not at all	64%	36%	11	50%	50%	10	45%	55%	11
	total		34	total		31	total		33

Performance:	Instrument: working in teams/dedicated groups			Instrument: frequent visits of management to the shop floor			Instrument: Promotion through internal media		
<i>we realise the postulated goals</i>	<i>(very often used)</i>	<i>hardly or never used</i>	N	<i>(very often used)</i>	<i>hardly or never used</i>	N	<i>(very often used)</i>	<i>hardly or never used</i>	N
(almost) completely	78%	22%	23	48%	52%	23	61%	39%	23
To some extent or not at all	90%	10%	10	18%	82%	11	36%	64%	11
	total		33	total		34	total		34

Table 5: Relation between performance and used 'soft' instruments in improving the cooperation: top six of most frequently reported 'soft' instruments

Remarkable is the ‘influence of face-to-face communication’ and ‘working in teams/dedicated groups’. Although these instruments are popular, they seem to have no positive link to the cooperation’s performance. We can conclude the same for ‘frequent visits of management to the shop floor’, only this instrument is less popular.

Unfortunately because of the low response rate we can not determine any significance by statistical tests. Therefore our results can only be seen as indicative.

Further results show that supply oriented networks apply the top six ‘hard’ instruments more frequently (30% or more) than the knowledge orientated networks. Such differences are not observed by the top six soft instruments.

9. DISCUSSION

Most important and used instruments reported in previous studies are supportive leadership, face-to-face communication, shop floor visits, work in teams or work groups and monitoring the improvement activities (Readman and Bessant, 2004; Middel et al., 2004; Hyland et al., 2004). These instruments are considered to be effective in CI. The mentioned studies are mainly focused on intra-organizational CI activities and do not discriminate between supply focussed or knowledge focussed collaborations.

Our results indicate that the most frequently used ‘soft’ instruments seem to contribute less or in no way to goal achievement of the cooperation. Additionally we see that there is a positive relationship between the rate of goal achievement and the frequency of used ‘hard’ CI instruments like ‘monitoring of improvement activities’ and ‘process mapping’. Linking the results to CI maturity level of the organization based on the INK management model we see no significant evidence: high maturity organizations do not perform better than low maturity organizations. But there still are some implications for a relationship worthwhile to investigate more.

Comparing knowledge oriented cooperations with supply oriented cooperations there is a difference in the use of ‘hard’ tools. The top 6 ‘hard’ tools are used more frequently in supply networks than knowledge networks. But because of the low number of respondents we could not determine the effect of these instruments on production oriented cooperations (and so from our perspective working on incremental improvement) and knowledge oriented cooperations (working on more radical improvement and so more innovation oriented). The results are too limited to elaborate on differences in use of instruments between these types, but the results give rise to the assumption that instruments play an important role to guarantee ‘manufacturability’ in collaborative new product development. This assumption is in line with the findings of Grantham and Readman (2005) that ‘the philosophical underpinning of CI, has the potential to enable all-important exploration within and between businesses at high levels of maturity’.

The use of ISO 9001 as a tool for measuring the maturity level is disputable. We know that the certified organizations need to have an improvement system and that they have to perform an evaluation of their suppliers. Compared with INK awarded organizations it is not quite clear if ISO 9001 organizations differ in maturity level.

The perceived importance of instruments and the use of these instruments are almost in line with previous studies mentioned in this paper. Our results show slight differences: the application of

instruments in inter-organizational settings is little less than in an intra-organizational context reported in previous studies. However our respondents characterize these instruments as important for CoI-activities. This is not surprising because CI-instruments are originally and at this moment still mainly used for improvement of processes and performance within stand-alone organizations (Middel et al., 2005). Because of the perceived advantages by using these instruments in CI-activities, it is understandable that respondents also perceive these instruments as useful and effective in CoI-activities.

More interesting however is the established positive relationship between the use of 'hard' CI-instruments and goal achievement. The results give food to the hypothesis that this type of CI-instruments are more relevant for cooperative goal achievement than 'soft' instruments as shop floor visits or working in teams.

10. CONCLUSIONS AND FURTHER RESEARCH

The application of 'hard' CI-tools and techniques appear to be of more relevance in achieving the goals of cooperation than 'soft' CI-tools. This is in contradiction with previous research, where the soft techniques often are qualified as important for the success of CI activities and achieving better business performance. But it is also in contradiction with the perception of the respondents in this study, because they perceive these soft techniques as important for improvement of the collaboration.

Because of the response rate the outcome of this study can only be qualified as descriptive. To work out the results in more detail (e.g. focussed on organization type and size) at this moment is not feasible. In further research we will elaborate on these details by repeating the survey on a larger scale. It is also relevant to study more closely the capabilities of continuous improvement and the specific instruments and methods used.

The approach in this study is a 'one way' approach. Only one of the partners of the cooperation was involved in the survey. The counterpart was not approached. In a future study we intend to involve several partners from bilateral (dyadic) or multilateral shaped (inter-organizational) cooperations. We also plea for and are working on longitudinal research designs in which maturity levels, operational performance and use and effects of CI-tools will be monitored. Especially more attention has to be paid to the differences between bilateral (dyadic) and multilateral (network) cooperation between new and existing collaborations (maturity aspects) and between innovation oriented cooperations and operational oriented cooperations (goal orientation).

11. REFERENCES

- Alders and van Hulst (2003) 'Partnerring als sleutel voor ketenintegratie' *Building Business*, no. 10, pp. 48-50.
- Alders, B. & E. Smakman, 'Scanmethodiek en uitkomsten van interviews met toeleveranciers en uitbesteders', *Deelrapportage fase 1 van het project Technologie Verkenning Twente (TVT)*, TSM Business School, Universiteit Twente, 1999.
- Boer, H. & J.J. Krabbendam, 'Inleiding organisatiekunde', 3^e herziene druk, Diktaat Universiteit Twente, 1993.
- Bendell, T, L. Boulter, H. Abas, J. Dahlgaard and V. Singhal (2005) 'Report on EFQM and BQF funded study into the impact of the effective implementation of organisational excellence strategies on key performance results', CQE University of Leicester, pp. 23
- Berendsen, G.J. en J.F.B. Gieskes (1993) 'De ondernemende universiteit: alles KITS?', in Bossink, B.A.G., J.F.B.

- Gieskes en O.A.M. Fisscher (red.) *'Kwaliteitsmanagement In Beeld'*, Kluwer, Deventer, pp. 186-202.
- Berendsen, G.J. en J.W. Brals (2000) 'Op weg naar kwaliteit in een zorgonderneming; verbetering en innovatie bij het Streekziekenhuis Midden Twente.', in: Berendsen, G.J., J.G.V. Maas en E.A.M. Rosendaal (red.) *'Grensverleggende professionaliteit: creëren, innoveren, perfectioneren'*, Samsom, Alphen aan den Rijn, pp. 123-138.
- Berendsen, G.J. and T. Booiijk (2003) 'Lies, damned lies and statistics; de impact van Six Sigma' *Kwaliteitskrullen* 16 (4) pp. 8-12.
- Bessant, J. (1998), 'Developing Continuous Improvement Capability', *International Journal of Innovation Management*, Vol. 2, pp. 409-429
- Bessant, J. and Caffyn, S. (1997) 'High involvement innovation through continuous improvement', *International Journal of Technology Management*, 14(1): pp. 7-28.
- Bleeke, J. and D. Ernst (1991) 'The way to win in cross-border alliances', *Harvard Business Review*, 69 (6), p. 127-135.
- Boer H., Gertsen F., Kaltoft R., Steendahl Nielsen J. (2005) 'Factors affecting the development of collaborative improvement with strategic suppliers', *Production Planning & Control: The Management of Operations*, Volume 16, Issue 4, p. 356 – 367
- Boer, H., F. Gertsen (2003) 'From continuous improvement to continuous innovation, a (retro)(per)spective', *International Journal of Technology Management*, 26 (8), p. 805-827
- Boer, H., et al. (2000) 'CI changes: from suggestion box to organisational learning, Continuous Improvement in Europe and Australia', Aldershot, Ashgate Publishing Ltd.
- Boomsma, S. en A. van Borrendam (1987) *'Kwaliteit in diensten; een zorg voor managers in de diensten- en industriële sector'*, Kluwer, Deventer
- Bossink, B.A.G., J.F.B. Gieskes and T.N.M. Pas (1992) 'Diagnosing total quality management, Part 1', *Total Quality Management*, vol. 3, no. 3, pp. 223-232.
- Bossink, B.A.G., J.F.B. Gieskes and T.N.M. Pas (1993) 'Diagnosing total quality management, Part 2', *Total Quality Management*, vol. 4, no. 1, pp. 5-12
- Cagliano, R. F. Caniato, M. Corso and G. Spina (2005) 'Implementing collaborative improvement; lessons from an action research process', *International Journal of Production & Control*, 17 (3) pp. 345-355
- Chapman, R. L. and Corso, M. (2005) 'From continuous improvement to collaborative innovation: the next challenge in supply chain management', *Production Planning & Control*, 16:4, p. 339 - 344
- Dabhilkar, M. and L. Bengtsson (2004) 'Continuous Improvements In Sweden: Results Of The 2nd International Continuous Improvement Survey', *Proceedings of the 5th International CINet Conference*, Sydney, Australia, pp. 114-126
- De Groot, S. (2007) 'Hoe effectief is het INK-model?', *Sigma*, 2007 (6), pp. 36-40
- De Man, A. and G. Duysters (2002) *'The State of Alliance Management'* White Paper Association of Strategic Alliance Professionals –ASAP
- De Man, A. and G. Duysters (2007) 'Alliantiemangement, theorie en praktijk'. In Boonstra, J. (ed.) *'Ondernemen in allianties en netwerken, een multidisciplinair perspectief'*. Deventer, Netherlands, Kluwer, pp. 93-106
- Dijkstra, L, C.W.G.M. Dirne, C.P.M. Govers and P.C. Sander (1997) *'Samenwerking in ontwikkeling'*, Kluwer, Deventer.
- Douma, M.U. (1997), *'Strategic Alliances, Fit or Failure'*, PhD Thesis, Utrecht, Drukkerij Elinkwijk BV
- Fisscher, O.A.M. (1994) *'Kwaliteitsmanagement en bedrijfsethisch handelen'*, Universiteit Twente, Enschede (oratie)
- Fisscher O.A.M. & B.A.G. Bossink (1993). 'Twente Quality Centre: Supporting SMEs to Achieve TQM', *European Seminar on Quality Promotion towards Small and Medium-sized Enterprises*. Aachen, 27-29 April.
- Garvin, D.A. (1984) 'What does product quality really mean?', *Sloan Management Review*, Vol. 26 No. 1, pp 25-43
- Gieskes, J.F.B. and H.G.A. Middel (2003) 'Kwaliteit van gezamenlijk verbeteren nader onderzocht', *Sigma* (2) pp. 12-17.
- Gosset, P., M. van Wagenberg & J. Lebrun, *'FREE SME adaption, Volume 1: Overview and guidelines to transpose the FREE methods to SMEs'*, Deliverable 202-1, ESPRIT project 23286 FREE, 1998.
- Grantham, A. and J. Readman (2005) 'Comparing Quality and Business Improvement Methodologies for Collaborative Working in the Product Development Process of SME's', *Proceedings of the 5th International CINet Conference*, Brighton, UK, pp. 249-260
- Hammer, M., 'The superefficient company', *Harvard Business Review*, Sept. 2001, pp. 82-91
- Hyland, P. W., L.D. Milia and T.R. Sloan (2004) 'CI Tools And Techniques: Are There Any Differences Between Firms?', *Proceedings of the 5th International CINet Conference*, Sydney, Australia, pp. 127-136
- Heer, A. de en C.T.B. Ahaus (1995) *'ISO 9000-serie en kwaliteitshandboek'*, Kluwer, Deventer, 3e druk
- Hendricks, K. B. and Singhal, V. R. (1997), 'Does implementing an effective TQM program actually improve

- operating performance? Empirical evidence from firms that have won quality awards' *Management Science*, Vol. 43 No. 9, pp. 1258-1274
- Klein Woolthuis, R. (1999a) *'Winnen kan ook samen'*, Ministerie van Economische Zaken
- Klein Woolthuis, R. (1999b) *'Sleeping with the enemy; trust, dependence and contract in interorganisational relationships'*, FeboDruk, Enschede
- Kornelius, L. (1999) *Inter-organisational infrastructures for competitive advantage, Strategic alignment in virtual corporations*, Proefschrift Technische Universiteit Eindhoven, University Press.
- Koudal, P., H. Lee, B. Peleg, P. Rajwat and R.Tully (2003), *'General Motors: building a digital loyalty network through demand and supply chain integration'*, Stanford, Case GS-29, 03/17/03
- Leeuw, A.C.J. de, *Organisaties, Management, analyse, ontwerp en verandering*, 4^e druk, Assen, Van Gorcum, 1990.
- Lemaire, P. (2003) 'De ontwikkeling van kwaliteitsmanagement in Nederland.' In *'Vijftig jaar kwaliteitsmanagement in Nederland'*, KDI, Zaltbommel, 2003, pp. 9-34
- Littler, D., F. Leverick & D. Wilson (1998), 'Collaboration in new technology based product markets', *International journal of technology management*, Vol. 15, No. 1-2, pp. 139-159.
- Maas, J.G.V. (1999) *'Professionaliteit; management van professie en professionele organisaties'*, Kluwer, Deventer
- Middel, R. (2008) *'Collaborative Improvement: Action Learning in the Extended Manufacturing Enterprise'*, Enschede, PrintPartners Ipskamp
- Middel, H.G.A., Gieskes, J.F.B., Fisscher, O.A.M. (2005), *'Driving collaborative improvement processes'*, *Production Planning & Control*, Vol. 16 No.4, pp.368-77.
- Middel, R. S. op de Weegh, J. Gieskes and R.W. Schuring (2004) 'Continuous Improvement In The Netherlands: A Survey-Based Study Into The Current Practices Of Continuous Improvement', *Proceedings of the 5th International CINet Conference*, Sydney, Australia, pp. 102-113
- Nassimbeni, G. (1998) 'Network structures and co-ordination mechanisms, a taxonomy', *International journal of operations & production management*, vol. 18, no. 6, pp. 538-554.
- Oosterhoorn, A.D. (2004) *'111 Instrumenten voor kwaliteitsverbetering'*, Kluwer, Deventer
- Park, S.H. 'Managing an interorganizational network, A framework of the institutional mechanism for network control', *Organization studies*, Vol. 17, No. 5, 1996, p. 795-824.
- Pullens, M., 'Stappenplan naar een netwerkorganisatie, Recept voor turbogroei', *Holland Management Review*, No. 63, 1999, p. 74-83.
- Readman, J. and J. Bessant (2004) 'What have UK firms learnt about implementing CI? Results of the UK Continuous Improvement Survey 2003' *Proceedings of the 5th International CINet Conference*, Sydney, Australia, pp. 137-148
- Rosenbrand, M.E., F.R. Dirks and J. Meijaard (2003) *'Kansrijker door samenwerking, kenmerken en resultaten van samenwerking door kleine ondernemingen'*, RZO and EIM, pp. 119
- Stegwee, R.A. (2000) *'Hebben we het over hetzelfde? Samenhang in de bedrijfs(informatie)kunde'*, Management & Informatie
- Stevens, F. (1993), 'Kwaliteitsmanagement: weet goed wat je doet' in Bossink, B.A.G., J.F.B. Gieskes en O.A.M. Fisscher (red.) *'Kwaliteitsmanagement In Beeld'*, Kluwer, Deventer, pp. 221-234.
- Van Aken, J.E. (1998) 'De virtuele organisatie en andere organisatienetwerken', *Bedrijfskundig Vakblad*, vol. 10, no. 1, pp. 10-15.
- Van Aken, J.E., L. Hop & G.J.J. Post (1997) 'De virtuele onderneming: begripsafbakening en evaluatie', *Holland management review*, no. 53, pp. 26-35.
- Van der Bij, J.D., H. Broekhuis and J.F.B. Gieskes (1999) *'Kwaliteitsmanagement in beweging'*, Kluwer, Deventer.
- Van Hagen, Milou, 2001, *'Organisatienetwerken en de onderliggende instrumenten, (Organisational networks and the underlying instruments)'*, Master Thesis, Enschede, Universiteit Twente
- Vinkenburg, H. (1988) *'Dienen en verdienen, hoe dertien bedrijven hun dienstverlening verbeteren'*, Kluwer, Deventer.
- Weenink, S.A.J., P.M. Wognum & O.A.M. Fisscher, 'Het managen van de klant-leverancierrelatie in productontwikkeling', *Bedrijfskundig Vakblad*, Vol.11, No. 7, 1999, p. 4-14.
- Wijchers, L.Th.R., L.A.F.M. Kerklaan en W.F.G. Mastenbroek (1992) *'Kwaliteitsmanagement in de dienstverlening'*, Kluwer, Deventer.
- Wildeman, L. and G. Kok (1997a) 'Strategische allianties: belangrijk maar moeilijk', *Internationaal Ondernemen*, 2e jaargang no.3.
- Wildeman, L. and G. Kok (1997b) 'Succesvolle allianties', *Nijenrode Management Review*, no. 4, mei/juni
- Wognum, P.M. & E.C.C. Faber (2003) 'Infrastructures for collaboration in virtual organisations', *International Journal of Networking and Virtual Organisations*, Vol. 1(1) pp. 32-54