# Action research in collaborative improvement

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**Abstract:** There is an increasing need to apply and transfer continuous improvement (CI) to inter-organisational processes. As such collaborative improvement (CoI) is emerging as a new concept within managerial literature and practice. This paper begins with a discussion on the logic and value of applying action research (AR) in empirical research in the field of CI and CoI to contribute to both theory and practice. It introduces the theory and characteristics of AR and describes the implementation of an AR process in an inter-organisational setting through the adoption of an AR model. Finally, it discusses the generation of theory through AR and concludes that AR is relevant and valid in research on CI and CoI as it contributes both to concerns of practitioners and the body of knowledge.

**Keywords:** action research; research methodology; continuous improvement; collaborative improvement.

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## 1    Introduction

Collaborative Improvement is emerging as a new concept within managerial literature and practice (Kaltoft et al., 2003; Cagliano et al., 2002; Coghlan and Coughlan, 2005; Middel et al., 2005). A recent literature study on Continuous Improvement (CI) indicated that there is an increasing need to apply and transfer CI to *inter-organisational* processes

(Boer and Gertsen, 2003), leading to the concept of Collaborative Improvement (CoI). However, there is still a substantial lack of theory and empirically grounded contributions to the concept of CoI.

Every process faces complex and unstructured problems that need to be organised and managed. 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 and 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 and that is particularly valuable for theory building is action research (AR) (Westbrook, 1995; Coughlan and Coghlan, 2002).

The term AR is applicable to a class of action-oriented research (Eden and Huxham, 1996; Coughlan and Coghlan, 2002; Reason and McArdle, 2004). AR is simultaneously concerned with contributing to practice, developing competencies of people facing problems and adding to scientific knowledge (Shani and Pasmore, 1985). Action research in collaborative improvement also positions itself within collaborative research, where external researchers and inside managers engage in collaborative research and generate actionable knowledge (Adler et al., 2004).

This paper will describe the design of an AR approach and explores the issues and challenges facing researchers as they apply AR in collaborative improvement. This paper is structured as follows. First, the paper will discuss the approach and the characteristics of AR. Second, the paper will describe the implementation and design of an AR model. Finally, the paper explores and discusses the challenges and issues faced by researchers conducting AR. Specific attention will be paid to ways to generate theory and assess the quality of AR.

The paper will begin with a discussion of a recent review in the field of CI and focussing on the empirical research methods that have been applied.

## 2    Research methods in CI

As stated by Westbrook (1995), a sign of vitality of an academic discipline is its, frequent, discussion on its role, its boundaries and its methods. In a recent review on CI, Boer and Gertsen (2003) analysed and discussed 86 papers with regard to methodology, research outcomes and theoretical content. The papers were presented at the (Euro) CINet[1] conferences of 1995, 1998 and 2000. Although Boer and Gertsen (2003) state that it was not always easy to unambiguously identify the research methods used, they identified a number of data collection methods, which, alone or in combination, have been used in the field of CI. Based on their own analysis and discussion of 55 papers of the CINet conference 2002, the authors of this paper endorse the statement by Boer and Gertsen (2003).

Literature on and research in CI has a strong empirical orientation. This is confirmed by the clear empirical basis of 85% of the 141 papers that have been presented at the four conferences (see Table 1). In contrast, Pannirselvam et al. (1999) examined and found that empirical research in published Operations Management research for the period of 1992–1997 comprised 18%.

**Table 1**      Research methodologies in CI

|                                              | 1995 | 1998 | 2000 | 2002 |
|----------------------------------------------|------|------|------|------|
| (Multiple) survey(s)                         | 4    | 8    | 7    | 10   |
| Single case study                            | 2    | 7    | 7    | 11   |
| Multiple case study                          | 1    | 10   | 10   | 14   |
| Action research, incl., (simulation) games   | 1    | 2    | 3    | 9    |
| Multiple methods                             | –    | –    | 2    | 5    |
| Consultancy/experience-based                 | 1    | 2    | 2    | 2    |
| Research proposal or agenda                  | 1    | –    | 1    | 1    |
| Conceptual/theory-based                      | –    | 5    | 3    | 2    |
| Other                                        | –    | 3    | 1    | 1    |
| Unclear                                      | –    | 2    | 1    | –    |
| Total number of papers                       | 10   | 39   | 37   | 55   |

*Source*:   Adopted and developed from Boer and Gertsen (2003)

Boer and Gertsen (2003) gave their interpretation of the research methodologies that have been applied and used by the authors. They noted that:

> The majority of researchers appear to prefer traditional methods like surveys and single and multiple case studies… Surveys were used in four (40%) of the papers presented in 1995. In 1998 and 2000, the numbers were eight (20%) andseven (19%), respectively, which suggest that this instrument is loosing ground … Instead, qualitative methods, in particular case studies, became more popular (Boer and Gertsen, 2003, p.814).

However, specific reference to AR is still limited in the field of CI. Nevertheless, AR as the applied methodology is increasing and there is, still, a clear opportunity for a rigorous application of AR in empirical research in CI to contribute to theory and practice.

## 3    Action research

The origins of the concept and the introduction of the term 'action research' were introduced in the work of Kurt Lewin and his associates in the 1940s. Lewin and his colleagues conducted AR in different social settings in which they were concerned with and combined the generation of theory and the change of a specific situation through the participation of a researcher. The researcher acted on and in the system, and, the act itself is presented as the means of both changing the system and generating critical knowledge about it (Westbrook, 1995).

Through the following decades, the concept of AR developed as its application increased in different fields of study. By now, AR is used as a generic term, which covers many forms of action-oriented research, such as:

- action science (Argyris and Schon, 1974; Argyris et al., 1985; Friedman, 2001)

- participatory action research (Whyte, 1991; Elden and Chisolm, 1993)

- action inquiry (Torbert, 1991).

Furthermore, AR indicates diversity in theory and practice, providing a wide choice as what might be appropriate for their research question (Reason and Bradbury, 2001; Coughlan and Coghlan, 2002).

A definition of AR that is frequently quoted within related literature is:

> Action Research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of science by joint collaboration within a mutually acceptable ethical framework (Rapoport, 1970, p.499).

The two aims of AR have to be sought through a process of changing the problematic situation itself and studying it at the same time (Foster, 1972; Coghlan and Brannick, 2005; Coughlan and Coghlan, 2002). As such, AR needs to develop an understanding of the ethical framework of the particular context. As stated by Coghlan and Brannick (2005) in AR, ethics involves authentic relationships between the action researcher and the members of the client system as to how they understand the process and take significant action. As Clark (1972) emphasises, AR is concerned with enlarging the stock of knowledge of the social science community.

According to Susman and Evered (1978), as the action researcher is working with the client system and managing the AR project, a third aim of AR rises, to develop the self-competencies of people facing problems. The client system also acts as a learning group and evaluates and reflects on the outcomes of the action (Bushe and Shani, 1991; Coughlan and Coghlan, 2002).

As such, AR can also be viewed as a cyclical process of diagnosing, action planning, action taking, evaluating and specifying learning (Lau, 1999). Figure 1 depicts the five different phases, whereas the client system infrastructure and the action researcher have a regulating effect on some or all of the phases (Susman and Evered, 1978). According to Susman and Evered, they:

> … consider all five phases to be necessary for a comprehensive definition of action research (1978 p.588).

**Figure 1** Cyclical process of action research
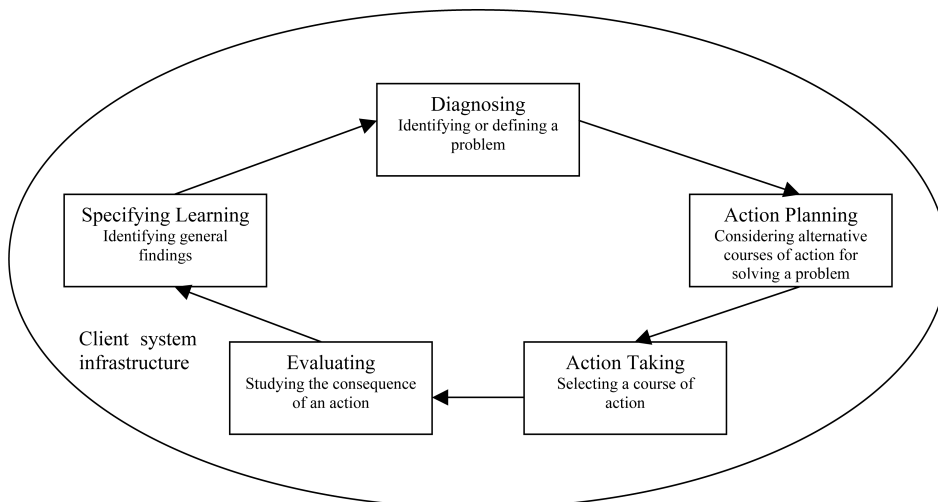


*Source:* Adopted from Susman and Evered (1978)

## 3.1   Characteristics of AR

Different forms of AR may differ in the number of phases that has been carried out by the action researcher and the system (Susman and Evered, 1978). Although there are different forms of AR, several broad characteristics define AR (Foster, 1972; Susman and Evered, 1978; Eden and Huxham, 1996; Gummesson, 2000; 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.

First, the focus of AR is on research in action, rather than research *about* action. Unlike other research methodologies, such as surveys and case studies, which seek to study organisational phenomena, AR is concerned with creating organisational change and simultaneously studying the process (Baburoglu and Ravn, 1992; Avison et al., 2001). Or as stated by Coughlan and Coghlan

> The central idea is that AR uses a scientific approach to study the resolution of important social or organisational issues together with those who experience these issues directly (Coughlan and Coghlan, 2002, p.223).

Second, AR is participative. The action researcher is not an independent observer, but becomes a participant, and the process of change becomes the subject of research (Benbasat et al., 1987; Westbrook, 1995). The quality of collaboration between the external researchers and the insider members of the client system lies at the heart of action research. The participation with practitioners on important social and organisational issues provides a rich insight, which could not be gained by traditional research where members of the system are objects of study (Whyte, 1991; Coughlan and Coghlan, 2002). Members of the client system are not objects of the study, but they participate actively in the cyclical process outlined above. The involvement of members of the client system in the AR process is important to its success (Shani and Pasmore, 1985). The involvement will lower the resistance to change and increases the probability that the recommendations conceived would lead to practical improvements (Shani and Pasmore, 1985).

Third, AR is research concurrent with action. As the definition of AR by Rapoport (1970) already indicates, AR is simultaneously concerned with changing that action in order to make it more effective and adding to the scientific body of knowledge.

Finally, AR is both a sequence of events and an approach to problem solving. As a sequence of events, AR is a cyclical process of diagnosing, action planning, action taking, evaluating and specifying learning, leading to further diagnosing and so on. As an approach to problem solving, it is an application of a scientific method to resolve critical dilemmas or finding solutions to immediate problems (Shani and Pasmore, 1985; Coughlan and Coghlan, 2002). The desired outcomes of the AR process are not only solutions to immediate problems, but also building upon the knowledge of people within the system through learning from the outcomes and a contribution to the body of scientific knowledge (Coughlan and Coghlan, 2002).

Learning mechanisms are required to facilitate both the learning of the participating organisations and to the sustainability of collaborative improvement (Shani and Docherty, 2003). The creation of structural learning mechanisms is critical for action research processes that need to generate new change process tools and to build communities that enable learning.

## 3.2 Action research model

Although the benefits of AR are attractive, the complexity of the AR process has long been recognised (Rapoport, 1970; Foster, 1972; Susman and Evered, 1978, Shani and Pasmore, 1985; Coughlan and Coghlan, 2002). Based on an analysis, Shani and Pasmore (1985) conclude that there is still a lack of emphasis on understanding the factors and their interrelations that might influence, positively or negatively, the process of AR and its outcomes. Therefore, Shani and Pasmore (1985) proposed a complete theory of the AR process, which will be further explained in Section 3.2.1.

Shani and Pasmore (1985) developed a model of the AR process, based on an in-depth, inductive study of an action research effort in one organisation. They identified four major sets of interrelated factors/processes that emerged as crucial in the AR process (see Figure 2).

**Figure 2**   Complete theory of the action research process
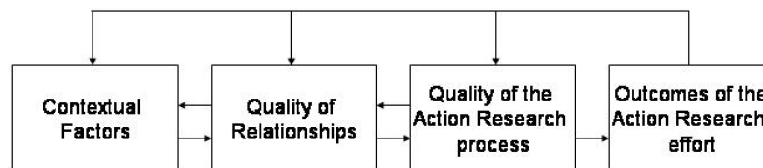


*Source*:   Adopted from Shani and Pasmore (1985)

## 3.2.1 Contextual factors

As stated by Eden and Huxham (1996), the history and context must be taken as critical to the interpretation of the likely range of validity and applicability of the outcomes of the AR process. An important requirement for AR is the concern to understand the specific context in which the outcomes of the research are derived (Pettigrew, 1990; Eden and Huxham, 1996).

Shani and Pasmore (1985) stated that the contextual factors set the stage for the formation of relationships and can have a positive or negative effect on the AR outcomes. Therefore, we will give an overview of the industry and discuss the significance of collaborative relationships of the System Integrator (SI).

## 3.2.2 Quality of relationships

Action researchers are not merely observing something happening, but take action (Gummesson, 2000; Coughlan and Coghlan, 2002). AR is interactive; it requires cooperation between the researchers and the client system (Gummesson, 2000; Coughlan and Coghlan, 2002; Adler et al., 2004). These characteristics differentiate AR from other research methodologies, such as surveys or case studies. However, to ensure that AR contributes theory to the body of knowledge, particular attention should be given to the

quality of the relationships in the AR process. Shani and Pasmore (1985) stated that, if there were a single variable that has the most significant impact on the outcomes eventually attained through AR, it would be the quality of relationships between the researchers and the members of the client system. The contextual factors, as described above, do much to determine the quality of relationships that will eventually evolve; but the state of the several relationships between specific factors is equally important (Shani and Pasmore, 1985). The factors that determine the quality of the relationship between the action researcher and the client system, as identified by Shani and Pasmore (1985), are the level of trust, demonstrated concern for the other, equality of influence and common language.

Furthermore, as collaborative improvement is an inter-organisational process between disparate companies, the outcomes attained through the AR process are also impacted by the quality of the relationship between the individual companies. Factors that determine the quality of the relationship are the level of trust, willingness to share information and open communication, (relative) power, mutual understanding and a shared sense of direction. The application of AR can in turn promote better quality relationships. The AR cycles produce improved relationships leading to improved outcomes from the AR process leading to improved relationships – in other words, a virtual cycle.

### 3.2.3  Quality of the AR process

According to Shani and Pasmore (1985), the quality of the AR process is measured by two main components:

- the inquiry process

- the implementation process.

The inquiry process, or more precisely the co-inquiry process, is seen as a key feature of the AR process (Shani and Pasmore, 1985). AR is seen as a joint process of the people involved engaging in a process of inquiry and action (Shani and Pasmore, 1985; Schein, 1999; Coughlan and Coghlan, 2002). As stated by Shani and Pasmore:

> In co-inquiry, not only are organisational members involved in the venture, but it is recognised that they hold a variety of resources, knowledge, and skills that are needed to make inquiry successful. The inquiry process itself – where people are involved in the effort, information is available, people collaborate in the process of gathering valid knowledge, generate shared understanding of the organisation, and people experiment with the knowledge generated – leads to significant changes and influences the quality of outcomes of the AR effort (1985, p.443).

According to Shani and Pasmore (1985), the implementation process is the second main component.

### 3.2.4  Outcomes of the AR effort

AR has been identified as a potent method for bringing about change in the client system and contributing to scientific knowledge (Rapaport, 1970; Shani and Pasmore, 1985; Westbrook, 1995; Eden and Huxham, 1996; Coughlan and Coghlan, 2002). The challenge for the action researchers is to engage in both making the action happen and stand back from the action and reflect on it as it happens, in order to contribute

theory to the body of knowledge (Coughlan and Coghlan, 2002). The effectiveness of the AR approach can be assessed by the

• degree of inter-organisational improvement and collaboration

• the degree of development of competences as part of the collaborative improvement process or the degree to which the organisations are able to learn about themselves and act on this learning, i.e., (inter-) organisational learning

• generation of new knowledge with regard to the management and organisation of CoI processes

• new theory for inter-organisational AR.

### 3.3 Generating theory through AR

One criterion of positive science for judging whether or not AR is scientific is whether relationships between action and consequences can be explained by the covering law of universal knowledge (Susman and Evered, 1978; Coughlan and Coghlan, 2002). However, as the aim of AR focuses on research in action, instead of creation of universal knowledge of the covering law, AR can be clearly contrasted to positivist science (Table 2).

**Table 2** Comparison of positivist science and action research

|  | *Positivist science* | *Action research* |
|---|---|---|
| Aim of research | Universal knowledge | Knowledge in action |
|  | Theory building and testing | Theory building and testing in action |
| Type of knowledge acquired | Universal | Particular |
|  | Covering law | Situational |
|  |  | Praxis |
| Nature of data | Context free | Contextual embedded |
| Validation | Logic, measurement | Experiential |
|  | Consistency of prediction and control |  |
| Researcher's role | Observer | Actor |
|  |  | Change agent |
| Researcher's relationship to setting | Detached neutral | Immersed |

*Source*: Adopted from Susman and Evered (1978) and Coughlan and Coghlan (2002)

As Table 2 indicates, the difference are extensive. The choice of the approach of research is depending on the phenomena one wants to study and the conditions under which they are to be studied (Susman and Evered, 1978). In general, AR is appropriate when (Coghlan and Brannick, 2005; Coughlan and Coghlan, 2002):

- the research question relates to describing an unfolding series of actions over time in a given group, community or organisation

- understanding as a member of a group how and why their action can change or improve the working of some aspects of a system

- understanding the process of change or improvement learn from it.

AR is thought to be most effective for technique development or theory building (Wood-Harper, 1985; Westbrook 1995). As Eden and Huxham stated:

> Theory building, as a result of AR, will be incremental, moving through a cycle of developing theory to action to reflection to developing theory, from the particular to the general in small steps (Eden and Huxham, 1996, p.533).

As AR cannot be objective, because the action researcher is also part of the client system, it is less valuable for hypothesis testing (Westbrook, 1995). Nonetheless, as the field of CI is still an area in need of developing and validating theory and management concepts (Boer and Gertsen, 2003), there is a clear opportunity for the application of the theory-building potential of action research.

The fact that the application of AR is still limited within the field of CI and CoI does not excuse AR from other methodological requirements of other approaches. Or as stated by Westbrook:

> Action researchers must take pains to ensure, as far as possible given the central role of intervention, that their research method is rigorous and their results general (Westbrook, 1995, p.17).

Section 3.3.1 will discuss the methodological requirements of other approaches (Westbrook, 1995) and how the authors dealt with these requirements in this research.

### 3.3.1 *Relevance*

AR involves the researcher in working with the members of the client system over practical matters and issues in an immediate problematic situation (Rapoport, 1970; Westbrook, 1995; Eden and Huxham, 1996, Avison et al., 2001; Coughlan and Coghlan, 2002). Since AR implies working on genuine concerns together with those who experience them, the criteria of relevance within AR is met. In this research, the focus was on immediate operational issues and problems, improvement opportunities and improvement of collaboration between the members of the client system.

### 3.3.2 *Insight*

Within AR, the researchers are working closely with the members of the client system. As the AR process has been applied for a period of months, working with different people from different functional areas of the companies, the researcher was perceived as a non-threatening actor in the process. As the researcher was building up the confidence of all the members of the client system, it allowed the researcher to be part of the CoI initiatives with access to rich and detailed information. This access yielded in-depth insight on and development of an understanding of the organisation and management of CoI. This type of insight would not be available to, for example, the case researcher, since it comes form acting as a change agent rather than as a recorder of the existing situation (Westbrook, 1995).

### 3.3.3 *Momentum*

As stated by Westbrook (1995), the involvement of companies also gives momentum. Working on practical concerns to improve the situation, ensures that the contacts between the researcher and the companies are appropriate, frequent and focused to the (research) issue.

### 3.3.4 *Subjectivity*

According to the positive frame of reference, subjectivity is a methodological challenge that needs to be challenged and confronted. In AR, the researcher is an actor (in contrast to the outside observer) and hence subjectivity is central to the process of action and reflection. However, in order to mitigate subjectivity within this research, the researchers paid particular attention to:

- Co-design the AR process together with the manager of the SI. Involving participants as interpreters and co-researchers allows the assumptions of the researcher to be challenged.

- Have a group of four additional companies, invited to reflect upon the outcomes and findings.

- Have a team of action researchers, to reduce personal bias in onsite work and research.

- Have companies check the write-ups (reflective notes, minutes).

- Seek for multiple viewpoints within the client system.

- Prefer data to opinion.

- Presenting and feeding back findings to reflect upon to the researchers within the CO-IMPROVE[2] project that worked according to the same AR process in Denmark and Italy.

In order to minimise the subjectivity of the research, the researchers ensured having more subjects.

### 3.3.5 *Rigour*

From the action researcher's perspective, the challenge is to define and meet standards of appropriate rigour without scarifying relevance (Argyris and Schon, 1991; Westbrook, 1995). Appropriate rigour in this research means:

- fully documenting the approach

- consciously and deliberately enacting the AR cycles

- critically testing own assumptions and interpretations and allowing these to be tested publicly.

### 3.3.6  Validity

AR can be justified within its own terms, particularly those which argue that the reflection and data generation and the emergent theories cannot be captured readily by alternative approaches (Schein, 1987; Eden and Huxham, 1996; Coughlan and Coghlan, 2002). Validity is a term from traditional positivist science and has connotations of proof and replication. Within its own terms, AR talks about quality. This paper will assess this research in terms of Shani and Pasmore (1985) theory and quality dimensions.

- the method has produced insight which cannot be gleaned in any other way (Eden and Huxham, 1996)

- the history and context for the intervention have be taken as critical to the interpretation of the likely range of validity and applicability of the results of AR (Eden and Huxham, 1996)

- triangulation with methods such as interviews and assessments has been used as a dialectical device which powerfully facilitates the incremental development of theory.

## 4    Empirical setting

This research was performed in an inter-organisational setting between a System Integrator (SI) in the automotive industry and three of its suppliers. Although the model was developed for the AR process on an organisational level, there is clear potential for the application and adoption in an inter-organisational setting. We will use the model to describe the setting in which AR was conducted and the process of AR itself.

### 4.1  The contextual factors

The SI is a specialist company in manufacturing and assembling 'motion control' systems for the different markets. The company sees itself in a niche of the automotive and truck market. The competitive structure of the automotive and truck industry has some clear characteristics:

- hierarchy in the market

- strong distinction between part suppliers and system suppliers

- economies of scale

- focus on competitive pricing and quality products.

Within the automotive and truck industry, the order-winning criteria are price, whereas quality, delivery and technology are qualifiers. Therefore, companies within these industries should constantly monitor the cost structure (throughout the supply chain) in order to remain competitive. There is a strategic benefit to collaborative supply relationships. It is therefore essential for the SI to look for long-term, highly involved and dedicated partners that fully support the processes of the SI. As such, the SI needs suppliers that apply Continuous Improvement (CI) with a strong focus on quality, cost

and delivery. A close collaboration with a limited number of suppliers is needed to guarantee maximum use of suppliers' knowledge in order to increase efficiency and reduce time to markets.

The SI selected three suppliers, which represent different types of relationships with the SI, to be involved in CoI initiatives as part of the research project.

Supplier 1 is a medium-sized company with approximately 200 employees. Supplier 1 is specialised in the design and production of automotive, medical and pharmaceutical plastic precision parts and assembled products. The SI selected this supplier because of its intensive collaboration over a number of years and both companies perceive the relationship as close. The close relationship is typified by frequent (face-to-face) meetings between different people and different functions, shared goals with regard to relationship and improvement projects and clear improvement plans and teams for sharing and exchanging information. Both companies expressed the desire to develop a very long-term relationship.

Supplier 2 is a small-sized company with approximately 55 employees. Supplier 2 is specialised in the production and delivery of fine mechanical parts. It delivers its products to customers in the automotive, agriculture, optical, medical and measurement/control industry. The SI selected this supplier because of its long-term relationship and collaboration in former improvement projects. The main driver for collaboration is quality. The supplier indicated that the relationship had shared goals with regard to quality. Although this was not indicated by the SI, they did express involvement in the supplier through the use of quality standards (QS9000). The intention of both companies is to increase the collaboration and develop a long-term relationship.

Supplier 3 is a medium-sized company with approximately 160 employees. Supplier 3 is specialised in production and development of cylinder tubes for the automotive and truck industry. The relationship between the SI and supplier is fairly young, since only recently the first supply deals were closed. Supplier 3 is perceived as a real 'automotive supplier', which knows and understands the industry-specific characteristics. The supplier is able to handle the entire process from buying raw material to the delivery of cylinder tubes and therefore of particular importance for the SI with regard to this product. Both companies are interested in developing a long-term relationship.

## 4.2  *The quality of relationships*

In this section, we will, first, discuss the perceived quality of the relationship between the three suppliers and the SI. Secondly, we will discuss the client system as a whole. Finally, we will discuss the quality of the relationship between the action researcher and the client system based on the factors identified by Shani and Pasmore (1985).

The SI and Supplier 1 indicated that they perceived their relationship as trustworthy. Both companies were consistent in business transactions and delivered according to specifications and promises. The relationship was perceived as important from the side of the supplier to highly important from the side of the SI. The SI perceived the relationship as highly important, because of the high dependency of the SI on a specific product that is produced and delivered by Supplier 1. This product is critical to the systems of the SI. The (relative) power was perceived as medium with no direct pressure from either of the two companies. Both companies expected operational as well as strategic benefits from engaging in CoI initiatives. The past involvement of both companies had already

generated learning from each other with regard to operational as well as strategic issues and both companies stated that they had a high willingness to communicate and share information openly. A mutual understanding had developed between the SI and supplier on operational and strategic issues and, as such, they shared a sense of direction within the relationship (development of a long-term relationship).

The SI perceived their relationship with Supplier 2 as trustworthy in terms of consistency in business transaction and delivery according to specifications and promises. However, Supplier 2 perceived the relationship as less trustworthy, because of a few incidents in the past relationship where the SI did not fulfil its side of the agreement. Both companies perceived the relationship as important. However, the SI perceived the dependency on the supplier as low, whereas the supplier perceived their dependency on the SI as high. The SI was one of the main customers of Supplier 2 with a 20% sales share of their total sales. As such, the (relative) power in the relationship of the SI and Supplier 2 is unbalanced. The SI has a high relative power compared to the low relative power from the side of the supplier. In comparison to the relationship between the SI and Supplier 1, the relationship between the SI and Supplier 2 was characterised by a lower mutual understanding and willingness to share information and communicate openly. The main reasons were past experiences from the side of the supplier and a perceived pressure by the SI towards the supplier. However, both expressed the intention to develop a long-term relationship with a focus on new product and process developments.

The relationship between the SI and Supplier 3 was fairly new and therefore no perception on the trustworthiness of the relationship could be given by the companies. Both companies indicated that they perceived the new relationship as very important. From the side of the SI, it was because the supplier is able to handle the complete purchasing activity with regard to the specific product they are producing and delivering. From the side of the supplier, it was because the relationship with the SI means an increase in sale and a new customer within the automotive industry. The relative power in the relationship was perceived as low. The potential purchase share of the total purchases of the SI was 2% and the potential sales were 3% of the total sales of the supplier. Since this was a fairly new relationship, neither a mutual understanding nor a joint sense of direction has been developed. However, both companies expressed the willingness to openly share information and frequently communicate. One of the representatives of the SI perceived the initial contacts between the companies as constructive and open.

The client system comprised the SI and three of its suppliers. The suppliers that were involved represented different types of relationships with the SI in terms of trust, (relative) power, willingness to share information and communicate openly, mutual understanding and sense of direction. Furthermore, the three suppliers produced and delivered different products to the SI, and, as such, were not in direct competition with each other. As such, information could pass freely and openly among the companies within the client system. All companies expressed the intention to communicate and share information openly to learn from each other.

Interdependence between the researcher and the client system is an essential feature of AR (Susman and Evered, 1978). The outcomes of the AR process are significantly impacted by the management of the relationship between the researcher and the client system (Susman and Evered, 1978; Shani and Pasmore, 1985). Prior to the AR approach, the action researcher and the members of the client system met before carrying out an in-depth case study. This case study was conducted in the areas where continuous improvement in an EME context could be applied and the requirements of companies in

terms of organisational, managerial and technological mechanisms to support and foster collaborative improvement (Middel et al., in press). As such, the action researcher was able to pre-understand the norms and values within this particular context, develop a common understanding on the research issue of CoI and develop a pre-relationship between the researcher and the companies. This impacted the level of trust in the relationship between researcher and members of the client system and a high level of openness was perceived. Different members of the companies entrusted the researcher with sensible information on their relationships with SI or the supplier during the AR process. This allowed the researcher to develop a holistic understanding of the unfolding events during the AR process. The level of trust between the researcher and the companies and the knowledge and pre-understanding of the researcher of the context and conditions, the structure and dynamics of the inter-organisational setting allowed the development of a mutual concern for the other. Empathy, respect and acceptance created an environment conducive to mutual exploration and participation (see also Shani and Pasmore, 1985). As such, power within the relationship was perceived as balanced. The companies selected and initiated the inter-organisational issues for improvement and were facilitated by the researcher, meetings were organised and scheduled by the researcher with input from the companies, and conflicts that occurred were resolved constructively. In the beginning of the research project, the researcher introduced and explained the objectives of the AR process to the members of the client system. This familiarised the members of the client system with the objectives, process, outcomes and mutual interest of the AR process. It also allowed the development of a shared language and common understanding towards AR, in which participants shared in the researcher's theory development and vice versa (Shani and Pasmore, 1985). In this way, common understandings can be developed from different perceptions of the same events or circumstances, which will ultimately lead to mutually satisfying outcomes of the AR effort (Shani and Pasmore, 1985).

### 4.3 The quality of the action research process

According to Shani and Pasmore (1985), the quality of the AR process is measured by two main components:

- the inquiry process
- the implementation process.

### 4.3.1 The inquiry process

In this research project, the AR process was adopted through a series of AR cycles. Each cycle involves a process of diagnosing, planning, taking action and then fact-finding about the results of that action in order to plan and take further action (Coghlan and Brannick, 2005; Coughlan and Coghlan, 2002; Coghlan et al., 2004). The AR group comprised the four companies and researchers from the University of Twente (UT) and Trinity College Dublin, (TCD). The group of researchers included two researchers with a wide range of research experience in CI, innovation, quality management, organisation development and business ethics and two doctoral students (one from the UT and one from TCD). The group of researchers met three times prior to the start of the AR process (Coghlan et al., 2004). The first two meetings were to achieve a common

understanding of the AR imperatives and the third meeting focused on a detailed preparation of the implementation of the AR process and how to gather, document and make sense of the data.

As the companies engaged themselves in action, the researchers gathered data through (Coghlan et al., 2004):

- instrumentation (documentation from assignments)

- minutes and reflective notes of the AR group

- minutes and reflective notes of researchers meetings.

Each meeting of the AR group was preceded and followed by a meeting among the researchers. The purpose of these meetings was as follows:

- gather, document and make sense of the data with respect to CoI between the companies

- reflect upon the documents of the assignments and review feedback from the companies

- develop and outline the plan for the process of AR from stage to stage in order to ensure the quality of the research data, companies motivation and performance

- discuss and resolve issues that might arise.

In this way, the action researchers were able to understand the generated data, expose and test their assumptions and interpretations and reflect and analyse upon the issues of CoI (Middel et al., 2004).

The findings of the AR group were fed back to a wider set of researchers in the CO-IMPROVE project. The action researchers compiled a series of research documents that were presented, discussed and reflected upon in workshop settings by all other (local) researchers in CO-IMPROVE meetings. During these meetings, the manager of the SI was present and participated in the discussion and reflection to, jointly, plan and implement consequent action. As such, the manager of the SI was actively part in the inquiry process. Co-inquiry suggests a two-way relationship between the action researcher and the client system. As Eden and Huxham stated:

> "The researcher becomes involved in and contributes to the practitioner's world, and the practitioner becomes involved in and contributes directly to the form of the research output." (Eden and Huxham, 1996, p.528)

### 4.3.2 *Implementation process*

The AR approach was put in place over a period of 15 months through a cycle of 12 joint workshops. These workshops involved all the companies and were aimed at engaging the companies in collaborative improvement projects, involving processes of diagnosing, fact-finding, implementation and evaluation of improvement actions in the areas of delivery, quality, change-order management and cost reductions. The participants themselves carried out the improvement activities, facilitated by the action researcher. The results of the improvement projects were presented and discussed in plenum by the representatives of the companies to evaluate and reflect on the process and progress of the collaborative improvement project. During the reflection and discussion at the workshops, the researcher stimulated and facilitated the identification of experiences,

observations and learning moments. In this way, explicit attention was paid to learning and how this could contribute to the development of the body of knowledge to the individual companies and the clients system as a whole.

Improvement projects in collaborative operations were started based on improvement areas, which were identified through interviews by the researchers with representatives of the companies and the results of assessments with regard to the level of operational integration and collaborative improvement maturity. The result was a list of possible improvement projects between the SI and the suppliers from which the companies selected specific improvement projects at the workshops. After the companies had selected a project, they started working on the collaborative improvement activity, whereby the researcher acted as a facilitator for all the companies in the project.

The initial approach can be described as an approach in which the companies in the network together initiate improvement projects. Within this approach, a high degree of consensus between the companies in the client systems was striven at. The SI had deliberately chosen not to be directive or prescribe improvement projects, since it felt that collaboration and collaborative improvement is about shared goals and vision, mutual dependence and joint work and activities. Furthermore, it believed that a directive role of the SI would not facilitate the participation of the suppliers and the development of collaborative improvement in the EME.

However, after three months, hardly any improvement projects were started between the companies. The main reasons were a lack of activity at company level and no sense of urgency in general. Although all the companies supported the adopted approach, it did not lead to the results with regard to collaborative improvement. The SI and the suppliers were not able to hold on to the enthusiasm, shown during the workshops, and translate this enthusiasm into activities within the companies.

Discussing and analysing this situation, the SI and the researcher decided to change the approach towards a more active and directive role of the SI. Within this role, the SI should start activities, generate discussion and encourage participation of all companies within the EME. Besides the change in role, the frequency of the workshops was increased from a half day every two months to a full day every month to increase efficiency and effectiveness of the meetings. The monthly workshops were intended to trigger and stimulate the process and progress of the collaborative improvement projects. This stimulus and trigger were needed since the companies perceived the projects to be additional to their daily activities and in practice a higher priority was given to daily operational activities. A second reason for increasing the frequency of the workshops was that energy and attention increased shortly before and shortly after a workshop. The sense of urgency increased in the period around the workshops as people received an incentive to start working on the collaborative improvement activities, but after some time attention and energy decreased, causing the lack of activity within the EME. By scheduling a workshop every month, the researcher and the SI were trying to keep momentum and speed within the process and progress of the improvement projects. A third reason was that the participants themselves underline the importance of face-to-face contact for learning collaboratively.

### 4.4   *The outcomes of the action research effort*

AR has been identified as a potent method for bringing about change in the client system and contributing to scientific knowledge (Rapaport, 1970; Shani and Pasmore, 1985;

Westbrook, 1995; Eden and Huxham, 1996; Coughlan and Coghlan, 2002). The effectiveness of the AR approach can be assessed by four factors that were described earlier.

### 4.4.1 Inter-organisational improvement and collaboration and inter-organisational learning

Over a period of one and half years, five CoI initiatives between the SI and the suppliers were started in the different functional areas, such as quality, (change) order management and manufacturing. The CoI initiatives were multi-disciplinary and required the involvement of different functional departments from all the companies, such as purchasing, engineering, sales, quality and production. An overview of the CoI initiatives and the operational and learning outcomes is presented in Table 3.

**Table 3**     CoI initiatives and their outcomes

| Relationship | Collaborative improvement initiative | Operational outcomes | Learning outcomes |
|---|---|---|---|
| SI – supplier 1 | Redesign of a product, which caused severe problems during malfunction in the system of the SI | Cost reduction and increase in the quality of the product. The supplier was able to reduce internal scrape rate by 33% | Increased awareness of the need to communicate and share information more regularly. Closer collaboration is necessary to overcome problems |
| SI – supplier 1 | Proposal to produce an existing product of the SI of aluminium in plastic | Expected outcomes are 50% cost reduction for the SI and increase in Sale for the supplier | The inducement for improvement is not always a practical problem but can also be more creative and pro-active |
| SI – supplier 2 | Cleanliness of products | Increase in sales from SI to supplier. Reduction in reject rate by SI | Need for project planning. Importance of information sharing between the companies |
| SI – supplier 3 | Information and communication on specifications of products | NA | Increased information exchange and awareness of need for improving communication |
| SI – supplier 3 | Analysis and evaluation of a change in tooling concept by the supplier | NA | Increased insight in organisational structure and communication flows on both sides |

The companies within the client system focused on real day-to-day issues and concerns that have been identified by them. Whereas the companies, initially, re-acted and tended to focus CoI initiatives on problems, they recognised that they could concentrate also on more creative and pro-active opportunities for improvement. As the process of CoI unfolded over time, the companies learned that CoI is not additional to daily activities, but an integral part of daily operational activities in and between the companies. By applying the AR approach as a problem-solving tool, the companies were able to start

solving problems systematically. The companies were engaging themselves in the AR cycles, whereby explicit attention is given to synthesising and diffusing experiences, observations and learning moments as part of the CoI initiatives.

Initially, there was no mutual understanding of the concept of CoI, which had a negative effect on the level of openness between the companies and resulted in political behaviour of the suppliers towards the SI. The suppliers had the impression that this was another way of implementing cost reduction and quality programmes. Particular attention was paid to create a shared vision on CoI and a sense of direction. The companies in the EME experienced the regular face-to-face meetings, such as the workshops, as a 'fuel' for CoI initiatives. During these meetings, they were able to align expectations, share information, reflect on initiatives and increase visibility of the process. In general, the regular meetings kept momentum and speed within the CoI initiatives.

Reflection and evaluation were not performed within the EME due to operational priorities. Learning was not an integral part of collaborative relationships and CoI initiatives between the companies in the EME. A challenge that faced the participants was the diffusion of learning externally to the other companies in the EME and internally in their own organisation. Given the current market changes and competitive pressures, the companies experienced and recognised the need for single-loop and double-loop learning (Argyris and Schon, 1996) to learn to improve and tackle increasingly complex improvement problems and challenges. The companies in the EME developed and improved their capability for inter-organisational improvement and learning, not only through engaging in CoI initiatives, but also through having the willingness to collaborate, communicate and share information, and to understand other's position and develop a sense of direction.

### 4.4.2 Knowledge with regard to the management and organisation of CoI processes

In managing the project and studying it at the same time, the action researchers faced the challenge to generate actionable knowledge, while companies where engaging in CoI initiatives. The AR process allowed the researcher to be part of the CoI initiatives with access to rich and detailed information. This access yielded in-depth insight on and development of an understanding of the organisation and management of CoI. As understanding of the process of CoI developed, several insights emerged in relation to managing and organising CoI (see also Kaltoft et al., 2003):

- companies need to understand each other's positions and to create a shared sense of direction

- a learning environment can be created in which companies can and do, openly, communicate and share information

- trust and commitment have to be created among the companies as part of the collaborative relationship and CoI initiatives

- the SI should have an active and committed role with regard to CoI initiatives and learning

- assessment tools help identify and implement CoI initiatives

- project management tools and frequent workshops keep momentum and progress in the CoI initiatives and create a sense of urgency

- facilitation by action researchers is required in the process of CoI and learning.

The workshops provided the structure for the collaborative space in which the learning mechanisms were utilised (Shani and Docherty, 2003). The planning and implementation of initiatives and the reflection on their progress were undertaken in an atmosphere of partnership and collaboration and enacted through the shared process of planning, implementing and reflecting.

### 4.4.3  Theory of inter-organisational AR

The inter-organisational relations and interactions within this research project reflect complex inter-level dynamics (Rashford and Coghlan, 1994). Within this project, they provide frames for understanding how researcher participation is developed through increasing complexity (Coghlan et al., 2004). Companies and individuals work on their own collaborative improvement projects. A manager of the SI participated in local meetings of the AR group and was actively part of the inquiry process. The findings of the AR group were fed back to a wider set of researchers in the CO-IMPROVE project. The action researchers compiled a series of research documents that were presented, discussed and reflected upon in workshop settings by all other (local) researchers in CO-IMPROVE meetings. These frames are not only for the purpose of understanding but also the basis for action; they provide a useful systemic focus for action and collaborative research (Coghlan, 2002, Coghlan et al., 2004; Adler et al., 2004).

This research fulfils the quality criteria for action research as articulated by Reason and Bradbury (2001):

- the project is engaging in significant work

- it is explicit in developing relational participation between the SI and their suppliers and between the researchers and the companies.

- it is guided by a reflexive concern for practical outcomes

- it is inclusive of a plurality of knowing, as the practical and technical knowing within the client system is complemented by the development of theoretical knowledge of how the client system works (Coghlan et al., 2004)

- a new and enduring infrastructure within the client system will result.

AR has been efficient and effective for both the researchers and companies within the client system. From the perspective of the researchers, it allowed in-depth insight into and development of an understanding of the process of collaborative improvement in order to generate actionable knowledge (Middel et al., 2004). From the perspective of the companies, it allowed the companies to engage in significant work, develop inter-organisational relationships and experience the relevance of reflecting and evaluating upon activities performed as part of inter-organisational work practices (Middel et al., 2004).

A summary table based on the model of Shani and Pasmore (1985) was created to display the richness of this study, its complexity and distinct outcomes (see Table 4).

**Table 4** Summary table of the action research process

| Contextual factors | Quality of relationships |
|---|---|
| *Environment* | *System Integrator and Supplier 1* |
| Hierarchy in the market | Relationships were trustworthy and consistent |
| Strong distinction between part suppliers and system suppliers | Demonstrated concern for the other and a mutual understanding of each other's position |
| Economics of scale | Equality of influence and balanced power in the process |
| Focus on competitive pricing and quality products | Shared language between the companies due to past experience |
| Order winning criteria is price, whereas quality, delivery and technology are qualifiers | |
| *System Integrator/suppliers* | *System Integrator and Supplier 2* |
| Different relationships in terms of supplied products | Relationships were trustworthy and consistent |
| Different relationships in terms of maturity of collaboration | Meditated concern for the other due to past experience |
| Different intentions with regard to collaboration | Unbalanced power position due to dependency of supplier on SI |
| Different history and experiences with regard to CoI | |
| | *System Integrator and Supplier 3* |
| | High empathy and acceptance towards each other |
| | Balanced power position due to mutual interest in the fairly new relationship |
| | *Action researcher and client system* |
| | Previous research allowed pre-understanding of particular context, develop common understanding of research issue, and develop pre-relationship |
| | Development of holistic understanding of the unfolding events due to entrusted position of researcher |
| | Empathy, respect and acceptance between researcher and client system developed during the project |
| *Quality of action research process* | *Outcomes* |
| *Inquiry process* | *Inter-organisational improvement and collaboration* |
| | *Inter-organisational learning* |
| Co-design of the AR process with manager of SI | Cost reduction, increased quality of products, increased sales |

**Table 4**    Summary table of the action research process (continued)

| Quality of action research process | Outcomes |
| --- | --- |
| *Inquiry process* | *Inter-organisational improvement and collaboration* |
| | *Inter-organisational learning* |
| Researchers met three times prior to start. First two meetings to achieve common understanding, third on detailed preparation of the implementation | Increased understanding in (inter-) organisational processes and structures |
| Each AR group meeting was preceded and followed by a meeting of researchers to challenge assumptions and interpretations | Development of a systematic process to solve problems |
| Instrumentation, minutes and reflective notes were used to gather the richness and complexity of the process, and generate a shared understanding | Learning is an integral part of CoI process and regular meetings as a 'fuel' for the CoI process |
| Wider set of researchers were used to reflect upon and analyse the emerging issues within the process | |
| Manager of SI was present and actively participated in the researchers' meetings | |
| *Implementation process of AR* | *Knowledge with regard to management and organisation of CoI processes* |
| AR worked on practical concerns to the companies involved | Development of a mutual understanding and the creation of a shared sense of direction |
| The AR process was guided by constant and iterative reflection as part of the process | A new and enduring learning environment was created |
| Companies carried out improvement activities; facilitated by researchers; Evaluation and reflection in AR group in plenum on content and approach | Trust and commitment have been created among the companies |
| An enduring infra-structure towards improvement and learning was developed | Active and committed role of SI |
| | Assessment tools help identify and implement CoI initiatives |
| | Project management tools and frequent workshops keep momentum and progress, and create a sense of urgency |
| | Facilitation by action researchers is required |
| | *Theory of inter-organisational AR* |
| | Companies and individuals work on CoI projects |
| | Manager of SI participated in meetings of AR group and was actively part of inquiry process |
| | Findings were fed back to wider set of researchers |
| | Compilation of series of research documents |

## 5 Conclusions

Analysis and discussion of 141 papers presented at four CINet conferences showed that literature on and research in CI has a strong empirical orientation. Although the majority of the papers presented traditional methods as their main research methodology, AR as the applied research methodology is gaining in popularity The empirical orientation of research on CI provides a clear opportunity for AR to contribute to theory and practice. AR is an approach to research that does not distinguish between research and action; it addresses the theme of research in action (Coughlan and Coghlan, 2002).

Despite the attractiveness of the benefits of AR, the complexity of the AR process demands a holistic attention to and critical interpretation of the approach itself.

This paper has presented and applied the model of the AR process by Shani and Pasmore (1985) in an inter-organisational setting. The paper has discussed the four interrelated factors/processes (contextual factors, quality of relationships, quality of action research process and outcomes of the action research effort), which are critical within the process of AR. As each AR approach is highly situational, in-depth insight into the process of AR, context and outcomes should be given to make the approach understandable and repeatable to achieve appropriate quality and rigour in research. In addition, particular attention should be paid to enactment of the cycles of action planning, action taking and evaluation, the quality of participation in the client system, contribution to the client system and the development of emergent theory from the action.

This research was focused on the application and adoption of an AR approach in CoI in a Dutch EME. The outcomes of the AR effort are:

- inter-organisational improvement and collaboration

- inter-organisational learning

- knowledge with regard to the management and organisation of CoI processes

- theory of inter-organisational AR.

AR is a potent method for bringing about change in the client system and generating actionable knowledge.

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## Notes

[1]EuroCINET is the European Continuous Improvement Network. Since 2000 the name has changed in CINet, which is a continuation of the EuroCINet. The Continuous Innovation Network (CINet) is a global network set up to bring together researchers and industrialists working in the field of Continuous Innovation.

[2]CO-IMPROVE is a three year EU-funded project. The objectives are to develop a business model, supported by a web-based software system, and action learning-based implementation guidelines to support the design, implementation, and ongoing development of collaborative improvement between partners in Extended Manufacturing Enterprises. Industrial partners comprised three companies based in The Netherlands, Italy and Denmark. Academic partners include Aalborg University (Denmark), Politecnico di Milano (Italy), Trinity College Dublin (Ireland) and University of Twente (The Netherlands).