# The Application of Action Learning and Action Research in Collaborative Improvement within the Extended Manufacturing Enterprise

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*Summary:*
*Increasingly organizations have to identify and implement improvement initiatives in an inter-organizational context. Implementing collaborative improvement is fraught with difficulties that encompass a wide array of intra- and inter-organizational change issues and working practices. In order to overcome these difficulties, explicit attention should be paid to the accumulation and development of knowledge and to the long-term development of a capability for learning and continuous improvement between organizations. This paper describes the application of an Action Learning and Action Research approach in collaborative improvement within an Extended Manufacturing Enterprise in the Netherlands.*

*Keywords:*
*Action Learning, Action Research, Collaborative Improvement, Extended Manufacturing Enterprise*

# 1 Introduction

Market developments, including intense international competition, fragmented and demanding markets and diverse and rapidly changing technologies (Teece et al., 1997), have created new imperatives for competition, moving increasingly from the level of the individual organization to networks of disparate companies. Within these networks companies have to focus on collaborative efforts and initiatives to continuously improve and change the current processes and work practices in order to keep pace with the external dynamics in the business environment. Therefore, the individual company is becoming an insufficient entity to identify improvement projects (Harland et al., 1999) and, accordingly, companies have to identify and implement improvement initiatives in an inter-organisational context, leading to the concept of collaborative improvement.

There is an increasing need to understand and to develop knowledge on the improvement and learning processes that take place at the inter-company level (Boer et al., 2000). Consequently, the concept of continuous improvement, which by now is a consolidated concept in the context of stand-alone companies, has been transferred and extended to the level of 'collaborative' continuous improvement, leading to the concept of collaborative improvement. Collaborative improvement (CoI) is defined as: "a purposeful inter-company interactive process that focuses on continuous incremental innovation aimed at enhancing the Extended Manufacturing Enterprise overall performance" (Cagliano et al., 2002).

The key to collaborative improvement is learning and development (Boer et al., 2000). However, the process of cultivating collaborative improvement across disparate companies within a network is fraught with difficulties that encompass a wide array of intra- and inter-organizational change issues and working practices. Therefore, companies have to apply and to use approaches that enable them to tackle these difficulties of inter-organizational change. One approach designed to tackle real problems and to develop a capacity to learn is 'action learning'. Although action learning is a widely adopted approach by managers in their own companies, it can provide a useful approach for managers and companies in an inter-organizational setting as well (Coughlan & Coghlan, 2004). While managers and companies engage explicitly in action learning cycles, researchers can use, in parallel, an action research methodology to generate actionable knowledge on collaborative improvement in the extended manufacturing enterprise.

This paper will focus on application of the action learning and action research approach in collaborative improvement within an extended manufacturing enterprise participating in the CO-IMPROVE Project. The combination of action learning and action research have been fundamental in the EU research project CO-IMPROVE (Collaborative Improvement Tool for the Extended Manufacturing Enterprise, G1RD – CT2000 – 00299). In 2001, the CO-IMPROVE project started with the objectives 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 and learning in the extended manufacturing enterprise. In the paper, we will introduce firstly the concept of the extended manufacturing enterprise. Secondly, we will discuss the concepts of action learning and action research and its application within the context of an extended manufacturing enterprise. Finally, we will discuss and reflect in detail on the process of action learning and action research and experiences of the researchers. As a piece, the paper contributes to the design and implementation of future action learning and action research initiatives in extended manufacturing enterprises.

## 2 The Extended Manufacturing Enterprise

Due to changing market and competitive demands, individual companies have found it necessary to focus on their core business in order to remain competitive, while, at the same time, developing relationships with other firms with complementary competences (Rockhart & Short, 1990; Nohria & Eccles, 1992). In order to cope with the market changes and to stay competitive within today's market environment companies have to identify and to implement improvement initiatives in the inter-organisational context. Today's competition takes place less between individual companies than between supply chains consisting of multiple, collaborating organizations (Christopher, 1992; Fine, 1998).

The concept of extended manufacturing enterprise (EME) is rooted in supply chain management literature. This relates to the overall set of relationships from the "supply network" of a focal company (Lamming, 1993; Harland, 1996). A supply network can be defined as a body of advanced relations characterized by an integrated strategy and management policy that the focal company maintains with a limited set of its suppliers (Bartezzaghi & Sassatelli, 2001). The EME (Busby & Fan, 1993) is defined in terms of manufacturing companies that co-operate closely to maximize the benefits of the business they are involved in. Here the suppliers are viewed as a part of the principal company, the so-called system integrator. Both the concepts of supply networks and EME are based on the notion of collaboration between companies, that is, working together, over an extended period of time, for the benefit of both (Ring & Van de Ven, 1992).

# 3 Action Learning

The key to Continuous Improvement and Collaborative Improvement is development and learning (Boer et al., 2000). Two related components are involved in learning: The first involves the accumulation and development of a core knowledge base – the "core competence" – which differentiates the organization from others and offers the potential for competitive advantage (Bessant et al., 2003). Acquiring this competence is not simply a matter of purchasing or trading knowledge assets, but the systematic and purposive learning and construction of a knowledge base (Teece, 1998; Prahalad & Hamel, 1994). The second is the long-term development of a capacity for learning and continuous improvement across the whole organization (Bessant et al., 2003). The learning process does not stop at the boundaries of the single organization, and, consequently, learning and competence development are relevant in an inter-organizational setting. This recognition places a greater emphasis on mechanisms and approaches towards the long-term development of a capacity for collaborative improvement and learning in an inter-organizational setting. In response, action learning can provide a useful methodology for the development of a capacity for learning as part of the CoI process. Although the concept of action learning (AL) originated at an interpersonal level there is clear potential for their application in CoI and inter-organizational learning (see also Bessant & Tsekouras, 2001).

AL is an approach to the development of people in organisations, which takes the task as the vehicle for learning (Pedler, 1996; Revans, 1998; Weinstein, 1999; Yorks et al., 1999). In AL, the starting point is the action and through implementation and reflection this becomes learning-in-action. AL has six distinct interactive components (Marquardt, 1999): a problem; the group; the questioning and reflective process; the commitment to taking action; the commitment to learning; the facilitator.

# 4 Action Research

Action Research (AR) is a cyclical process of diagnosing, action planning, action taking, evaluating and specifying learning (Lau, 1999). Action research focuses on research in action, rather than research about action, in which members of the studied system actively participate in the cyclical process. Several broad characteristics define action research (Eden & Huxham, 1996; Coghlan & Brannick, 2001; Coughlan & Coghlan, 2002):

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

The research reported in this paper was undertaken through an AR approach where the researchers were both managing the project and studying at the same time (Coghlan & Brannick, 2001; Coughlan & Coghlan, 2002). The AR approach was simultaneously applied with AL, which was to allow the researchers to interact with the EME as the companies engage themselves in the process of learning in action.

The AR approach was adopted to facilitate and to stimulate the development of a capability for improvement and learning process within the EME. As stated by Westbrook (1995) a main contribution of action research to learning, which is not available to other methods, is that when participants involve themselves in change experiments, they engage in non-trivial learning, and they think and reflect seriously on what they are doing.

# 5 Research Base

The focus of the paper is on the application of Action Learning and Action Research within an EME in the Netherlands, comprising of a system integrator and three of its suppliers. The system integrator (SI) is a company, which is specialized in 'Motion Control'-systems for different markets, including the automotive, truck, marine, medical and agriculture market. The company sees itself in a niche market, dominantly automotive and truck.

The suppliers selected by the SI to participate in the CO-IMPROVE project all represent different kinds of relationship and deliver different kind of products. This means that information and communication could pass freely throughout the whole group without running the risk of giving or losing sensitive information to competitors. The underlying reason for the SI to select these suppliers was that the suppliers were perceived as highly involved in collaboration and are dedicated partners that fully support the SI in assembling and delivering the systems of the SI.

Over a period of 1½ years, 5 CoI initiatives between the SI and the suppliers were started in the area of 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.

A specific CoI initiative between the SI and one of the suppliers (hereafter the Supplier) concerned a quality problem with a product (hereafter SUP), which was supplied by the supplier to the SI. The SUP had caused severe problems in the final products of the SI due to the fact that the SUP could collapse during function. The project team comprised of people from purchasing, sales, engineering and quality. It was recognized that the supplier was not able to optimise technically their processes to prevent the malfunctioning of the SUP. Therefore, the participants engaged themselves in a systematic process of problem solving in order to retrieve additional information and suggestions to solve the problem with regard the SUP. The problem solving happened in a very open and constructive way, trying to find the underlying causes and how these could be solved. An improvement plan was developed, assigning different tasks and responsibilities to project members with due dates. Regular face-to-face meetings were used to share information, discuss the process and progress of the initiative, reflect and evaluate, synthesize learning. The meetings kept momentum in the CoI initiative, created an atmosphere for direct communication and honesty, and increased the awareness of the benefits of CoI and learning. As the process unfolded over time, a researcher facilitated the entire CoI process. The outcomes of the project and the learning achieved were:

- New material composition of the SUP, reducing cost and increasing quality for the SI and reducing internal scrap rate of the supplier by 33%;
- Increased (awareness of need to) information sharing and communication as part of the CoI process;
- Recognition that openness, trust, goals sharing and mutual understanding are required to allow actual collaboration and to finalize efforts in CoI to effective results.

# 6 Action Learning and Action Research in the EME

## 6.1 Action Learning in the EME

The application of the concept of action learning in the CO-IMPROVE project was envisaged as an integrated set of actions to be executed in learning networks. A program was designed based on an AL framework (Marquardt, 1999) and built around a structure of regular workshops. Here participants would meet in a group, discuss and reflect on the progress of the particular change initiative on which they were working and then follow up on the learning from that meeting in the day-to-day enactment of attempted solutions to the problem.

Briefly, the AL approach was put in place in the EME over a period of 18 months through a cycle of 15 workshops. These workshops were organised on a monthly basis. The workshops were aimed at engaging companies in collaborative improvement activities, involving processes of diagnosing, fact-finding, implementation and evaluation of improvement actions. Moreover, the process of action learning emphasised the importance of a structured questioning and reflective process within the EME. The workshops were scheduled according to a fixed format of the agenda. Within the agenda slots were scheduled for the CO-IMPROVE project, CoI initiatives on dyad and EME level and incentives. These slots had the objective of stimulating and triggering discussion and action to identify and to select CoI projects, to learn from experiences of others within the project, to link the meetings in order to keep momentum in the CoI initiatives, and to synthesize learning.

In more detail, the six components of Marquardt's framework (1999) underpinning the CoI initiatives are as follows.

**1. A problem**

The focus was on immediate operational issues in terms of product and process improvement, pro-active and creative improvement opportunities and improvement of the collaboration between system integrator and suppliers.

**2. The group**

The AL group was comprised of the SI and the three suppliers. The group met 15 times over an 18-month interval. During the meetings at least two representatives of the SI and one representative of each of the suppliers were present and participated actively in open group discussions.

**3. The questioning and reflective process**

Monthly EME workshops were used to monitor each improvement initiative and facilitate a reflective process. The workshops aimed at engaging companies in collaborative improvement activities, involving processes of diagnosing, fact-finding, implementation and evaluation of improvement actions. The results of the improvement activities were presented and discussed in plenary to evaluate and to reflect on the process and progress in order to identify experiences, observations and learning moments.

A reflective document was used to structure the process of improvement and to facilitate a reflection on the process and progress of improvement projects between the companies in order to learn from their experiences, observation and reflection. Evaluation and reflection was not an integral part of the improvement process and, therefore, the participating people/companies skipped the evaluation/reflection process and continue with daily activities (priorities) after an improvement project. The reflective document and process of action learning emphasized the importance of a structured questioning and reflective process. Using this

document people/companies within the EME began to see the importance and benefits of evaluation and reflection.

Enactment of the process of AL began to emerge through iterations of workshops. In the beginning of the CO-IMPROVE project the questioning and reflective process was planned, because evaluation was, at that time, not a part of the way-of-working in previous (collaborative) improvement projects. The SI constantly emphasized the need and importance of evaluation and reflection and sharing the lessons learned with the members in the EME. As the project continued, the participants saw benefits of the questioning and reflective process and it became an integral part of the collaborative improvement activities.

The expand PDCA was the basis for the improvement initiatives. The improvement initiatives and the questioning and reflective process were structured in alignment with the PDCA-cycle. Company visits and factory tours were used to sharpen the focus on the emerging issues within the EME.

**4. The commitment to taking action**

The commitment of the AL group was to taking the necessary strategic and operational steps to engage in collaborative improvement initiatives. The premise underlying this commitment was that no real learning takes place unless and until action is taken. The commitment to action was reflected in a schedule of meetings to support and to facilitate the questioning and reflective process. In each meeting explicit attention was given to the progress and process of each improvement initiative, during a number of phases within each meeting:

- Collaborative improvement action planning and evaluation
- Presentation and reflection plenary on the process and progress of the project
- Practical, reflective and challenging discussion on the issues arising in the improvement activities

**5. The commitment to learning**

In the meetings explicit focus was given to learning during the meetings through presentations and discussions in plenum and the diffusion of knowledge, experiences and lessons as part of the collaborative improvement initiatives. The attention towards learning was planned through a reflective questioning process in order to increase the awareness of the concept and benefits of a structured process of collaborative improvement and learning.

**6. The facilitator**

Within the AL group members of the University of Twente and Trinity College Dublin facilitated the AL process. The facilitators acted primarily as learning coaches, coordinating the meetings and keeping learning to the forefront of the agenda.

## 6.2 Action Research

- Organizing for Research and Action

As the definitions of AR and AL indicate, there are common features in both approaches. Both share the same values, are based on the same learning cycle, and focus on learning in action (Coghlan & Coughlan, 2003). However, the divergence between AR and AL is in the focus and outcome. AR goes beyond the focus on learning and seeks to contribute to theory (Coghlan & Coughlan, 2003).

Overall, CO-IMPROVE was a research project that encompassed three EMEs (one of which was the Dutch EME) and four research institutions. Accordingly, the action research process was organized to work with concurrent projects centered in three locations. The action research was focused on how the action learning approach established the usefulness and usability of the business model and the technical model through a sequence of actions across the different settings (Coghlan et al., 2004). For the action researchers, this objective was achieved through a series of action research cycles (Coghlan & Brannick, 2001; Coughlan & Coghlan, 2002). Each cycle involved 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. As CO-IMPROVE was using action research to create and maintain the learning networks as learning systems the emphasis was on a process of proactive engagement and not simply reactive adjustment (Chisholm, 1998).

In CO-IMPROVE, Researchers, external to the participating companies, organized and facilitated the efforts of each company learning network. These researchers were organized also as a researcher learning network and collaborated to apply their collective knowledge of continuous improvement to develop the CO-IMPROVE approach. The researchers' efforts were supplemented occasionally by outside consultants, academics who have researched the area, or managers with relevant experience.

There were three levels in the researcher learning network (Coghlan et al., 2004):

1. The local researcher network in each country.
   The local researcher networks engaged in action learning with their local company network, and action research on the development of the project from their local perspective.
2. The workpackage researcher network.
   The ongoing development and application of the business and technical models and the action learning process were each the responsibility of the institutions who were leading the workpackages dealing with these three elements.
3. The project researcher network.
   The project researcher network encompassed the three local researcher networks and the three workpackage researcher networks.

The researcher learning network met three times over a five-month period prior to the start of action learning phase of CO-IMPROVE. In the first two meetings, the Dublin researchers led workshops on action research and action learning in order to achieve a common understanding of the action learning and action research imperatives. The third meeting focused on detailed preparation of the assignments for each company network and of the tracking of what would go on within each company learning network.

- **Data Gathering, Documentation and Reflection**

As with the other two local researcher learning networks, the Dutch network gathered, documented and made sense of data with respect to their respective research area for the duration of the action learning process. Data were gathered through:

- Instrumentation (documentation from assignments)
- Minutes and notes of company network meetings
- Minutes and notes of researcher meetings
- Researcher journaling (This refers to the personal notes of researchers who kept a record of their own observations and reflections, thoughts and feelings and personal learning through the process).

The data gathered, documented and reflected on by the researchers were fed to the various company teams who kept an overall watching brief of the progress of their area of responsibility.

- **Structures for Communication**

Consistent with the three levels in the researcher learning network, there were different structures for communication (Coghlan et al. 2004):

The local researcher network
Each company network meeting was preceded and followed by a local researcher meeting which engaged in the action research cycle, of diagnosing, planning action, taking action and evaluating action with respect to the implementation of and research on the 3 themes - the business model, the technical system and the company action learning process. The purpose of these meetings was to

- Gather, document and make sense of data with respect to each research area with respect to their respective company learning network for the duration of the action learning process
- Review the feedback generated from assessments of practice and performance in each company learning network.
- Develop and outline the process being used to set and to communicate objectives for the change initiative to management in the network partners and to consider the degree of conditionality in their buy-in.

- Develop and outline the plan for transitional steps from stage to stage so as to minimize possible deterioration of company performance, company motivation and quality of research data.
- Resolve issues that might arise
- Develop a position paper on the development, application process, usefulness and usability of the business and technical models and the action learning approach in each company learning network.

As outlined earlier, the work of these local teams was facilitated through, development, customization and application of assignments at company network meetings, minutes and notes of company network meetings, minutes and notes by individual researchers of on-site meetings with members of the company learning network between company network meetings and researcher journaling.

The researcher network for each workpackage met at each partner meeting and engaged in the action research cycle, of diagnosing, planning action, taking action and evaluating action with respect to the implementation of and research on the 3 themes in the three company learning networks. The work of researcher network for each workpackage was also facilitated through development of assignments for application at company network meetings, minutes and notes of company network meetings, minutes and notes by individual researchers of on-site meetings with members of the company learning network between company network meetings and researcher journaling.

The project researcher network met at partner meetings where all local and workpackage researcher networks presented reports on the progress of their action research across the three company networks, and the development of the business and technical models and the action learning process. The work of the project researcher network was facilitated in part through writing position papers on the action learning approach in each company learning network.

# 7 Discussion

Central elements in this work reported in this paper have been collaborative improvement, action learning, and action research. The remainder of this section will focus on a discussion of the latter two elements.

## 7.1 Action Learning

In general, the EME provided the opportunity to implement and test an AL approach in an inter-organizational setting. The design of the AL approach was built around a structure of regular meetings. Through the AL approach the companies

within the EME developed an increased awareness of the concept and benefits of collaborative improvement, recognized the importance of a structured process towards improvement and learning, and provided a setting of reflection and evaluation with a high degree of openness and trust.

The companies within the EME focused on real day-to-day issues and concerns that have been identified by them AL engaged the companies in explicitly learning in collaborative improvement initiatives. During each meeting presentations were given with regard to the progress and process of an improvement initiative, which were discussed and reflected on in plenum at the meetings. Explicit attention was given to the diffusion of knowledge, experiences and lessons learned as part of the collaborative improvement initiatives. The process drew on a wide range of interventions – self-assessment instruments, documents, presentations at meetings, feedback by other participants, factory tours and coaching. The way the facilitators structured the AL process and the different roles they played during the process enabled the companies to keep learning to the forefront of the agenda.

Prior to the AL approach, reflection and evaluation was not performed due to operational priorities within the EME. Consequently, in the beginning of the AL approach, learning was not an integral part of collaborative relationships and CoI initiatives. The situation improved gradually over time, but participants were constantly struggling with balancing operational priorities and learning as part of CoI. Facilitation by the SI and the action researchers was perceived as essential.

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 behavior of the suppliers towards the SI. The suppliers had the impression that this was another way of implementing cost reduction and quality programs. The first part of the AL approach paid particular attention to creating a shared vision on CoI and a sense of direction.

Another challenge that faced the participants was the diffusion of learning externally to the other companies in the EME and internally in their own organization.

## 7.2 Action Research

The AR approach provided the Dutch EME with identifiable benefits in terms of the identifying and synthesizing experiences, observations and learning moments. The companies in the EME developed and improved their capability for inter-organizational collaboration, not only through engaging in CoI initiatives, but also through having the willingness to collaborate, communicate and share information, and to understand each others position and develop a sense of direction. Reflection on and evaluation of the process of improvement was not a common behavior within the companies of the EME. This was mainly due to high priorities placed on operational activities. The action researchers facilitated and stimulated

evaluation and reflection of the CoI process, acquiring an EME perspective with regard to learning, and, consequently, contributing to the actionable knowledge and development of a capability of collaborative improvement and learning.

By applying the AR approach as a problem-solving tool, companies were able to start solving problems systematically. The approach allowed the researchers 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 organization and management of CoI. As understanding of the process of CoI developed, several insights emerged in relation to managing and organizing CoI that might not have emerged otherwise:

1. Companies need to understand each others` positions and to create a shared sense of direction
2. A learning environment can be created in which companies can and do, openly, communicate and share information
3. Trust and commitment have to be created among the companies as part of the collaborative relationship and CoI initiatives
4. The SI should have an active and committed role with regard to CoI initiatives and learning
5. Assessment tools help identify and implement CoI initiatives
6. Project management tools and frequent workshops keep momentum and progress in the CoI initiatives and create a sense of urgency
7. Facilitation by action researchers is required in the process of CoI and learning

The networks of researchers in CO-IMPROVE were engaging in both action learning and action research. With respect to action learning, their task was to implement the action learning workpackage on the application of the business model and technical system in the company learning networks. They did this through the questioning and reflective process in inter-institutional, international and inter-disciplinary networks.

Clearly in action research contexts where a single EME is being studied in action, the organizing of multiple concurrent networks of researchers, as in the broader CO-IMPROVE project, does not apply. Yet, in such single EME situations, the enactment of cycles of action and reflection on the action learning process in order to develop actionable knowledge still remains central. Activities such as the recording of events, the writing and presentation of reflection papers and the joint exploration of shared or divergent meaning and interpretations are essential to the development of actionable knowledge.

# 8 Conclusions

Action learning has provided a useful methodology for the development of a capacity for learning as part of the collaborative improvement process. Through its enactment as an integrated set of actions to be executed within the EME, AL has contributed towards a continuous process of learning and reflection in (inter-) organizational practice.

The action research approach stimulated and supported the inter-organizational improvement process and the EME through a structured cyclical process. The approach has been efficient and effective for both the researchers and companies. From the perspective of the researchers, it has allowed in-depth insight into and development of an understanding of the process of collaborative improvement in order to generate actionable knowledge. From the perspective of the companies, it has allowed the companies to experience the relevance of reflecting and evaluating upon activities performed as part of inter-organizational work practices.

The suitability of AR to applied fields has been highlighted by Nasland (2002) in the specific case of logistics since it strives to advance both science and practice. However many of his observations in relation to logistics and AR are also applicable to supply chain management (SCM). Problems in this field are often unstructured, real- world problems. AR is a research approach for tackling real world, managerial and organizational problems such as obtain in SCM (Nasland, 2002) and it can contribute to research as well as practice. Given the crucial role of relationships within SCM, the approach underlying AR - that the foundation for understanding lies in interpreting relationships (Nasland, 2002) - is especially congruent with the collaborative improvement needs of SCM. The application of AR has the potential not only to provide insight around relationships but also to re-enforce and to enhance relationships.

The application of AR in this study is within the EME. Such networks are an increasingly important approach to organizing the supply chain. Given the technical, organizational and managerial aspects of such networks, there is a need to understand and to develop knowledge beyond the physical transaction aspects of the chain to encompass behavioral aspects including goal setting and relationships. Such a need has been previously emphasized by Halldorsson & Aastrup (2003) in relation to logistics enquiry. In common with logistics, SCM operates within a context with each enactment of the supply chain appearing in a specific context. As argued by Halldorsson & Aastrup (2003) in the case of logistics, to understand and explain supply chains, we must deal with their specific context. As described above, AR is ideally suited to meeting these requirements.

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