

# PAR EXPERIENCE FROM PRODUCTION INNOVATION IN MÄLARDALEN

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## ABSTRACT

This case paper describes the role of Mälardalen Industrial Technology Center, an industry support organisation in Sweden and the way its collaborative innovation support is operated. Three programmes where representatives from academia support industrial companies are studied. The coordinating organisation act as a developed collaboration research centre. This is important for action learning and group development. It is beneficial for the university and companies with a strong programme collaboration with researchers and students.

## INTRODUCTION

Several innovation support organisations aim to help companies improve and develop new operations and products. The organisations target different companies with diverse types of support. Small and medium sized companies (SME's) are often challenged by lower educational level, dispersed needs and less contacts with universities compared with larger firms and may have particular needs of regional support connecting them to universities (Tödtling 2001, Lind et al. 2013). This case studies the role of the Mälardalen Industrial Technology Centre (MITC), in relation to other innovation support organisations in Eastern Mid-Sweden. The paper studies three of MITC's support programmes where representatives from academia support industrial companies in solving problems and generating generic knowledge. The case contributes with participatory action research (PAR) experience and aims to put these experiences into a theoretical context. One reason for undertaking the study is to improve the practical methods for development of small and medium sized

enterprises (SMEs) based on theory and experience. The general research questions are: a) What type of development or learning processes are triggered by the programmes? b) How can the approaches be improved with regards to forming developed collaboration?

As this is a single qualitative case, based on action research (Gummesson 2000), the results can be used for hypothesizing in further quantitative research. The introductory part of the study is based on an empirical study of the innovation support initiatives in the region. Then the main part focuses on three programmes for industrial development of SMEs. The comparison of programmes used by MITC is aided by a theoretical overview, resulting in suggestions for improvement of method use. The contribution is mainly industrial by improving the initiatives and putting these in a theoretical context, while strengthening collaboration with the university. The scientific contribution is in showing how innovation theories have been put into practice and what parts are useful.

## DATA AND METHODS

The first part of the study maps innovation support organisations and is based on interviews with 11 representatives. It classifies different types of innovation support organisations in the region (Gullander et al. 2017) and identifies critical collaboration attributes (Lind et al. 2013). Participatory action research was subsequently used (table 1) to study methodology in Tillväxtmotorn (TM), Produktions-Lyftet (PL), and MITC-Light.

Participant researcher	MK	AB	SS
Coaching #companies	PL 6#	TM 30#	-
Coordinating	PL 3y	TM, PL 6y	-
Developing	PL	TM	MITC-L
Invited Researcher	TM MITC-L		MITC-L

Table 1: The authors' researcher participation in the programmes.

These three programmes were compared with the theoretical models they are founded on. In a reflectional analysis workshop in June 2017 the authors used experimental learning in a self-reflexive methodological process, reflecting on the action learning programme management and coaching/facilitation practice (Sanyal 2017). The practical experiences were then compared to the theoretical approaches

## THEORIES

According to Lind et al. (2013) research centres aiming for win-win or “developed collaboration” between academia and industry needs for knowledge to go both ways, beneficial for both parties. A developed collaboration centre can support translational processes in one-way industrial development activities for increased long-term benefit. The innovation and change support programmes are built around theories of organisational change, group action learning, engagement and motivation.

Experiential learning starts with experiences that form pre-understanding of observations (Gummesson, 2000), which enables learners to observe events from a new perspective and subsequently build a deeper understanding of the events. This gives a double loop of reflection on the pre-understanding as new knowledge is built. Reflecting in practice (autonomous), while practicing, and by reflecting on own practice, afterwards, according to Schön (1983). Thus, practice is a necessity in the process to understand or apply theories (Schön 1983).

Kolb (1984) explains experiential learning as a feedback loop, where concrete experiences help Lewiniwan learning processes (figure 1, appendix 1). This is the main theory behind learning from pilot trials, where we ‘make the world into a laboratory’ (Kolb 1984) in line with experimenting in improvement KATA (Rother 2009). Several ineffectiveness reasons have root causes in the lack of adequate feedback according to Kolb (1984). Kolb emphasise Piaget assimilated experiences into accommodated concepts or schemas by imitation and play (experimenting) and summarise learning as a transformation of experience into knowledge.

In Kotters change model (Appelbaum et al. 2012), eight steps, often included in change management programmes as pre-requisites or action steps, are used to lead organisational change:

1. Establish Sense of Urgency
2. Create a Guiding Coalition
3. Develop a Vision and Strategy
4. Communicate Change Vision
5. Empower Employees for Broad Action
6. Generate Short-Term Wins
7. Consolidate Gains for further Change
8. Anchor Approaches in company Culture

Withmore (2004) means that there is a difference between coaching and teaching. Coaching is more about asking the right questions, which is facilitating learning, rather than instructing. This is in line with how Rother (2009) describe coaching Kata. In all coaching of groups, it is important that the coach understands how groups develop, Integrated group development models include introduction, a conflict based phase and then trust and productive work (Wheelan 2009, Tuckman and Jensen 1977)

## RESULTS

Numerous types of innovation support organisations working with industry are active in the Eastern Mid Sweden region. The funding of these are disperse and may come from one of the five subregions, “län”, local municipalities “kommuner” or national or EU funding sources. The organisations can be categorised into groups such as; investment support, incubators, science parks, industrial development centres, technology clusters, and innovation offices (Gullander et al. 2017) and combinations. These actors provide two main types of support.

1. Support for start-ups and new innovations.
2. Support for innovation in existing companies.

Type 1: This region has five universities operating in the five sub regions. Three of these have holding companies where innovation spin-offs from research are incubated. Almi is a national organisation with regional offices supporting innovation with investment loans and funding for mainly new, growing private companies. Incubators typically focus on start-ups and/or research spin-offs.

Type 2: Industrial technology clusters and competence hubs in the region support introduction of new technologies in industry. Examples are Automation Region and Robotdalen with focus on digitalisation and automation innovation, and Uppsala Bio, which supports life-science development. Science parks are usually local initiatives in close proximity to universities. Industrial development centres (IDCs) exist in regions all over Sweden and aim to transfer technology and innovation to industry.

The studied organisation, MITC, works in many respects as an IDC, supporting large and small companies (Gullander et al. 2017). Some activities, are themselves cluster programmes and research projects and MITC can therefore be categorised as a developed collaboration research centre (Lind et al. 2013). This case however focuses on MITCs three regular programmes supporting innovation and change management in SMEs.

Produktionlyftet (PL) - with its well documented methodology (see appendix 1) use a mentoring approach in early stages and KATA coaching in late

stages of the programme. The methodology provide tools for identifying challenges and addressing incremental improvements based on the companies' specific business situation. The coaches are usually from research or consultancy and are experts in lean and organisational development. They shift between coaching and mentoring and work in pairs where one, usually a researcher, has the responsibility for the development of the methodology. Participants are encouraged to 'see with their own eyes' and identify challenges while guided towards a self-identified goal. It takes time and effort for all involved to get the long-term commitment expected. Most PL companies have no other connection to the university than through the coach, but some take on students outside the programme. Finding coach competence can be challenging, and the connection to the university has been perceived as weak.

MITC Light - springs out of experiences highlighting the need for practicing production development while managing daily operations. The participating SMEs define their own needs and set goals for the programme based on their predefined company strategy; a specific development project within their own production environment. Active learning in this programme takes place mainly through learning from others (as in Tillväxtmotorn below) and through trial and error of the concepts introduced in the projects. The coach contributes actively with dialogue, knowledge, invitation of experts and connection to students involved in the projects. The method relies on being led by a coach with some expertise in production, lean methodology and organisational development, and is performed in a network of SMEs. Selected elements of teaching and mentoring is performed by invited experts. The company interest and commitment to the programme has been high and the university connection through guest lectures and students have been clear. The methodology is perceived as person dependent and in some cases ad-hoc.

Tillväxtmotorn (TM) – is very much a personal learning journey for SME managers, as well as a business development programme. The manager commits to network development. The learning process, plays out as follows. Participating managers discuss individual challenges with the group and commit to making changes and improvements between meetings. These are documented and subsequently followed up on at the following meeting. Reflection and feedback is provided by the group. Due to trust growing over time the managers begin to open up to the group, learning evolves and the individual improvements made in each of the businesses results in incremental innovation. Group development is based on integrated group development models. Similar to MITC-light, TM invite experts to present on different topics, but they are not present in the learning discussion. Participators are

encouraged to take on thesis students outside of the programme. The TM-coach act merely as a facilitator for the network learning part of the meetings and act at the same authority level as group members (Berne 2011). The learning and development is wholly self-driven. The network learning is dependent on the participating group which is a challenge for the coach and programme managers. The facilitator type of coach can be a challenge to find in university research, where subject expertise is promoted. There is a connection to research and education, but it has been perceived as going mainly one way.

## PROGRAMME SUMMARY

The programmes studied are classified in terms of coaching versus individually driven learning, as well as how clearly defined the goal is. Important issues such as learning from others via networking, when to use an expert coach versus a coach who is only expert in coaching (as opposed to expertise in the topic in question), and how collaboration connect the companies with academia is shown in Table 2.

Programme	Network learning	Coach	Academia /research involvement
Produktions-Lyftet	No	Expert coach	None or low
MITC-Light	Yes	Coach	Invited experts + students
Tillväxtmotorn	Yes	Coach/facilitator	Invited experts. Students outside programme

Table 2: The three programmes use of networking, coaching and academy involvement.

Action learning is used to different extent in the programmes. Problem identification and solution commitment play a key role in learning and developmental gains. PL use this method for improvement throughout the programme and encourages co-workers to take part in the development. MITC Light undertakes action learning in the group and often in a real-world setting, on the shop floor. In TM, the managers are encouraged to open up with their current challenges and problems, which can be both emotional and personally challenging. The group offer support and ideas for resolution, after which the individual managers commits to test the ideas. Generally, the more the managers open up the more he/she receives back in terms of feedback, knowledge, support and contacts. The coach in PL and MITC-Light is skilled in the areas of work and willingly shares that knowledge. In TM, the coach has guidelines not to present own knowledge or ideas on issues discussed, to not act authoritatively and to allow for the managers'

own knowledge to emerge and be shared. This has to do with the group dynamics and the audience. TM targets mainly managers or people with similar authority and the coach doesn't challenge the group but rather lets the group members challenge each other.

## ANALYSIS AND DISCUSSION

### DEVELOPMENT PROCESS IN THE PROGRAMMES

PL covers all of Kotter's 8 steps and is an advanced form of support and suitable after leadership development, such as TM. In TM, leaders are coached to embrace e.g. step 1-5 in a coaching leadership manner. MITC Light covers Kotter's step 4-7, while step 1-3 are seen as prerequisites to the program. MITC Light may gain from connecting stronger with development theory and reduce personal dependency. Coaching theories are often based on coaching individuals rather than groups. It may be difficult to adhere to a strict facilitator/sensei role or a strict mentor/teacher role, and in practice the theoretical approach could gain from developing models for how to adapt coaching to maturity level of groups. Peer pressure may play a significant role in learning and development in TM and MITC Light. Learning in networks is used where companies receive continuous feedback and questions on how the company is meeting the developmental goals. This provides a strong motivation for change. However, it also requires a lot of trust within the group and some data and knowledge may not be shared among the companies. The coach needs to facilitate trust within the group, a challenge even for experienced coaches. In PL group learning takes place within a company and peer pressure is mainly acting internally by committing to the development plan. This requires the coach to be a knowledge bridge to other companies, implying a more authoritative (teaching) role than in the other programmes. All programmes take a long-term perspective, which is crucial to supporting innovation in SMEs. The programmes share the challenge of finding suitable coaches and all are to different extent personal dependent.

### PROGRAMME COLLABORATION WITH UNIVERSITY

Practical challenges of running PL and TM have been establishing a connection to the University and create mutual learning. In TM the companies have been encouraged to work with thesis students and attend networking events, but not as an integral part of the programme. MITC-Light, on the other hand, has a broad university connection through students who are participants in the projects. A stronger university connection, for PL in particular, to student projects and research could mean a significant improvement in innovation capability for the companies. A challenge specific to TM is that the managers attending often struggle to transfer the learning and ideas for innovation to the rest of the company, depending on the specific idea and the manager's position within the company. Continuing interaction with the university has been helpful in this regard. Universities generally find

collaboration with SMEs challenging. In order to not end up in a one-way transfer of knowledge, a developed collaboration centre, founded firmly both in university and industry can support translational collaboration. Larger businesses in comparison have more structured ways of collaborating with formal contractual relationships and projects are often driven by alumni or affiliated researchers. By organising this collaboration into programmes for SME development give a connection path to the university, and over time the idea of collaborating e.g. with students, appear more appealing.

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## APPENDIX 1: MITC AND THE PROGRAMMES

### MÄLARDALEN INDUSTRIAL TECHNOLOGY CENTRE (MITC)

The studied organisation, MITC supports large and small companies, and academy by transferring academic knowledge of manufacturing, product development, sustainability and innovation management to industry. Using students and researchers and education MITC supports industrial development by matching industrial and academic needs in a “win-win relation” (MITC 2017). Some cluster programme activities are specific, such as the TransMission programme, is a supporting electrification technology change management in the vehicle industry, while other activities like the SME support programmes are more general. MITC also arranges seminars and workshops with academia and industry as well as sets up research projects and research centres. This case study focuses on MITCs regular programmes supporting innovation in SMEs.

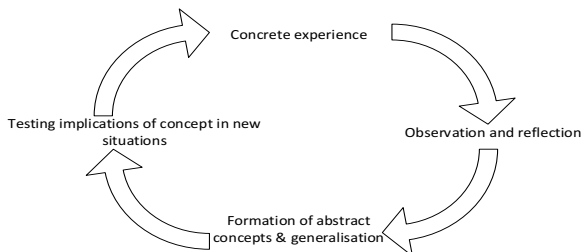


Fig a. Experiential learning process redrawn from (Kolb 1984)

The programmes for development of SMEs are used in an aim to achieve the goals to support an increased innovation technology innovation rate in the industrial companies in the region. The main ways to achieve these are by development (Kotter) and learning (Kolb)(fig a). The way to connect the top-down development with bottom-up learning follows lean theories of Hoshin Kanri (Rother).

Three main programmes are used by MITC in order to support production innovation and change management ability in industrial companies. The programmes studied

	<b>Produktions-Lyftet</b>	<b>MITC-Light</b>	<b>Tillväxt-motorn</b>
Total time	18 m	12 m	10 m
# coaching	30-32	5-6	13
Time/coaching	8h	4-5h	3h
Companies / coaching	1	4-6	10-12
Participants/company	15-250	2-4	1
Network-coaching	No	Yes	Yes

Table A: The three programmes use of networking, coaching and academy involvement.

can be classified in terms of what type of coaching or individually driven learning and definition of goals. The

programme attributes, like number of participants, time of coaching and learning from others via networking, etc. is shown in Table A.

### PRODUKTIONSLYFTET

Produktionlyftet (PL) - use a proven and well documented methodology for coaching lean management to SMEs and larger companies (Produktionlyftet 2017). It has a structured process, a handbook, and certification of coaches. The methodology is based on all eight steps of Kotters change model and Kolbs learning model (fig x) is used to train a broad group of leaders and employees in coaching sessions for 18 months. The coaches guide each company individually for one full day every 2 weeks starting with a mentoring (REF) approach in early stages and moving to coaching KATA (Rother 2010) in later stages of the process.

### MITC-LIGHT

MITC Light - lacks a documented methodology (so far) but, is generally following Kotters step 4-7, and has been designed out of experiences from PL and production development research at MDH identifying the need for practicing production development while managing daily operations. Kotters step 1-3, including forming a vision and strategy can be seen as prerequisites for starting the program. MITC-Light is performed in a network of 4-6 SMEs with 2-4 persons from each company. The coach invites topical experts to the bimonthly half day sessions and connect company projects to students, but also contribute actively with own knowledge. The method relies on being led by a coach with production, lean methodology and organisational development expertise.

### TILLVÄXTMOTORN

Tillväxtmotorn (TM) – relies on a methodology for developing company leaders that can be traced to Kolbs learning cycle. It is not in particular connected to Kotter. The learning process is based on action learning theory. The programme does not require an identified goal for the manager apart from a general commitment to development of him/her self and the others in the network. The programme goes through 13 learning meetings with invited topic experts The coach act facilitator for the 13 network learning meetings. The learning and development is wholly self-driven

### ADDITIONAL REFERENCES

MITC (2017) [WWW.MITC.NU](http://WWW.MITC.NU)

Produktionlyftet (2017) [www.produktionlyftet.se/](http://www.produktionlyftet.se/)