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## Implementation of Lean in SME, experiences from a Swedish national program

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### Abstract

*This paper presents experiences from implementation of Lean in small and medium sized enterprises (SME). In Sweden, a national program, "The Production Leap", to support and strengthen the production capabilities of small and medium-sized enterprises by implementing Lean production has been proceeding since 2007. The program consists of three main parts: regional seminars for inspiration, courses for education in Lean, and coaching of individual companies. Until June 2012 more than 1000 employees have participated in courses and more than 130 companies in coaching. Research institutes, regional industrial development associations, universities, unions, employers' organisations and companies have co-operated in the development and operation of the program. The program has been evaluated as very successful. The aim of this paper is to describe the program and how the methodology to develop companies has evolved. Experiences from the authors' participation in the program from the start as well as evaluations of the program and of participating companies are used in the analysis. Emphasis is on factors leading to successful development and transformation of companies. Based on questions such as: what activities, who to involve, what is progress, what in the context is important, what is generic, how to reach sustainable transformation? Examples from companies participating in the program will be presented and discussed.*

**Key words:** Lean, change methodology, implementation, transformation, SME

### 1. INTRODUCTION

The Production Leap (Produktionslyftet in Swedish) is a national program for enhancing the performance of medium sized manufacturing enterprises in Sweden. The program vision is to contribute to the companies' progress towards effective production and a strong, sustainable capacity for change, with Lean as the starting point. After the Production Leap's involvement, the companies shall have the strength and commitment to drive the Lean process further on their own, based on the principle "help-to-self-help". The program was initiated in 2007 and the first program period lasted until 2010 and comprised of 60 enterprises. The program was evaluated from different parties and regarded as successful and a second program period (3 years) was launched in 2010. This program period is now finished (2010-2012, with approximately 80 companies) and a third program period is currently ongoing. The target group for the program is companies with 30-250 employees (in special cases up to 500), operating in the traditional manufacturing industry. The aim of this paper is to describe the program and how it has evolved, focusing on the methodology used to develop companies.

### 2. METHOD

This case study paper is co-authored by four individuals. All authors have been involved in the program since the start in 2007. The authors have different roles such as educators, coaches and workshop facilitators. The authors participation ensures high access to the empirical material including own experiences and first-hand reflections. The description in this paper is based on the authors own experiences, program material, internal and external evaluations of the program.

### 3. THE PROGRAM ORGANIZATION AND MAJOR ACTIVITIES

One of the major initiatives to the program emanated from the study Made in Sweden- Production for competitiveness [1] - IVA-report. In the IVA-report it was concluded that there is a great productivity potential especially in Swedish small and medium sized manufacturing companies, that has to be taken advantage of if the companies where to stay competitive in the global market place. The larger manufacturing companies often had internal programs

to develop their abilities, but the small and medium sized companies had no resources or support structure for this. Industry Forum in United Kingdom (a national program funded by Society of Motor Manufacturers and Traders (SMMT)) [2] and [3] was initially a source of inspiration and served as a role model for formalizing the Swedish program Production Leap (Produktionslyftet). A national gathering with supporting organizations such as unions, Public funders such as The Knowledge foundation (KK stiftelsen), the Swedish Governmental Agency for Innovation Systems (VINNOVA), the Swedish Agency for Economic and Regional Growth (Tillväxtverket) and regional industrial development associations, universities and companies came together and proposed a national support program for sustainable Lean development in SME:s. The objective of The Production Leap is to stimulate enterprises to evolve as learning organizations with inspiration from the Toyota Production System concept, under the concept of Lean Production. From the start, the program was expected to build upon standardized workshops and consultancy services, with a non-significant budget for development.

The perception from Industry Forum was that it was all about introducing a battery of “standard solutions” to individual companies. However, it soon became apparent for the actors within the program that the approach had to be improved, and it has continued to evolve ever since.

From the start in 2007, the approach to managing change in this program has changed in a few ways and there has been a collective maturity process for the educators, coaches and consultants involved in the program. Together, these changes have moved the program approach from a focus on tools to a focus on understanding each company’s individual needs and challenges and forming a process together.

The program has from the start been managed and organised (national coordination) by the industrial research institute Swerea IVF AB and Chalmers University of Technology. A program board consisting of supporting organisations and companies was formed to manage the program and support the program director. Swerea IVF is contracting part to the public funders and companies and co-ordinates the company coaching, while Chalmers co-ordinates the education at the different seats of learning.

In the first program period (2007-2010) three additional partners The Royal Institute of Technology, Luleå University of Technology and Jönköping University participated. In the second program period (2010-2012) these organisations still remain active and four more universities have joined the program, Mälardalen University, Mid Sweden University, University of Gävle and Blekinge Institute of Technology. The program now has presence in all eight NUTS regions of Sweden (Nomenclature of Territorial Units for Statistics) which was an important demand from the public funders of the program. The financiers wanted the program to establish a national structure of industry, universities, colleges and research institutes for competence

development within the field of production. Other important partners in the program are regional and local company networks and Industrial Development Centres (IUC).

The management team for the program has a meeting every second week just after a pulse meeting where the approximately 45 coaches and educators address specific problems in individual companies and share learning throughout the program. The pulse enables the management team to monitor program progress and priorities from different development activities.

The programme consists of 3 major areas of activity;

- **Spreading inspiration and knowledge** – motivating companies to learn more about Lean and to inspire companies to join the program. Examples of activities are seminars, newsletters, website, articles and press releases.
- **Education in Lean production** – an open course in Lean production has been developed for professionals in industry. Participants come from different branches of industry and sizes of companies. The Production Leap subsidizes two places for change managers in every company that join the program. Commonly, approximately 30 percentages of the course members are employees from companies joining the program. It is important that those who attend the course have the position, authority and resources that will make it possible for them to facilitate the changes based on their knowledge. They should be part of, or at least strongly tied to, the company’s management team.
- **Coaching** - finally two coaches (consultants) from the programme are assigned to the company and aids in their transformation during 18 months. The public funders have set out some formal conditions regarding, among others, size and business sector for company participation that has to be met. Furthermore a visit to each company that applies is done in order to find out the precondition for success and that the company is prepared to reappraise its operations and to work hard. When a company is accepted (formal acceptance is decided in the program board), the company is allocated a pair of consultants, or “coaches” as it is called within the program following a coaching methodology. To each company the consultants’ time budget is roughly 350 hours, where most of this time is spent on the actual company site.

#### 4. COACHING METHODOLOGY

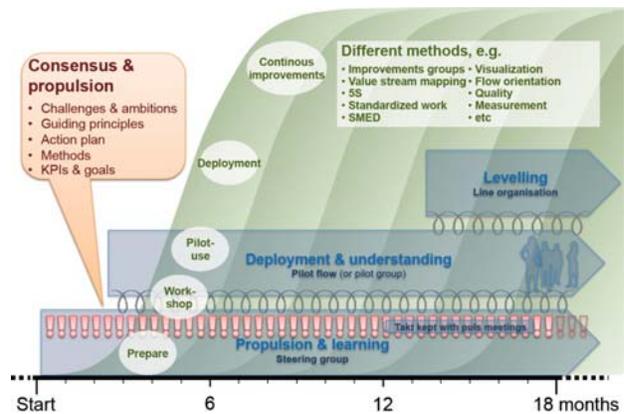
The Production Leap applies a standardized and well-tested process that lasts for eighteen months, called “The Wave” (see figure 1). During the first phase, phase 1, the management team and steering group establish consensus and propulsion. Workshops are held with the

following theme: general introduction to Lean (including an assessment of present state and vision for future state), management of change, challenges & ambitions, guiding principles and pulse board and pulse meetings. Each workshop comprises a full day followed by internal company work in between workshops. These workshops demand time reserved, by the company, for internal reflections and discussions. The phase is finalized with establishing of KPIs, targets and an action plan for the Lean transformation.

The main idea of phase 1 is to create a common sense on basic values, for the company as well as regarding the participation in the program. The workshops are attended by a so called Lean Steering Group, which is similar to a “project board”. The group consists of the executive team expanded by key stakeholders, for example the labour union. Some companies choose to include even more people, which results in a diversity of sizes of such steering groups. If the group becomes too large it usually transforms into a reference committee and an operative work group. One or two Lean change agents are assigned by the company. The composition of the Lean Steering Group is crucial for the future success in the Lean implementation. The group should include represent all functions forming the value flow in the company. Also, both management and union must have one view in accordance. The importance in positive attitudes for change should not be underestimated.

Finally, in phase 1, it is agreed on a pilot area for deployment and understanding. In the pilot area the company Lean change agents and part of the management team undergo training in the different working methods and adjustments are made to the specific needs of the company. This pilot area is in focus in the second phase where visions and principles are more developed and operationalized in implementation of methods and tools in the pilot area and spread throughout the company. The pilot area must be selected in a way, making it likely that the decided goals can be attained. The success of the pilot area is important for the further Lean implementation through the company. It is the responsibility of the Lean Steering Group to monitor the pilot area work and communicate it's achievements to the rest of the company. An important part of the pilot area work is organizational learning through continuous reflexions on achievements and adversities. The coaches from the program guide the process and the goal is that the company develops own capability to drive the change process and continue to do so after the 18 months coaching period.

A Head Coach and an Assistant Coach, from the programme, are appointed, in consultation with the company. One or both of these carries out workshops, gives instructions and generally provides support every other week during the first year, in order to introduce, stimulate and urge on the introduction of agreed principles, ways of working and methods. On a number of occasions, other experts also participate for various specific activities.



**Figure 1.** The Production Leap applies a standardized and well-tested process that lasts for eighteen months, called “The Wave”

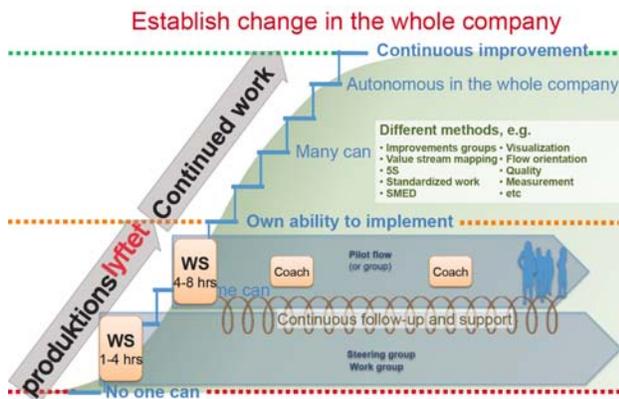
During the first quarter, the following are developed and established:

- Guiding principles for the company's future production system. Most companies work out and document their own production system in form of a publication. Here, basic values, vision and business concept are discussed and how they resulted in appointed principles. Also how methods and tools are based on the principles is explained.
- A common understanding of the problems that will be in focus during the company's change process. The Lean Steering Group use different assessment and diagnose tools and value flow analysis are accomplished.
- The way of working for the company's steering group. The organization of the companies lean implementation work is decided upon, including what resources, type of leadership, Lean change agent appointment. Responsibilities for managers (focusing control, decision and active involvement in Lean training) and Lean change agent appointment (focusing coaching and support) are decided.
- An action plan for the continued work and Lean transformation. A pilot area is decided. The pilot area can be a part of a value flow or the whole value flow in the company. It can be a value flow in production or an administrative flow or a combination.
- Measureable figures and goals for monitoring the process. Based on challenges and problems identified are common measures decided. These measures must make it possible to not just assess performance for the company as a whole, but also for the pilot area.

The work during phase 1 must not be underestimated. It is vital for the success of the continued work to establish a common understanding of the principles that will guide the development. A Management or Steering Group is established, which acts as a purchaser, pacemaker and active support in the change process. Local union representation should be included in the group. The group's members must put aside time for compulsory follow up at least every other week, but

preferable every week, and for significant work efforts in the meantime.

A broader understanding for Lean and the guiding principles are established in the company through a Lean game. During the continued work, following on from the initial phase, new ways of working are developed, introduced and stabilized in the pilot group (see figure 2). The choice and design of these are partly based on the guiding principles, partly on the challenges and problems to be found in the company and specifically in the pilot group, as they are described during phase 1. Naturally, the more concrete the challenges and problems are, the better the change process will proceed. New ways of working can mean applying methods such as improvement groups, visualization, flow orientation, SMED (shorter set-up times), 5S (systematic workplace organization), standardized work etc.



**Figure 2.** The main purpose of the Production Leap is to build up the company's own ability to continuously improve and learn

The work in the pilot area follows the action plan developed by the steering group during phase 1. Introduction of new working methods and tools are established via a standardized model. The Production Leap's coaches and experts make day visits, with workshops and instruction etc., every other week during the first ten to twelve months. 35-44 visit days are reserved for each company, depending on the size of the company. The first workshop is held with the steering group to introduce and adjust the new working method or tool to the individual company needs and prerequisites.

In the second workshop the company Lean change agents and part of the management team undergo training in the pilot area. The coaches from the program guide the process and the goal is that the company develops own capability to implement further in other areas of the company. After the establishment in the pilot groups, the company will be able to roll out the implementation to new groups with support from the Production Leap. After that, as the company's own forces acquire the knowledge and take over as the pacemaker, the interval is lengthened to four weeks. The overall goal is that the company develops ability to drive the change process and continue to do so after the 18 months coaching period in the spirit of continuous improvement.

## 5. EVALUATIONS OF THE PROGRAM

The program is monitored and evaluated internally. At a summing up meeting in the end of the 18 months coaching period the participating companies give their own view on results achieved. Results from two companies will be presented in this chapter. After the first program period two major external evaluations of the program was published. The external evaluations was initiated by the public funders and made by a consultancy firm and researchers. A summary of the external evaluations is presented at the end of this chapter.

## 6. EXAMPLE OF INTERNAL EVALUATIONS - RESULTS FROM TWO COMPANIES

To give an insight in what The Production Leap has meant for companies participating in the coaching program, we describe experiences from two companies, Emballator Lagan Plast and Furhoffs Rostfria. The descriptions are from two different perspectives, complementing each other.

Emballator Lagan Plast in Ljungby develops, produces and markets plastic packaging for food, pharmaceuticals and chemical products. They began their Lean trajectory in 2005, joined the Production Leap in 2008 and won the Swedish Lean Prize in 2011. To illustrate the effects of the Lean process we talked to Managing Director, Christian Silvasti; Factory Manager, Håkan Larsson; Continuous Improvement Coordinator, Marcus Wahlgren and Quality and Environment Manager, Anette Larsson. According to their experience, Lean has resulted in concrete effects for customers, employees, owners and society. The following statements are illustrative examples from our conversation:

- Customer contacts are not only more frequent than before, they are also considerably more effective and rewarding for all parties. The company runs an operator exchange program, where operators from the company and its customers link up and exchange experience as well as demonstrate how the respective manufacturing processes operate.
- Customer satisfaction has risen up from 7.7 to 7.85 on a nine-point scale.
- Between 2004 and 2011, delivery precision has climbed from 94.0% to 98.7%, but the real gains are in the customers' confidence in a functioning and more efficient way of working.
- The winning the Swedish Lean Prize, which they received in October 2010, has given the employees even greater pride in their work.
- Security and commitment can also be seen in the development in well-being at work during the period 2004-2011, attendance rate increased from 94.2% to 97.5% when related to short-term absence, and from 90.6% to 98.1% when related to long-term absence.
- From being close down candidates 7-8 years ago, the company group are now transferring production from a sister company in Denmark

to Emballator Lagan Plast in Sweden, to the existing premises.

- The Lean implementation has brought radically more efficient floor space utilization.
- Since 2004, the company has more than doubled turnover from 98 MSEK to 205 SEK.

FurhoffsRostfria in Skövde is a family owned metalworking company with roots stretching back to the end of the 19th century. The company main business is processing stainless steel sheets with operations in two areas: building products (primarily heating, ventilation and sanitation) and customer specific products, such as for example radar antennae. Professional skills and pride of work is emphasized as a necessity and strategic strength by the company. The production competitiveness is characterised by combining modern handcraft and efficient production e.g. laser cutting and CAD competence. We discussed the companies Production Leap experiences with Björn Furhoff, CEO and owner and with Jan Adolfsson, Production Manager. The following statements are illustrative examples from our conversation:

- Coming into contact with the Production Leap, it was felt as if it was just cut out for their company.
- It was difficult to get started, but they knew that it was a long take-off run. Also knowing that there was a lot of 'low hanging fruit' areas where improvements would quickly have an effect. Thanks to this, good examples were achieved through the various tools that are included in the Production Leap.
- Critical was to get everyone supporting the Lean trajectory and new ways of thinking. However, coming across territorial jealousy and other problems. Through patience and low level of prestige from managers, finally a uniform understanding and standards evolved.
- The company has two strong trade unions here with no opposition. Both unions were included from the start, from the fundamental values and onwards. They are a good example, and like the management they are aiming to develop jobs and a long-term approach.
- Today, the company has concluded its time as a Production Leap company and it is now driving the Lean process forwards under its own management.
- The following quotes are characteristic for their opinion: "Daring to take time from production and talk, for instance about good order and clarity, 5S and planning is so rewarding – we earn the time back many times over".
- Ambitious Change Managers who can arouse the enthusiasm that keeps the activities alive are important. At the same time, it is of the utmost importance that the management is passionate about the Lean process and sets a good example for changes.

- The Production Leap has meant that the company has obtained good tools to work with; there is more structure and clarity now.

## 7. EXTERNAL EVALUATIONS

The external evaluations was initiated by the public funders and made by a consultancy firm (Ramböll) and researchers (action research by Helix), both evaluations were made after the first program period 2007-2010. The evaluations are mainly based on internal program documentation, extensive interviews with management, Lean coordinators and employees from the first 25 participating companies. Interviews have also been made with coaches, organizers of seminars and surveys have been done with participants in educational activities within the program.

Some of the results from the external evaluations are:

- Seminars for spreading inspiration and knowledge about Lean have attracted more than 5000 participants at 80 different locations until December 2009. According to 85% of the organizers the seminars has led to interest to join the program and 46% of the participating companies have taken steps towards a Lean strategy according to the organizers.
- During the period 2007-2009 25 courses in Lean production was delivered by the program with more than a total of 340 participants from the program target group. Course evaluations and interviews show that 90% of the participants have had use of the knowledge in their daily work and will recommend the course to colleagues.
- A crucial point for success is involvement of the management team in the change process. It is hard to judge to what extent this is achieved in the program but some indications are that in more than 50% of the participating companies the vice president or site-manager are active in the steering committee.
- Almost all companies have developed and documented guiding principles for their production system during the coaching period.
- There is evidence from some of the companies on effects in measures as reduction in capital employed, improved value-stream and reduction in lead-time, improved set-up time and lower inventory levels.
- The most important factor of success according to the interviewed vice-presidents is a change in culture, with more initiatives to change from employees and a will to develop knowledge to continuously improve. This is also the overall goal of the program but according to the evaluations it is much too soon to judge the participating companies abilities to do so in the long run.

## 8. DISCUSSION AND CONCLUSION

From the experiences during five years, it can be seen that there has been a considerable progress in design of "The Production Leap" program. All the three major areas of activity - (1) spreading inspiration and knowledge, (2) education in Lean production, and (3) coaching - has changed a lot. It does and must take time to develop a program like this. The coaching has involved the development of a whole methodology starting from more or less nothing. A real challenge has been the design of the organisation and way of working to be able to communicate and learn between the different companies involved in coaching, which is important to develop and improve the different methodologies and processes. The engaged coaches represent different backgrounds and experiences, which has been an advantage in the development, but also a challenge to be able to school skilled coaches, following the agreed way of working, foremost following the "the Wave" process.

Coming into the second program period, the wish for a durable dissemination of the Leap program to the whole country, involved universities in all the eight NUTS regions of Sweden. The involvement concerns all three major areas of activities of the Leap program. In all the areas the different universities proved to have varying competences, ambitions and resources, probably related to their maturity and stability differences. The way of working and progress differs between the regions. Appropriate solutions gradually evolved based on the individual preconditions. Universities, industrial development centres and consultancies had different roles as well as the central coordination organisation. During the three year program period a gradual development and autonomy of the regions have evolved. Still there is need for further development regarding the companies' possibility to have access to expert knowledge in demanded areas. The roles of the coaches, identifying needs, are important. Expert knowledge can be available through experts in industry and universities but also through advanced courses in specific areas e.g. Lean logistics, Lean automation, Lean leadership, Lean product development and Lean improvement work.

Characteristic for the companies participating in the coaching is the long-term perspective on the development of the company, resulting in that the companies obtain their own ability to change and improve their company. The trajectory of one company is not the same as for any other. It is crucial that the company itself and its staff accomplish their own process of change. This conception reflects a central understanding of Lean that the Production Leap represents. The development process of a company in itself represents Lean, meaning that Lean cannot be implemented by copying another company's experience and its current production system. This on its part depends on a specific context and development process. Naturally large demands are put on the

coaches, to guide, educate and support, not copy and impute solutions. The standardized process "The Wave" has proved to give an appropriate support in designing the company specific production system.

The future of the Production Leap program is still unclear, now discussions for a fourth program period proceed. A long term conditions for operating the Production Leap program is desirable. Realising the whole emergence and development of the Production Leap program, there is now a strong methodology to develop companies, facilitating the participation of future companies in the program. There are many good examples of successful companies that have participated in the program.

It takes time to develop a program methodology, develop courses, train coaches, build a Lean culture or develop companies, enlarge a program, improve and reach a continuous improvement stage. Basic, in the development of a company, is that there is a vision and long sighted operations strategy to follow. Hopefully this paper can contribute to inspire and guide development and establishment of other national programs for implementation of Lean in SME. Involvement and active support from all stakeholders, i.e. companies, unions, society, universities and industry institutes, is a necessary prerequisite for success.

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# Implementacija Lean u MSP, iskustva švedskog nacionalnog programa

Lars Medbo, Dan Carlsson

Primljen (11.09.2012.); Recenziran (20.02.2013.); Prihvaćen (28.06. 2013.)

## Rezime

*Ovaj rad predstavlja iskustva implementacije Lean u malim i srednjim preduzećima (MSP). U Švedskoj, od 2007. godine sprovodi se nacionalni program „Proizvodni skok“ koji podržava i ojačava proizvodne sposobnosti malih i srednjih preduzeća implementacijom Lean proizvodnje. Program se sastoji iz tri glavna dela: regionalni seminari za inspiraciju, kursevi za obuku u Lean, i obuka individualnih kompanija. Do juna 2012. godine, više od 1000 zaposlenih je učestvovalo u kursevima i više od 130 kompanija na obukama. Istraživački instituti, regionalna društva za industrijski razvoj, univerziteti, sindikati, organizacije zaposlenih i kompanije sarađivale su u razvoju i radu programa. Program je ocenjen kao veoma uspešan. Cilj ovog rada jeste da opiše program i način na koji je metodologija za razvoj kompanija evoluirala. Iskustva autora koji su učestvovali u programu od početka, kao i evaluacije programa i kompanija koje su učestvovale koriste se u analizi. Akcenat je na faktorima koji vode do uspešnog razvoja i transformacije kompanija. Na osnovu pitanja poput: koje aktivnosti, koga uključiti, šta je napredak, šta u kontekstu je značajno, šta je generičko, kako dostići održivu transformaciju, predstavljeni su i objašnjeni primeri iz kompanija koje su učestvovale u programu.*

**Ključne reči:** *Lean, metodologija promene, implementacija, transformacija, MSP*