BUSINESS SUPPORT AGENCIES INTRODUCING LEAN PRODUCTION IN SMES – DOES IT MAKE ANY DIFFERENCE?

Anna-Lena Allert[1], Kristina Säfsten[2]

[1]*University of Skövde, School of Engineering Science, Skövde, Sweden*
[2]*School of Engineering, Jönköping University, Jönköping, Sweden*

anna-lena.allert@his.se

Many SMEs are implementing lean production in collaboration with a business support agency in order to improve their competitiveness. This research investigated whether improvement initiatives had the intended effect in some companies. A questionnaire was answered by employees in 26 SMEs. The result indicated experienced effect concerning leadership, communication and employee commitment, areas considered important for success in improvement initiatives, and also progress in areas that characterise development towards lean. The result also indicated differences in experienced effect between managerial and non-managerial functions and between companies.

Keywords: improvement initiative, lean, SME, business support agency, effect

1. INTRODUCTION

Simultaneously increased globalization and thereby greater international competition means that companies are facing great challenges today. In order to remain competitive manufacturing companies has to improve their operations and hence improvement initiatives are common, e g implementing lean production, one of the most influential new paradigms in the industry (Hines et al., 2004). Small and Medium Enterprises (SME) role are important for prosperity of the EU, since they are an essential part of society, contributing to national economy and welfare. Therefore publicly funded support systems aiming at strengthen the competitiveness in SMEs are common in Europe (European Commission, 2012). Hence, many SMEs are implementing lean in collaboration with a business support agency. But despite numerous research studies of this kind of interventions, there is a lack of knowledge whether the effects are the expected and there is little evidence of the positive effect of firm growth and development (Bill, Johannisson, & Olaison, 2009). Critical for success in improvement initiatives in general, as well as when implementing lean, is leadership and management involvement and one important leadership task is communication and information (Kaufmann & Kaufmann, 2010; Näslund 2013). Researchers and practitioners do not agree about the content of the concept lean production (Brännmark et al., 2012). The concept is defined only in operational terms, which can be used to investigate a development towards lean production (Pettersen, 2009). Typically respondents in studies of improvement initiatives are individuals from some kind of managerial functions. Improvement initiatives have been studied by interviewing the management in participating companies (Done et al., 2011; Herron & Hicks, 2008) and in studies measuring degree of leaness used questionnaires answered by managing directors (Soriano-Meier & Forrester, 2002).

Based on the situation described, it is of interest to investigate the effects in SMEs implementing lean in collaboration with a business support agency. The main question raised is whether improvement initiatives had the intended effect in companies that participated in improvement projects in collaboration with a business support agency. The outcome of interest was the short-term outcome, which is a prerequisite for the desired ultimate long-term outcome; strengthened competitiveness of the company. The research presented in this paper investigates the effect of an improvement initiative that those who were affected by the intervention experienced in their daily work and in their work situation, i.e. all members of the staff in participating companies including management. Focus is on two perspectives: Leadership, communication and employee commitment and

Development towards lean production. Additionally, possible differences in experienced effect between managerial and non-managerial functions are investigated.

2. THEORETICAL FRAMEWORKS

The global competition in the manufacturing industry is increasing and the industry has to improve their operations and develop their employees in order to remain competitive. Improvement initiatives aiming to enhance profitability and long-term competitiveness are frequent, and one of the most influential new paradigms in the industry is lean production (Hines et al., 2004). There is no consensus on a definition of lean (Pettersen, 2009) but many authors have highlighted the work of identifying and eliminating waste as the core of lean (Hines et al., 2004; Liker, 2004; Womack & Jones, 1996). Successful sustainable lean should be regarded as a system that must permeate the entire organization's culture, it is not just about implementing tools and methods (Bhasin & Burcher, 2006; Jørgensen et al., 2007; Liker, 2004). Nevertheless, many researchers argues that there seems to be very much focus on training people in tools and techniques when companies implement lean, and to little focus on developing an understanding of the human factor to build the right company culture (Dahlgaard & Dahlgaard-Park, 2006; Liker, 2004). Researchers and practitioners do not agree about the content or nature of the concept and consequently is the effect of an implementation of lean difficult to assess. When investigating the effect of lean, there are other factors, non-lean factors, which need to be considered, e.g. leadership style and implementation design (Brännmark et al., 2012).

Lean production has become popular among Small and Medium Enterprises (SMEs) since it is considered to be a cost reduction mechanism, and cost factors are crucial for most organizations. But because of lack of financial resources and leadership deficiencies in SMEs, implementing lean is believed to face major problems (Achanga et al., 2006). However, most of the lean principles are considered to be applicable also to the SMEs, even though they were developed through research into large companies (Karlsson & Åhlström, 1997). A vast majority of companies in European Union (EU) are SME and they are essential part of society, contributing to national economy and welfare and hence they are important for the future prosperity of the EU (European Commission, 2012). Accordingly, SMEs get lot of attraction from EU and publicly funded business support systems aiming at strengthen the competitiveness in SMEs are common, both on national and regional level (Bill et al., 2009). One example is agencies supporting improvement initiatives aiming to enhance profitability and long-term competitiveness, e.g. implementation of lean production. Despite numerous research studies, there is little evidence that support projects actually facilitate e.g. firm growth and development. Many improvement initiatives take place with external support in SMEs, but there is a lack of knowledge about what happens and whether it is in accordance with the intended objectives of the intervention (Bill et al., 2009). Most researchers claim that leadership and management involvement are essential for success in improvement initiatives such as lean implementation. Management commitment is important for a variety of reasons, they influence to a great deal company culture, controls the required resources and set the organizational goals, areas that are considered critical for successful improvement work. (Achanga et al., 2006; Näslund 2013; Zhou, 2012). Communication and information are crucial to create understanding, employee commitment and participation. Communication and information is thereby also an important leadership task and good communication is often characterizing successful businesses (Kaufmann & Kaufmann, 2010). Furthermore, a leadership that creates dedicated and motivated staff is a key factor for competitive production (Kungliga Ingenjörsvetenskapsakademien, 2005). Several methods for measuring development and assessing changes towards lean production are described in the scientific literature (Bayou & De Korvin, 2008; Doolen & Hacker, 2005; Karlsson & Åhlström, 1996; Sánchez & Pérez, 2001; Singh et al., 2010; Wan & Chen, 2008). They vary in nature and measure different things in different ways, e. g. self-assessment using a questionnaire answered by the management or using mathematical techniques for measuring leanness. But despite the difference between the methods and the uncertainty of what exactly defines lean there are many indicators that most of the authors agree indicate changes towards lean (Pettersen, 2009). Following Pettersen (2009) some of these indicators have been used in this research to investigate whether a development towards lean production has taken place in the companies; 5S[1] (housekeeping), multi-functional teams, job-rotation, continuous improvement and standardized work.

3. RESEARCH METHODOLOGY

Survey research can be conducted to gain knowledge in a particular area of interest, and descriptive survey research is specifically interested in describing and understanding the phenomenon, in other words survey of the status by gathering facts. A survey most often involves the collection of information from individuals and this

[1] 5S is a lean workplace organization methodology. Translated from original Japanese the 5Ss are: Sort, Set in Order, Systematic Clean Standardize, Sustain.

collection can be done by questionnaires or personal interviews (Forza, 2009; Tanner, 2002). In this research a survey was conducted in SMEs that had been participating in improvement initiatives in collaboration with the business support agency Industrial Development Center West Sweden AB (IDC). To collect data a questionnaire was constructed by using the logic model technique. A logic model (Fig. **1**) represent a program theory[2] as a chain of events and is a way to describe and understand the expected causal processes mechanisms involved to produce the expected outcome of the project or program (Funnell & Rogers, 2011). The technique has become increasingly useful as a method to evaluate and assess interventions (Yin, 2013).

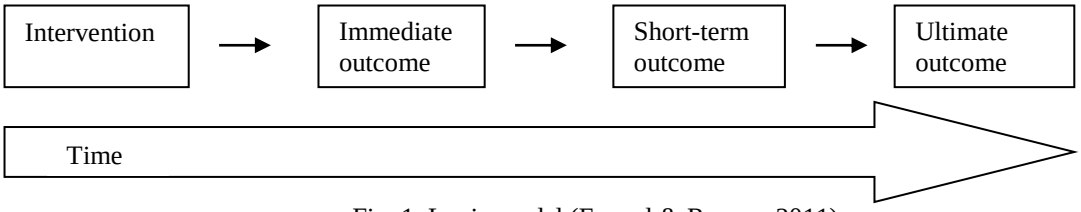

Fig. 1. Logic model (Funnel & Rogers, 2011).

Considering the time aspect and the fact that the interventions in this study were either ongoing or just recently finalized, the primary interest for this research was to investigate the short term outcome. The short term outcome is both a prerequisite for the achievement of the ultimate outcome as well as an indicator for progress towards the project objectives; enhanced competitiveness in the companies (Funnell & Rogers, 2011). This research investigated the short-term outcome by asking those who were affected by the intervention (members of the staff in participating companies) of the effects they experienced in their daily work and in their work situation, during or after the intervention. Based on the logic model technique, questions were formulated on the basis of the descriptions of the project and of what was expected to happen, i.e. the intended effects, in companies when implementing the project intervention. In total, 75 closed ended questions was constructed and grouped in four areas; the employee's own situation in the workplace, management and control of operations, development of the company as a whole and effects of the improvement work in some areas. The questions were answered by agreeing or disagreeing, using a 4 grade Likert scale plus the alternative answer "Do not know". Likert scale is a technique commonly used when the researcher want to obtain people´s attitude or perception on certain issues. From a set of statements the respondents are asked to choose the one that most closely describes their attitude. (Forza, 2009; Frankfort-Nachmias & Nachmias, 2008).
57 manufacturing companies that had been, or were currently, working with improvement initiatives in collaboration with IDC were contacted. 41 companies participated in the survey (N= 1057, response rate 33%). The sample in the research presented in this paper is 26 companies with more than 40 % response rate, (N=779, response rate 71 %) (Table 1). Companies with a response rate less than 40% were excluded. The companies are mainly wood, engineering, and furniture industry but also a car dismantling company, a building company and a plastic producer. All companies have between 5 and 230 employees.

Table 1. Facts about companies and respondents.

Number of participating companies	26	Response rate	71%
Number of employees in companies	1092	Proportion managerial respondents	19%
Number of respondents	779	Proportion respondents participated in education program	77%

3.1. Analysis of the result

The questions were phrased as statements about experienced effect over the past year in the areas described above. Any degree if agreement in the statement has been interpreted as an experienced effect, in both the presentation and the analysis of the findings. The results of the study are presented and analysed from two different perspectives, by using a selection of questions from the survey. The selection was made with the aim of highlighting the main features of the results from perspectives that are relevant for indicating a development in accordance with the project's objectives, enhanced competitiveness in companies by implementing lean production. In this paper two perspectives have been used:

[2] "A program theory is an explicit theory or model of how en intervention, such as a project, [...] contributes to a chain of intermediate results and finally to the intended or observed outcomes. It can support the development of meaningful performance indicators to track progress and report achievements." (Funnell & Rogers, p xix – xx, 2011).

Leadership, communication and employee engagement; Leadership and management involvement together with communication and information are considered essential for success in improvement initiatives such as lean implementation. (Achanga et al., 2006; Kaufmann & Kaufmann, 2010; Näslund 2013; Zhou, 2012)
Development towards lean production; indicators that have been used to investigate whether a development towards lean production has taken place in the companies are: 5S (housekeeping), multi-functional teams, job-rotation, continuous improvement and standardized work (Pettersen, 2009).
To be able to analyse possible differences between managerial and non- managerial functions a categorization was made of respondents in these two groups. There were six different alternative answers regarding the respondent's function in the company in the questionnaire. Three options related to some type of managerial function was categorized into the category "managerial" (N=143) and the remaining three alternatives to the category "non-managerial" respondents (N=602).

4. CASE BACKGROUND

The research presented in this paper was conducted in collaboration with Industrial Development Center West Sweden AB (IDC). IDC is business support agency financed by public funding with the aim of enhance competitiveness in manufacturing companies in the region of Skaraborg. The effect of two improvement initiatives were studied, ProduktionKompetensCentrum (PKC) and Fordon & Framtid (F&F) (Allert, 2012; Allert, 2013). PKC is concerning production development by coaching the lean implementation process in the company and associated training and education in lean methods. The process starts with identifying the present status of the company and then by continuous steps increasing the overall performance in a structured manner. The process is the following:
Step 1- Presentation and commitment
Step 2- Analysis of the company during three days, including a detailed study of production efficiency.
Step 3.1 - Forming improvement program by defining the company's goals and an improvement plan.
Step 3.2 - Running improvement program including on site coaching and revisions.
Training in lean production for the entire workforce is recommended during the third step and education programs are offered in collaboration with a university. The other project under study, F&F, was concerned with training program based on specific needs in the companies and was run during May 2010 till August 2012 (Allert, 2012).

5. FINDINGS

The results of the study are presented through a selection of questions from the survey forming two perspectives, aiming to describe the short term outcomes of improvement initiatives relevant for this research. Any degree if agreement in the statement has been interpreted as an experienced effect.
The first perspective is experienced effect concerning leadership, communication and employee commitment presented in three figures (Figure 1, 2, 3). In the area regarding leadership of the business progress was experienced (Fig. **2**). Almost half of the respondents (47 percent) considered that management commitment has increased. Two out of five considered that management is more involved in the business (43 percent), that management´s attitude to the employees are more positive (39 percent) and that the managers are more inspiring (42 percent).

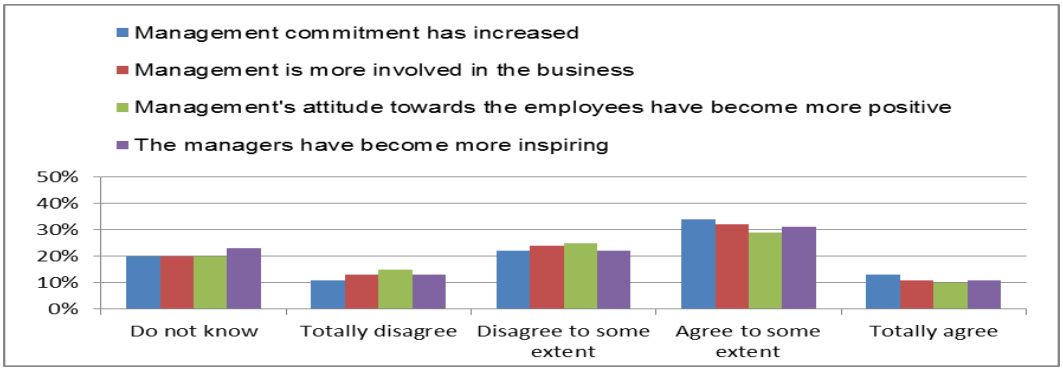

Fig. 2. Presentation of survey responses to questions concerning management commitment.

The work with communication and information processes had been developed and improved in the companies Fig. **3**). Just under half of the respondents experienced at a greater transparency of the company (45 percent), that communication has improved (46 percent) and that they get more information from management (48 percent). More than half (55 percent) considered that there are more meeting forums now.

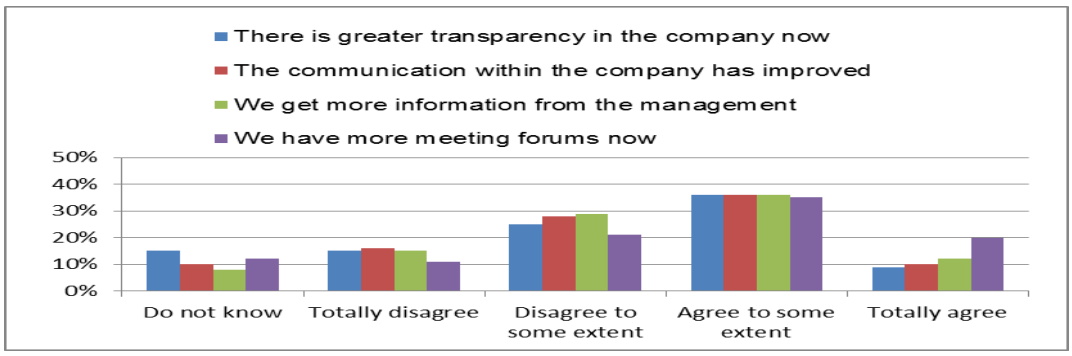

Fig. 3. Presentation of survey responses to questions concerning communication.

The results indicate a strong increase of the personal commitment, perceived workplace community and sense of participation (Fig. **4**). Two-thirds of respondents answered that the personal commitment has increased (63 percent). Furthermore, over half of the respondents are happier at work (51 percent) experienced a larger workplace community (57 percent) and more involvement (52 percent). Two-fifth (40 percent) has gained greater influence on their work situation.

Fig. 4. Presentation of survey responses to questions concerning workplace commitment and involvement.

The second perspective presented is the experienced effect in areas that characterize development towards lean production by looking at some indicators used to investigate changes taking place when introducing lean (Fig. **5**). The result indicated a great progress towards lean. A large majority considered that workplace organization (5 S, housekeeping) and standardized work has improved, 81 respectively 71 percent of the respondents. Two-thirds considered that the company is working more systematically with efficiency work (65 percent) and with goal-driven improvement work (67 percent). More than half (57 percent) considered that the proportion of teamwork has increased and almost half (48 percent) considered that the physical work environment has been improved. One third (30 percent) considered that job rotation has increased.

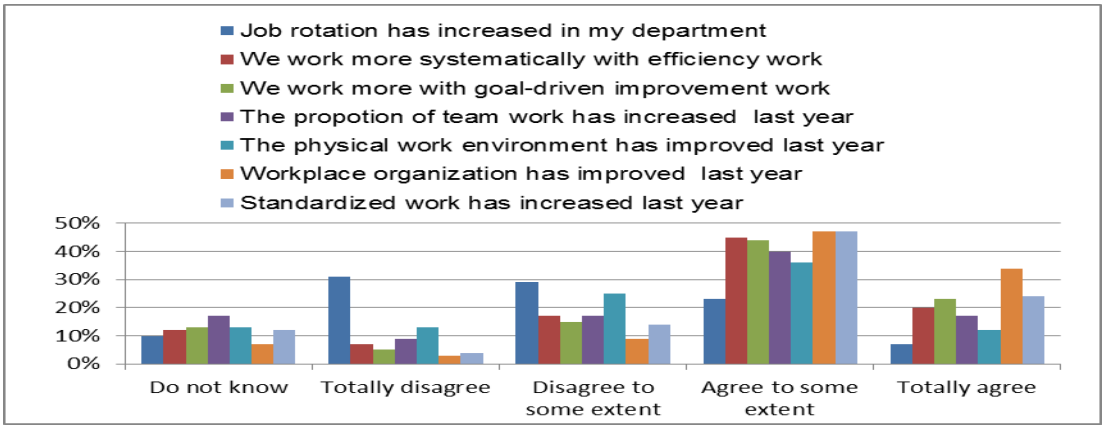

Fig. 5. Presentation of survey responses to questions concerning development towards lean.

Typically, respondents in managerial functions considered that it has been a larger progress in all the areas studied, compared to non-managerial respondents. Regarding questions about development of leadership, information and communication in the company, the difference in experienced effect between respondents in managerial function respectively non-managerial was varying between 23 and 34 percentage points. The difference between the two groups was less concerning progress towards lean and efficient production. Regarding workplace organization the difference was at the least, 8 percentages points, and regarding physical work environment it was the most, 28 percentages points. Furthermore, the results indicated differences between experienced effect in the various companies. When comparing the average distribution of responses for the entire study with the individual company to each question, major differences in experienced effect among companies become obvious. In some companies the experienced effect was above average in general, and in other companies the experienced effect was less in almost all of the questions.

6. DISCUSSION AND CONCLUSIONS

Two perspectives were used in order to investigate whether improvement initiatives had the intended effect in SMEs working in collaboration with a business support agency. The first perspective analysed is experienced effect concerning leadership, communication and employee commitment where progress was experienced. Management was perceived as largely more engaged, more involved and with a more positive attitude to employees. The work with communication and information processes had been developed and improved in the companies. The results also indicated a strong increase of the personal commitment, perceived workplace community and sense of participation. The second perspective analysed was the experienced effect in areas that characterize development towards lean production where the result indicated a great progress. The companies are working more systematic with continuous improvements and a substantial development concerning workplace organization (5S) and standardized work was experienced. In summary, the results indicated a development in accordance with the intended effects of the improvement initiative and its objectives in the short term. Following the logic model (Funnell & Rogers, 2011), it is concluded that there have been a progress in the companies congruent to the project objectives, i.e. a development towards enhanced competitiveness.

Regarding possible differences between managerial and non-managerial functions, the result indicated that individuals in a managerial function experienced effect to a higher degree in all the areas studied. The greatest difference was considering leadership, information and communication. The initiative and the work carried out in the company in collaboration with IDC are targeted toward the managerial functions in the first place. They must then take the work forward in the company. It is therefore natural that managerial functions experience the greatest effect of the actions taken. On the other hand, a social desirability bias is possible (Bryman & Bell, 2007), if managerial respondents provide answers more in accordance with what they think they should answer, consistent with what the researcher want to hear (Storey, 1998). It is the management of the company that decides to participate in the improvement initiative and it is probable that they want to justify this decision by emphasizing the effect. This circumstances are worth noticing, since it most often are individuals from managerial functions who are respondents in researches, e g studying effect of improvement initiatives (Done et al., 2011; Herron & Hicks, 2008) or assessing lean (Soriano-Meier & Forrester, 2002). It highlights the importance of including *all* employees, otherwise missing information and thereby knowledge of an essential part in companies, i.e. the non-managerial employees. For improvement initiatives to be sustainable they need to be integrated into the company culture and the organization as a whole (Kotter, 1996). The result in the present study, based on both managerial and non-managerial respondents, indicates that the initiative have had effect in

the entire company, not only on managerial level. This in turn indicates that the effect of the improvement initiative has potential for sustainability and is congruent to the project objectives in the long term.

The results indicated a difference between experienced effects in the various companies, even though the interventions were similar. The result did not differ depending on in which step of the intervention the company was, since no correlation between quantities or time size of the intervention and the outcome could be identified. For example, in some companies that only had participated in Step 2 at the time for answering the questionnaire the experienced effect was higher than in companies that had completed Step 3.2. It is reasonable to assume that there are several underlying factors, including internal factors in the companies, affecting their interest and capacity to manage and enforce the improvement initiative. Previous research has shown similar results when studying improvement initiatives in SMEs in collaboration with a business support agency. Both Done et al. (2011) and Herron & Hicks (2008) found that the degree of improvement varied considerably between the investigated companies. Done et al. (2008) identified three sets of factors that potentially affects an intervention; Intervention Context Factor, Intervention Design & Implementation Factors and Change Agent Approach Factors. Herron & Hicks (2008) concluded that the most important factor for success was the support of management and the willingness to accept change.

The results presented in this research are not generalizable since there is a possible selection bias. Participation was optional for the companies and it is possible that companies in which the intervention had more effect are more likely to participate than others. This means that the companies that participated in the study are not representative of all companies working in collaboration with IDC. Thus would the real effect of the actions undertaken in total be less than the effect presented in this study. Whether the results (the experienced effect) were caused by the improvement initiatives has not been investigated. In survey research it is difficult to determine the link between cause and effect (Voss, 2009). Companies are strongly affected by external factors, e. g. customer's activities or economic fluctuations, and it may be difficult for respondents to attribute the changes that have happened in the company to the specific improvement initiative.

For future research it is of interest to investigate why the experienced effect seems to differ between the companies, i.e. why similar initiative get different outcome. SMEs is mainly defined by the number of employees but Ghobadian and O´Reagan (2000) argues that there are other variables than size that influences leadership, strategic planning and culture in companies, which are all factors considered to be critical when implementing lean (Achanga et al., 2006; Näslund 2013). Thus SMEs cannot be regarded as an in all respects homogeneous group and further research is needed to gain understanding of the differences that may exist in the SMEs. There is a need for deeper knowledge and understanding of the internal contextual factors affecting both the implementation and the outcome of improvement initiatives in SMEs in collaboration with a business support agency. Since SMEs are of great importance for the national economy and welfare it is of interest for the society to both ensure and contribute to their development and long-term survival. Deeper knowledge and understanding of the heterogeneity among SMEs would enable business support organizations to improve and refine methods and practice to even better meet the companies based on their needs and their specific circumstances. Also for the SMEs a greater awareness of factors that may affect an improvement initiative in itself can be beneficial. Awareness that it is not just as simple as to begin working with lean, but there are other factors that affect the outcome as well. These circumstances have implication on both the design on business support services, the possible effect of the support (the intervention) and the possibilities of measuring the outcome.

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