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The role of leadership in implementing lean manufacturing

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Abstract

It is widely accepted that for the successful implementation of lean manufacturing, the senior management commitment is of great importance. However, the lean journey is usually a long one, and eventually management commitment creeps. Furthermore, the involvement of employees in daily improvements is also critical for the success of implementation. Lean leadership can be considered as a way of sustaining and improving the employee performance in lean production systems. In the present study, a thorough literature review is presented focusing in reviewing the principles of lean leadership and the practices that can lead in improving the employee performance. Furthermore, the characteristics and qualities of lean leader are discussed.

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Keywords: Lean manufacturing; leadership; survey

1. Introduction

Lean over the years has become a "buzz" word. Started with lean manufacturing in the late 80s (rebranding the Toyota Production System) [1], and nowadays the term "Lean" can be found almost everywhere, just to offer some examples: lean services, lean entrepreneurship, lean software development, lean product development, lean accounting, lean startups and the list goes on and on. The underlying concept though is the same; maximize the customer value with minimum waste, i.e. "manufacturing / delivering more with less".

Although, the term "lean" is widely understood nowadays, implementing lean still poses a number of challenges. The successful *lean transformation*, as described the process of a company moving from an old way of thinking to lean thinking by lean experts and practitioners, relies in a big number of factors. The identification and ranking of these critical success factors have been the focus of a big number of studies. Salonitis and Tsinopoulos [2] based on an extensive review of the available literature, identified several key success factors, including: "Organisational culture and ownership", "Developing organisational readiness", "Management commitment and capability", "Providing adequate resources to support change", "External support from consultants in the first instance", "Effective communication and engagement", "Strategic approach to improvements", "Teamwork and joined-up whole systems thinking", and "Timing to set realistic timescales for change and to make effective use of commitments and enthusiasm for change". Zargun and Al-Ashhab [3], in a similar study, identified 27 critical success factors that they classified into four groups, namely "Strategy and Objectives", "Leadership and Management", "Human resources" and "External factors".

The commitment of senior management in the lean transformation is underlined in almost all studies. Dombrowski and Mielke [4] highlighted the leadership as a cornerstone for engaging employees in continuous improvement initiatives, something that they consider a critical factor for introducing a lean production system.

In the present paper, the focus is on the role of high level management in the successful implementation of lean manufacturing. The work is based on a systematic literature review and a number of interviews conducted in various manufacturing companies in the UK.

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2. The lean paradigm

Lean manufacturing is about eliminating waste (the non-value-added components in any process) and satisfy customers. Waste identification and elimination is central to lean manufacturing philosophy. Through lean, manufacturing can be achieved by using less human effort in the factory, less space, less financial resources and less material for producing the same product [1]. To achieve this, five lean principles have been proposed by Jones and Womack [5], namely "value", "value stream", "flow", "pull" and "perfection".

In order to achieve lean, a number of tools and practices have been developed. These can be presented graphically in the "house of lean" (fig. 1). The implications of the house of lean, is that there is logical sequence that needs to be followed for implementing lean. Therefore, the "foundations" need to be set before the lean "house" can be build. The starting point is stabilizing the performance of the production system, and for doing so, a number of tools can be used, such as 5S, SOPs etc. Afterwards, the focus can be in "building" the walls, and so on. The lean tools and processes can be also classified per their focus. Fig. 2 presents such a classification of the tools as suggested by Salonitis and Tsinopoulos [2].

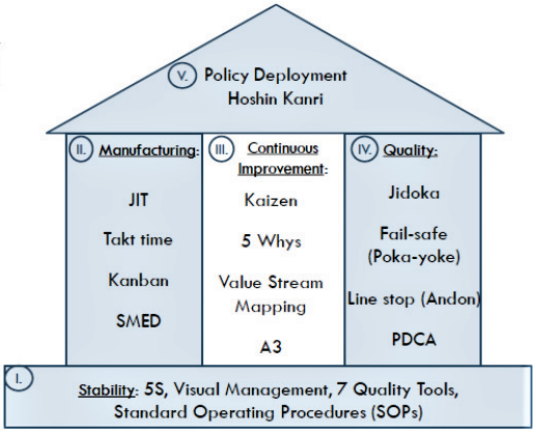

Fig. 1: House of lean (adapted by [5])

However, it needs to be highlighted that the lean transformation is about the whole organization, and not only production. All individual departments and their operations within the organization are to be optimized in a coordinated way. This coordination is the responsibility of the senior management.

3. Critical success factors for lean manufacturing

As indicated in the introduction, the success of introduction lean manufacturing relies on several factors. Hamid [6] identified eight internal organizational factors and two external factors. The internal factors include "top management", "training and education", "thinking development", "employees", "working culture", "communication", "resources" and "business planning". The external factors include "customer focus' and "government intervention".

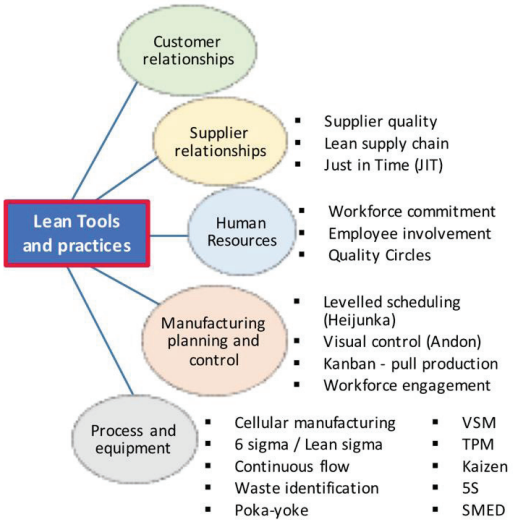

Fig. 2: Lean manufacturing tools and practices [2]

"Top management" factor is key in almost all studies, regardless of whether the study was focused on small and medium enterprises (SMEs) or big organizations, or whether the study was focused in specific countries (example in studies [2], [3], [4], [7], [8]).

In order to capture the importance of lean management in manufacturing companies within the UK (a country whose companies are considered quite mature in lean implementation), and also identify if there are any key differences between large and SMEs a number of interviews were conducted with production managers.

4. Importance of top management for lean introduction

Senior management commitment has been widely considered as a vital factor. The senior management commitment could be demonstrated in the form of developing clear vision ensuring sufficient financial resources, and providing strategic leadership. Although the transformation into lean is often desirable to be driven from the shop-floor, it is important that senior management lead the journey in its first stages. found empirical evidence that management commitment and support affected negatively and positively the efforts of implementing lean initiatives. 75 companies were contacted, with 48 accepting for a short telephone semi-structured interview (64% response rate). The interviews took place in December 2016. The companies participating represents several sectors including automotive, aerospace, defense, consumer goods etc. Out of the 48 companies 20 of them (ca 42%) are SMEs, allowing for such a comparison to take place. The interviews were focused on the critical success factors for lean manufacturing, the lean tolls and techniques diffusion and their understanding by companies and the barriers that the companies face when trying to increase their maturity. In the present study, the results on the critical success factors as well as the barriers related to the senior management will be reported, in order to highlight the importance of the top management commitment.

Fig. 3: Lean introduction critical factors

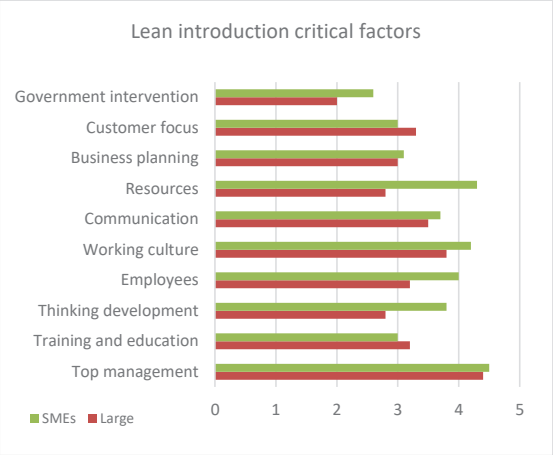

Fig. 4: Lean introduction critical factors (Large manufacturing companies and SMEs)

Following Hamid's [6] classification of critical factors, the interviewees were asked to rank the factors in order of importance. Figure 3 presents the overall results, whereas figure 4 indicates the differences captured between SMEs and large organizations. It is obvious from the responses received that "top management" is critical for the introduction of lean manufacturing in both large organizations and SMEs.

The literature review also revealed the key barriers to implementing lean. This can be grouped (as per Salonitis and Tsinopoulos [2]) into "top management related barriers", "employees related barriers", "financial barriers" and "others". The top management related barriers that are of importance for the present study are related to the poor commitment due to several factors such as lack of understanding, poor knowledge, change inertia, lasting of commitment etc.

The interviewees were asked to indicate whether they agree or disagree with each statement in a Likert scale. The scale was ranged from 1 to 5 representing the level of disagreement / agreement ranging from "I strongly disagree" to "I strongly agree". The result thus for each technique can be interpreted according to three classes of average score; 1 – 2.33, 2.34 – 3.67 and 3.68 – 5.00 as negative, neutral and positive perception for each item. Therefore, each respond was quantified and the average value for each technique is presented. The raw material collected and the scoring of all barriers are presented in figure 5.

Based on the results, it is shown that one of the main causes in deploying lean manufacturing projects is related to everyday problems occurring such as Distractions, and/or slowdowns due to firefighting on other projects. In order of importance, workforce related barriers are the most critical ones with top

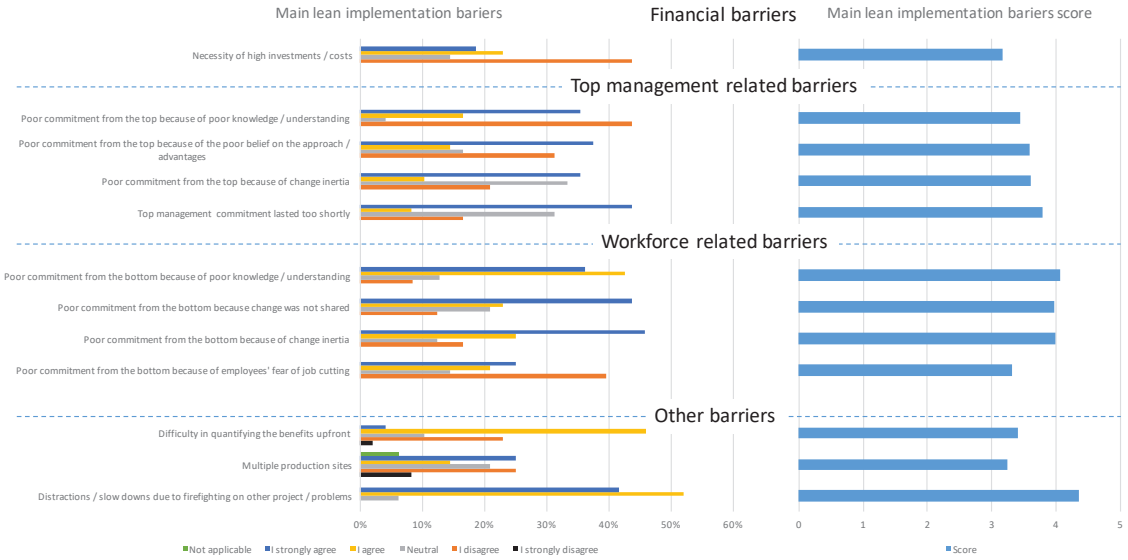

Fig. 5: Lean barriers

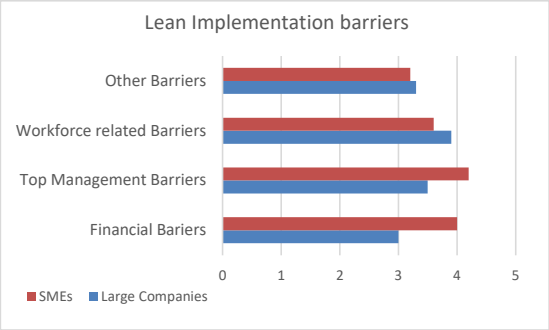

Fig. 6: Lean implementation barriers

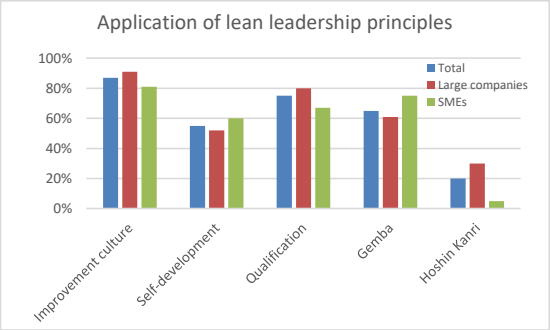

Fig. 8: Comparison of application of lean leadership principles in UK

management related ones coming second. Lean maturity is also a key factor. Almost all the large organizations stated that during the lean introduction, the key barrier is the workforce understanding and commitment to lean, and as they move forward in their lean journey, top management commitment becomes more critical in their success. However, for the case of SMEs the first in importance barriers were considered to be related to top management as it can be seen in figure 6. This is in agreement with previous studies in the UK (for example Achanga et al. [7] indicated leadership as the key factor among finance, skills and culture).

5. Leadership and management for lean

Lean manufacturing implementation can be considered as any other major change initiative. As a change, this is not an one-off project, but rather a continuous process with impact both on processes and people. One of the major challenges of lean implementation is guiding the change journey. This guidance is the responsibility of the top management and leadership within an organization. It is obvious thus that a lot of the lessons learned through change management literature could be used for lean manufacturing implementation as well. Kotter [9] has studied the causes of change project failures, and summarized them into eight statements, highlighting the errors made by leadership (fig. 7). As a response to these errors he suggested the 8-step change management plan.

Leadership errors that lead to change failures
1. Lack of a sufficient sense of urgency or allowing too much complacency.
2. Lack of a powerful guiding coalition.
3. Lack of a vision or underestimating the power of vision.
4. Grossly under-communicating the vision.
5. Failure to remove obstacles to the new vision.
6. Failure to create short-term wins.
7. Declaring victory/success too soon.
8. Neglecting to anchor changes firmly in the corporate culture

Fig. 7: Why leadership fail to implement changes? (Adapted from [9])

Leadership's thus role is critical in the introduction and implementation of lean. One of the first studies on the role of the leader in lean was provided by Mann [10], [11]. He structured the role of leadership as a process, proposing the dimensions of lean leadership. A number of attributes were identified for a leader to be able to guide the organization through the lean journey.

Going back to the roots of lean manufacturing, Toyota has invested in developing leaders for lean. The five values which drive Toyota leaders can be stated as the continuous challenging of traditional approaches; the strive to constantly improve performance (kaizen); the knowledge based operations (genchi genbutsu); enabling and promoting teamwork; and promoting mutual respect [12]. An interesting difference, western manufacturing companies rely on the common practice of employing managers with the necessary lean experience when setting off for lean implementation, whereas Toyota invests in developing leaders.

Dumbrowski and Mielke [4] derived a list of fundamental principles for lean leadership through a thorough literature review and survey. They highlighted the fact that leadership is not really adding value but they have to set the scene for the employees to add value to the product in the most efficient and effective way. They clearly make the link between leadership and the employees, and how managers should engage employees and allow them to improve within the organization for the benefit of the organization. They thus describe the lean leadership system through five principles, namely: "improvement culture", "self-development", "qualification", "Gemba" and "Hoshin Kanri – policy deployment".

These five leadership principles were explained to the participants in the survey. The application of these according to their responses is shown in figure 8. These findings agree with the findings reported by Dumbrowski and Mielke [4] on their study of both Geramn and rest of the world enterprises. An interesting conclusion that can be drawn is that SMEs outperform large companies when it comes to "self-development" and "Gemba". The self-development refers to the leaders investing time for self-improving and acquiring new skills. Although it would be expected that managers would be applying that more in large companies, as there are leadership courses offered to most of these companies, SMEs indicated that they are more active in this. Gemba refers to

the leadership's personal observation of the workplace, where the value is added. SMEs seems to have more engaging managers and thus the present higher percentages of applying Gemba principle.

Dombrowski and Mielke [13] in a subsequent publication presented 15 rules for the leadership that can be considered as practice-oriented requirements. Three rules per lean leadership principles were suggested. However, these have not been validated in industrial practice up to now.

Dun et al. [14] presented a thorough literature review on the values and behaviours of effective lean managers. They identified seven key values ("continuous improvement", "teamwork", "customer focus", "respect for people", "information sharing", "management by facts" and "management commitment") supported by relevant publications. Furthermore, they identified 19 typical behaviours that lean managers exhibit, with the most cited ones being "engaging employees", "celebrating and recognizing success", "coaching teams", "sharing information" and "visiting the shop floor".

6. Key expectations from Management

The literature review and the survey highlighted several expectations from management that will be summarized in the following paragraphs.

6.1. Top management commitment

The lack of commitment was highlighted in the survey and the literature review [15], [16]. Lean promises cost savings, although management in many cases fail to understand the cost savings are the result and not the objective of implementing lean. As a result of this, once the enthusiasm for the "new" philosophy has calmed, and the results are not as promising as expected, the commitment creeps. Furthermore, middle management commitment is critical as well. Middle management can prohibit or enable the implementation, as they are the ones that deal on daily basis with the employees, who are the actual practitioners of lean methods and tools. Mann [10] stated that managers on each level have complementary roles in the lean implementation.

6.2. Leadership style

The complementarity of the roles can be supported and enhanced through distributed leadership. This has been emphasized by Roth [17], highlighting that in Japanese companies, distributed leadership is evident even in the form of informal authority that complements the formal one.

An interesting point by van Dun et al. [14] is that both transformation and transactional leadership behaviors are expected from lean leaders. Transactional leaders tend to focus on the efficient use of resources (following the lean idea of eliminating waste), whereas transformational

McMahon [19] suggests that leadership needs to be "firm and inspiring, relentless and resilient, demanding and forgiving, focused and flexible". With regards the leaders themselves, the expectation is for them to act as role models [10].

6.3. Engaging and developing employees

As briefly mentioned in the top management commitment section, employee engagement is of paramount importance. This is usually achieved hierarchically. Top management engage middle managers and middle managers then engage employees and operators. This engagement can be achieved through several different ways such as training, practicing, mentoring, coaching etc. Thus top management may practice and apply Gemba, but it is the middle managers and the operators that solve problems and practice root cause problem solving.

6.4. Setting a lean strategy

The literature review indicated that the leadership of an organization need to set the paradigm and clearly explain the need for lean introduction and implementation. This implies that the leadership needs to exhibit long-term consistency based upon the lean philosophy and values.

Furthermore, the strategy needs to be clear with regards the vision and the direction of the company. Hoshin Kanri is the term used by Toyota for describing policy and strategy deployment [20]. This strategy will provide the plans for implementing the top-management goals and translate them into objectives and actions for the middle management and operators.

7. Conclusions

In the present paper, the importance of top management and leadership in the introduction and implementation of lean manufacturing has been discussed. Based on a survey undertaken within the UK manufacturing sector, top management has been highlighted as the key success factor, particularly for SMEs.

Although there is a wide assumption that through the use of lean tools and methods, lean manufacturing can be implemented; the reality is that these are not assuring success unless top management and leadership are tailored to the needs of lean manufacturing. This is supporting previous findings from other researchers. For further validating this findings, the next step will be the in depth analysis lean practices and lean leadership impact in specific companies. By doing so, possible bias and sources of errors will be assessed and addressed accordingly.

A number of expectations from the management were discussed such as the top management commitment, the selection of the appropriate leadership style, the engagement and development of capable lean employees.

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