LEAN MANUFACTURING IMPLEMENTATION: THE MAIN CHALLENGES AND BARRIERS

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Lean manufacturing, lean enterprise, lean production, or often simply "Lean", is a practice that considers the expenditure of resources for any goal other than the creation of value for the end customer to be wasteful, and thus a target for elimination. Lean can be described at different levels of abstraction: it can be defined as a philosophy, as a set of principles and as bundles of practices. The paper reveals to the challenges and barriers to be faced and overcome while implementing lean concept. Research method is the analysis and synthesis of scientific literature, logical, comparative and graphic representation. On the base of analysis, authors of this paper present major implementation barriers.

Keywords: barriers, implementation, lean manufacturing, principles.
JEL classification: M11, L23, M54.

Introduction

The term "Lean" was coined by a research team working on international auto production and it reflects the waste reduction nature of the Toyota production system and contrasts it with the craft and mass forms of production (Womack, 1991). Later “Lean” was defined by G. Howell (2001) as “Give customers what they want, deliver it instantly with no waste”.

Manufacturing companies have been faced with increasing amounts of pressure from customers and competitors in the past couple of decades. Customers have higher expectations from their purchases, and manufacturers can meet these expectations by increasing a product’s quality, reducing delivery time, and minimising product costs – or a combination of the three (George, 2002). This has forced the manufacturing industry to implement new production strategies to enhance their competitiveness in the global market place (Chena, 2010).

More than 20 years foreign scientists are discussing about lean manufacturing, lean principles implementation, and tools and techniques. J. P. Womack et al. (1996) defined Lean production as a business and production philosophy that shortens the time between order placement and product delivery. J. P. Womack (2002) depicted the five core principles of Lean. M. Imai (1997) emphasised improved productivity, quality increase and becoming more cost effective by identifying and removing waste, as well as implementing key lean tools. S. P. Vendan and K. Sakthidhasan

Though lean manufacturing has been widely recognised for its effectiveness in continuously improving productivity, product quality, and on-time delivery to customers; although a lot of companies started implementing lean concept, according to Bhasin and Burcher (2006), only 10 percent or less of the companies succeed in implementing lean manufacturing practices.

The main barriers to lean implementation have been researched by various authors. Z. Radnor et al. (2006) depicted three issues that organizations face with: the people issue, the process issue, and the sustainability issue. Slightly different classification presented M. F. Bollbach (2012); he highlighted the social and the technical barriers to Lean implementation. H. M. Alinaitwe (2009) tried to prioritise Lean construction barriers. Brandão de Souza and L. Pidd (2011) were researching the barriers to lean health care implementation.

Despite significant studies and works on Lean manufacturing, this field has struggled with a lack of clarity about why Lean implementation is not so successful and what main barriers it faces with.

The problem is what are the main challenges and barriers for lean manufacturing implementation and what measures could be taken to facilitate it.

The purpose of this paper is to identify the main challenges and barriers to Lean implementation.

Research methodology. The analysis of scientific literature enabled to disclose the essence and importance of Lean concept. Synthesis of scientific literature allowed finding out the core principles of Lean manufacturing. Scientific literature was systemized and summarized by applying the logical, comparative and graphic representation. On the base of conducted analysis and synthesis, two groups — people related barriers and organizational barriers — were identified and recommendations how to overcome them presented.

The results of this research can be useful for scientists anaalizing this topic from theoretical and empirical perspective, and for practicians implementing lean concept in business.

The Essence of Lean Concept

Lean manufacturing was first implemented by Toyota Corporation in response to the mass-production model. When engineers at Toyota researched mass-production systems, they discovered that their mass-production model, which eliminated changeover time by using one machine for each part, was not optimally efficient (Toyota Production System).
They discovered that machines downstream were sitting idle until the specific part the machine made was required for production. These idle machines contributed to waste in the process. Therefore, the engineers from Toyota created a lean manufacturing system. This system focused on the continuous identification and elimination of waste. As a result, the Toyota Production System (TPS) used fewer resources than mass production. Organisations have found that, by identifying and removing waste, as well as implementing key lean tools, they can continuously improve their productivity, increase quality, and become more cost effective (Imai, 1997).

Long production runs, big backlogs and long lead times are fast becoming operating styles of the past. Flexibility and quick response must become the norm. The driving force behind this need is customers who increasingly expect short lead times for products configured exactly as specified and delivered on time, every time. The trend of quick-response, no – excuses delivery has put many manufacturers in the uncomfortable position of having to conform or lose business to a competitor who has developed short cycle time capabilities. To meet competitive requirements and reduce costs, many manufacturers are turning to lean manufacturing techniques to drastically cut cycle time and increase their competitive edge (Vendan, 2010).

Lean production can be described at different levels of abstraction: it can be defined as a philosophy, as a set of principles and as bundles of practices (see figure 1). For instance, Womack et al. (1996) define Lean production as a business and production philosophy that shortens the time between order placement and product delivery by eliminating waste from a product’s value – stream.

There are many views of what constitutes Lean thinking. Although most people recognize its roots in the Toyota production system, there has been considerable development of the concept over time, with J. P. Womack and D. T. Jones (1996) regarded by most as the originators of the term. According to J. P. Womack (2002), the five core principles of Lean, based on an underlying assumption that organizations are made up of processes, are:

- specify the value desired by the customer;
- identify the value stream for each product providing that value and challenge all of the wasted steps;
- make the product flow continuously;
- introduce pull between all steps where continuous flow is impossible;
- manage towards perfection so that the number of steps and the amount of time and information needed to serve the customer continually falls (see figure 2).

Figure 2. The five core principles of Lean

Subsequent development of the approach (Hines, 2004) differentiates between Lean at a strategic level focusing on the principles, and at an operational level focusing on the tools and techniques (Radnor, 2008).

**Challenges and Barriers in Lean Implementation**

There are some challenges which still face the implementation of Lean and which to date still have not been fully addressed. Z. Radnor et al. (2006) depict the following three issues that organizations face with:

- the people issue — understanding the effect and gaining ‘buy-in’ of the individual particularly when there is a dilemma that ‘persuading people to embark on the lean journey, where the last stop may be their own removal or reassignment isn’t easy’;
- the process issue — understanding which processes are applicable for lean tools and techniques;
- the sustainability issue — how to ensure that lean becomes more than another set of tools but becomes an inherent way of working.

Slightly different classification presents M. F. Bollbach (2012); he discloses the social and the technical barriers to Lean implementation: high employee turnover, weak supplier performance, market conditions, lack of Lean knowledge, intercultural communication, and work styles.

Summarizing N. Bhatia and J. Drew (2007), Z. Radnor and R. Boaden (2008), Z. Radnor and P. Walley (2008), L. Brandão de Souza (2009), H. M. Alinaitwe (2009), L. Brandão de Souza and M. Pidd (2011), R. Čiarnienė and M. Vienažindienė (2012) and M. F. Bollbach (2012), authors of this paper maintain that classification of barriers into social and technical is more acceptable. But technical barriers mostly depend on the organization. Thus, authors highlight two types of barriers: people related barriers and organizational barriers. The list of main barriers to successful Lean implementation is presented in table.
Presented classification of barriers to Lean implementation is very overall. Barriers can differ depending on the sector of economy and specific company. It can be said that every case of lean concept implementation is more or less unique. And companies face with some variety of barriers. According to the authors’ of this paper position, some general recommendations could be suggested.

Firstly, one of the major mistakes and reasons of unsuccessful implementing of lean concept is focusing on tools and techniques instead of sufficient consideration to personally related issues. It is very important to ensure efficient trust, human motivation and commitment at the organization among all the levels of employees.

Secondly, despite the fact that some authors describe lean in different levels of abstraction – philosophy, set of principles and bundles of practices – there should be very close interaction between them. Lean as a philosophy must be clearly understood and rated at the top managerial level, maintained through the main principles and implemented using different tools and techniques.

Thirdly, one more recommendation is that lean improvement programs have to be incorporated into the company’s strategy.

<table>
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<tr>
<th>Type of Barriers</th>
<th>Evidence</th>
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<tr>
<td>Resistance to change</td>
<td>Implementing lean production often demands a significant change in an organization's attitude, which can be very challenging if an organization is not well slated to deal with the changes.</td>
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<td>Perception and lack of knowledge</td>
<td>Lack of understanding of lean knowledge, principles and techniques among managers and employees.</td>
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<td>Identity of improvement team members</td>
<td>Often made up of those willing to get involved, rather than those who should do so.</td>
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<td>Poor communication</td>
<td>The over-use of jargon and the lack of a clear message to staff.</td>
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<tr>
<td>Compartmentalization</td>
<td>The fragmentation into functional and professional silos imposes a major and functional barrier to the flow of customers, goods and information.</td>
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<tr>
<td>Hierarchy and Cultural issues</td>
<td>Based on the hierarchy of staff and the way management roles are allocated, it typically become a barrier for any improvement but this is care and also frequent roles especially important when lean is introduced.</td>
</tr>
<tr>
<td>High Cost of Implementation and lack of resources</td>
<td>Implementing lean often means completely dismantling previous physical plant setups and systems. The purchase of efficient machinery and training employees can add considerably to companies’ payroll expenses.</td>
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<tr>
<td>Weak link between improvement programmes and strategy</td>
<td>Lean improvement programs are not incorporated into company’s strategy.</td>
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<tr>
<td>Data collection and performance measurement</td>
<td>It is necessary to show progress and to assess the effectiveness of the different changes, tools and techniques that are implemented.</td>
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Conclusions

1. Summarizing scientific literature, Lean manufacturing can be described at different levels of abstraction: it can be defined as a philosophy, as a set of principles and as bundles of practices.

2. According to the conducted analysis the following five core principles of Lean can be identified:
   - specific value to the customer;
   - value stream mapping wastes elimination;
   - continuous improvement;
   - continuous flow;
   - and pull driven systems.

3. The analysis of scientific literature revealed that various authors emphasize slightly different barriers and challenges to lean manufacturing implementation. Part of them depict social and the technical barriers, while the others highlight barriers related with people issue, process issue, and sustainability issue.

4. Authors of this paper suggest classification of barriers into two groups: people related barriers and organizational barriers.

5. General recommendations to facilitate lean manufacturing implementation process could be suggested: focusing on people and personally related issues; close interaction between lean as a philosophy, set of principles and bundles of practices; incorporation of lean improvement programs into the overall company’s strategy.

References


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Santrauka


Raktiniai žodžiai: barjerai, diegimas, principai, taupi gamyba.

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