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LITERATURE REVIEW ON LEAN PHILOSOPHY AND THE ADVANTAGES OF ITS IMPLEMENTATION

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Abstract: *This article presents the essence of the Lean concept and reviews the organizational benefits from the adoption of the lean approaches. As nowadays companies from all industries worldwide are striving to constantly improve their processes, profits and market share, gain competitive advantages, achieve sustainable business practices while at the same time coping with growing challenges and costs, it is imminent for them to begin implementing the most efficient and proven performance maximization techniques. The current article overviews the efficiency of the probably most successful and widely used such philosophy – Lean, and the main success factors for its proper implementation. Several lean limitations and future research recommendation are presented as well.*

Keywords: *lean concept; manufacturing; management; efficiency; implementation; critical success factors*

INTRODUCTION

Today the global business networks are getting more and more complex, demanding and technologically advanced, as most of the market players are resorting to the latest managerial practices and hi-tec developments in their attempt to fulfil the customers' needs in the most viable way. Optimizing all their corporate processes, minimizing all possible costs and delivering an added value to the market is critical for the contemporary enterprises.

The goal of this article is to review the existing body of literature and reveal insights into how companies can utilize the concept of Lean in achieving operational efficiency and eliminating the non-value adding activities. Implementing in the right way the various lean techniques could certainly be highly beneficial for any organization which is willing to devote the necessary efforts and cope with the inevitable difficulties in the optimization journey.

The article has the following structure. In the Exposition, subsection Related Work to Lean overviews some of the relevant contemporary research findings on the topic and thus presents the historical development of the concept, its essence, and why more and more organizations are adopting it. Subsection Lean Efficiency and Critical Success Factors describes the efficiency and main advantages Lean can possibly deliver, as well as the key success factors for its successful implementation. The Conclusion reveals certain limitations of the lean concept and suggest an implication for future research.

EXPOSITION

Related Work to Lean

The modern globalized industrial world has urged the majority of the corporate leaders of many sectors of the economy to develop more competitive production systems – probably the best answer found in the literature is the concept of Lean (Elkhairi, A. et al., 2019). In today's competitive business environment, companies are facing tremendous pressure in the form of

customers' diverse requests, clear demand responsiveness and constant drive for cost reduction. In order to fulfil these expectations and to improve the effectiveness of the corporate processes, lean philosophy is being widely used (Tekez, E. et al., 2016).

The concept of lean manufacturing was originally created for maximizing the resource utilization by the minimization of waste. Subsequently lean was formulated in response to the fluctuating and competitive business environment. Generally lean manufacturing has been universally used to increase operational excellence and performance in manufacturing systems (Cortes, H. et al., 2016). It has been documented that the introduction and implementation of lean production principles over the last twenty years has had a notable impact on many manufacturing enterprises (Matt, D. et al., 2012).

Similarly, lean manufacturing or also known as lean production, has been considered among the most popular paradigms in waste elimination in both the manufacturing and service industries. That is why many companies have reaped the benefits to practice lean manufacturing in order to enhance their quality and productivity (Wahab, A. et al., 2013).

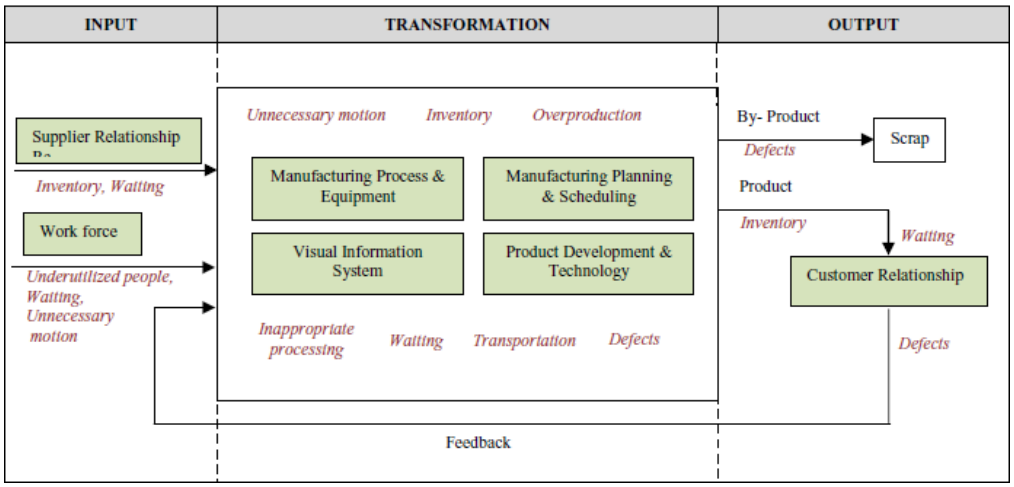

Figure 1: Lean Dimensions in a Manufacturing System and its Relation to Wastes

Increased global competition, production costs and scarce resources are permanently forcing the enterprises to think and act in new directions. In order to remain competitive, it is important for them to have effective, precise, and streamlined production processes. Consequently, many organizations choose to introduce lean with the purpose of improving competitiveness by creating customer value, while simultaneously eliminating any kind of waste in their operations (Lodgaard, E. et al., 2016).

Moreover, due to the rapidly changing business environment companies are facing challenges and complexities all the time. Any organization set to survive may ultimately depend on its ability to systematically and continuously respond to these changes in enhancing the product value. Therefore, value adding process is necessary to achieve this perfection. And thus implementing a lean manufacturing system is becoming a core competency for any type of organization in its quest to sustain (Sundar, R. et al., 2014).

Not least the urgent need to minimize the negative corporate environmental impacts while enhancing their financial strength and positive societal benefits is attracting company leaders to implement various quality improvement systems such as lean manufacturing, six sigma, sustainable manufacturing, and circular economy concepts and technologies. All of these approaches are certainly valuable, with Lean Manufacturing being among the leading systems, if implemented within the appropriate framework (Yadav, G. et al., 2019).

The Lean Manufacturing concept originates primarily from the Toyota Production System (TPS) and Just in Time (JIT) methodology, and is generally focused on eliminating waste and improving customer satisfaction. The Lean effectiveness and efficiency are proven by many

successful business cases around the world and this philosophy has been considered a critical strategic advantage (Elkhairi, A. et al., 2019).

From a more historical perspective lean can be traced back to Toyota's quest against waste in the in 1950s due to shortage of both capital and resources, and the necessity to discontinue using resources when resulting on poor process quality. At that time a new manufacturing paradigm evolved – the Toyota Production System. It was first presented in an academic article in 1977, whereas John Krafcik was the first author who described TPS as lean production in 1988 in his article "Triumph of the lean production system". One of the bestselling business publications – the book from 1990 "The machine that changed the world" popularized the concept of lean as a benchmark of productivity in the world automobile manufacturing (Lodgaard, E. et al., 2016). It emphasized the unique aspects of Japanese car industry management, regarding the lean management. Even though it is widely known worldwide that lean management was born in Japan, somehow its actual origin is not completely well recognized. Dominating proposition is that lean management dates back to the Japanese turbulent period in 15th to 16th century. Since that times are the concepts for elimination of Muri (Strain), Mura (Variegate), Muda (Waste) on the Plan, Do, Check and Action Cycles (PDCA) (Katayama, H., 2017).

However, the roots of the contemporary lean philosophy can be related first to Henry Ford in 1913, who established a spectacular production system in the US Highland Park manufacturing plant. There a set of practices and tools (interchangeable parts, standard work and the assembly flow line) was put in place in such a coherent way which allowed them to turn out products at impressive speeds, with very short flow times and high consistency (Manotas-Duque, D. et al., 2007).

Lean management represents a complex socio-technical system where both technical and social practices should be consistently implemented and integrated in order to foster a continuous improvement culture (Costa, F et al., 2018). Furthermore, lean can be defined as a management philosophy focused on identifying and eliminating waste throughout a product's entire value stream, extending not only within the organization but also along the company's supply chain network. Lean promises significant benefits in terms of waste reduction, and increased organizational and supply chain communication and integration (Bayou, M. et al., 2008).

The Lean theory, principles and tools are namely intended to highlight the value within the company and eliminate waste entirely. And while the lean practices are well known and applied worldwide, their implementation purpose must be tailor-made because each firm is unique (Mourtzis, D. et al., 2016).

Manufacturing leanness is a strategy to incur less input to better achieve the organization's goals through producing better output. The systematic measure of leanness has seven characteristics – relative, dynamic, long-term fuzzy logical, objective, integrative and comprehensive (Bayou, M. et al., 2008). Lean Management can also be defined as a managerial approach focused on enhancing customer value through the elimination of non-value adding steps from work processes. Recently it is enjoying a resurgence, largely because its "do more with less" philosophy is particularly well-suited for the austere conditions of a "Great Recession" recovery (van Dun, D. et al., 2017).

Lean Efficiency and Critical Success Factors

Applying the lean concept can significantly improve a company's performance by concentrating on the value-adding activities. Over the last couple decades, numerous studies have been presented on the drivers and barriers that organizations face when trying to implement lean. Those studies have mostly been based on conducting surveys with questionnaires and interviews, and have targeted specific industrial sectors and/or geographic regions. In order to help the companies to implement lean a number of frameworks have been proposed. The majority of them however resemble roadmaps, prescribing the sequence of the various lean tools that should be adopted, without considering the complexity of the human factor. Thus not surprisingly many organizations have failed and were not able to achieve the benefits of lean manufacturing. In the

literature however it is widely accepted that the successful lean implementation is usually accompanied by a change in the way companies value the different dimensions of work. One of the major challenges of lean implementation is navigating the change journey as detailed as possible in the implementation plan. Lean manufacturing requires change in structure, system, process, and employee behavior (Almanei, M. et al., 2018).

Furthermore, the majority of the academic research emphasizes on a single lean technique, while quite a few publications focus on more than one lean tool. But for the successful implementation of lean throughout the organization, as many as possible practices should be covered – such as Value Stream Mapping, Cellular Manufacturing, U-line system, Line Balancing, Inventory control, Single Minute Exchange of Dies (SMED), Pull System, Kanban, Production Levelling, Total Productive Maintenance (TPM), Mixed Model Production (MMP) etc. (Sundar, R. et al., 2014).

Certainly there is a variety of factors that could contribute to the implementation of the lean practices. Specifically, the manufacturing organizations usually implement a broad range of lean practices, as the implementation level does vary and might be related to numerous economic, operational and organizational factors (Doolen, T. et al., 2005).

Out of the many research publications on the topic Manotas-Duque, D. et al. (2007) present a comprehensive illustrative table, summarizing key success factors in lean implementation.

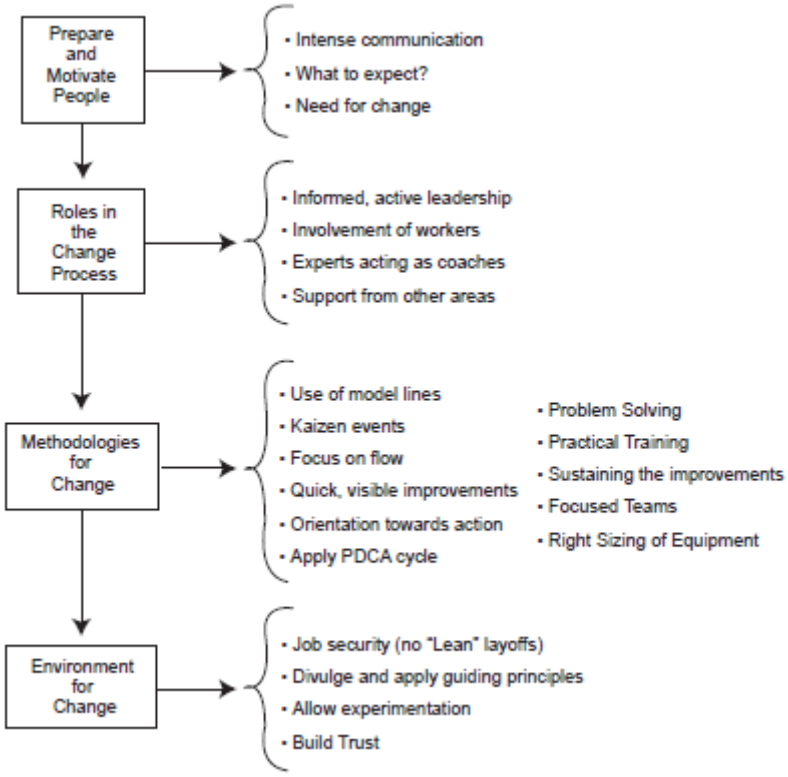

Figure 2: Success Factors in Lean Implementation

Lean management is viewed as well as a managerial approach for improving company processes based on a complex system of interconnected socio-technical practices. Implementing the lean techniques generates competitive organizational advantages such as improvements in product quality, productivity, worker health and safety, and increased customer satisfaction. And the adoption of lean management in the enterprise can be enhanced by various key lean manufacturing drivers. Yadav, G. et al. (2019) investigate and present the relative importance and priority of 31 such drivers. They demonstrate that improved shop-floor management, quality management, and manufacturing strategy were among the most valuable ones.

The organizational culture (OC) also plays a role in the lean management. Some studies show that a specific OC profile defines the successful lean organizations. Specifically, when compared to unsuccessful lean companies, they exhibit a higher institutional collectivism, future orientation, a humane orientation, and a lower level of assertiveness. Whereas a high level of institutional collectivism, future orientation, and humane orientation are generally often related to the best performing lean companies in general, a low level of assertiveness is typical only for the successful lean organizations. Additionally, the successful ones also use soft lean management techniques to a higher degree than the not so successful examples (such as lean practices concerning people and relations - small group problem solving, employees' training to perform multiple tasks, supplier partnerships, customer involvement and continuous improvement). At the same time they do not differ significantly in terms of hard lean management practices (such as lean technical and analytical tools). These findings suggest that in order to successfully implement the lean management techniques, it is critical for the company leaders to go beyond the technicalities by adopting soft practices and nurturing the development of an appropriate OC profile (Bortolotti, T. et al., 2014).

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 the management commitment diminishes. Furthermore, the involvement of employees in daily improvements is also critical for the successful implementation. Lean leadership can be considered as a way of sustaining and improving the employee performance in lean production systems (Alefari, M. et al., 2017).

It comes as a no surprise that not so many organizations succeed to maintain sustainable continuous improvement processes. A key success factor again is the involvement of employees in the daily improvement actions. This can be achieved by a different way of leadership – the so called lean leadership. Even though the lean leadership has been considered of a particular importance and widely applied by a variety of companies, there are certain aspects that might be misinterpreted and others which are not used as thoroughly as they should (Dombrowski, U. et al., 2013).

The successful adoption of lean manufacturing practices requires more than the use of different tools. Even though the manufacturing enterprises worldwide use such techniques, the dimensions of the national culture might influence the lean effect on corporate performance. Lean manufacturing is considered to be most effective in countries with high uncertainty avoidance, low assertiveness, low future orientation, and low performance orientation (Kull, T. et al., 2014).

CONCLUSION

Despite the vast research publications on lean manufacturing systems, the concept still remains underdeveloped for two reasons. Firstly, there is no generally accepted definition. Various authors define lean in terms of its objectives which vary, overlap and differ in the different companies. Secondly, no single study has elaborated a systematic and universal relative measure of lean production systems. With the lack of such a measure, two organizations cannot be rated objectively on their lean progress and performance (Bayou, M. et al., 2008).

Although there is tremendous interest in lean worldwide, lean implementation is not straightforward process (Lodgaard, E. et al., 2016). Without a doubt it is not easy being lean. And for many companies, getting lean right the first time does not always happen. Lean promises significant benefits in terms of waste reduction, increased organizational and supply chain communication and integration. Implementing lean, however, and achieving the levels of organizational commitment, employee autonomy and the information transparency needed to ensure its success, is quite a difficult task (Scherrer, M. et al., 2009).

Theoretically, lean manufacturing could be successfully applied to all industries. There are numerous research articles and books describing successful lean transformation, though the majority of then focus on large organizations with large resources and expertise. The lean concept however has only been adopted by a limited number of SMEs. Namely the resources and expertise

are main reasons why large organizations adopt lean to a higher extent than smaller companies. On the other hand, a major problem is the lack of commitment of the direction, and the non-respect of the established norms (Elkhairi, A. et al., 2019).

Many companies fail when trying to apply lean. They often achieve significant short-term results, before the implementation processes finally ends. Consequently, it is crucial to identify and understand why the failure rate is so high in order to plan the lean adoption properly. Critical success factors for lean implementation are well described in the academic literature. There is a prolific research as well on identifying the barriers which a company faces when trying to implement lean. However, there seems to be less research investigating whether these barriers are perceived uniformly at the different hierarchical levels in the organization. Unless perceptions are equal, efforts to overcome the barriers may be misguided. Management commitment and leadership is regularly highlighted as the most important critical success factor in driving the lean implementation process (Lodgaard, E. et al., 2016).

Two main reasons are considered to be of major importance for the successful application of lean implementation results over time. The first one is the broken interaction among the people (social aspect), and the tools and techniques (technical side). The second reason is the lack of leadership commitment, especially from the top managers (Leandro, R. et al., 2016).

Building on these implications and limitations, a proposition for future research could be the development of a unified and objective quantitative methodology, which would allow to compare the degree of effectiveness of any organizations that have implemented lean. In this respect, for the past 2 to 3 decades the methodologies in studying lean management have gone relatively unchallenged. The vast majority of the research is found to be qualitative and relies heavily on the researcher subjectivity. Quantitative analyses are necessary to verify and strengthen the existing literature and particularly to confirm the lean critical success factors (Pearce, A. et al., 2019).

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