A MODEL OF LEAN OPERATIONS MANAGEMENT SYSTEM: THE RESPONSE TO THE MISSING LINK BETWEEN LEAN TOOLBOX AND A SUSTAINABLE CONTINUOUSLY IMPROVING ORGANIZATION

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ABSTRACT

The purpose of this paper is to develop a shop floor management model for processes and operations management that controls and enhances day-to-day facilities performance from following five axes: customer satisfaction, internal processes performance, problems solving and learning, continuous improvement, and Genshi Genbutsu. The model has been developed based on extensive review of literature on Lean Manufacturing, Lean Leadership, and operations management. The shop floor management model developed in this paper provides a useful daily agenda for the practical managers in monitoring and measuring of operations performance and enhances the Lean Leadership culture supposed as the critical factor in the success or failure of any Lean Manufacturing program.

Key words: Model, Lean Manufacturing, Operations Management, Performance Management, Shop floor control, Continuous improvement, Kaizen, San Gen Shugi, Genchi Genbutsu, Morocco.

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1. INTRODUCTION

The introduction of new management practices is an important issue for firms as they seek to upgrade their productivity, improve the quality of customer offerings and retain competitiveness [34]. Among these practices, Lean Manufacturing (LM) is
often regarded as the most important strategy for manufacturing firms desiring to achieve world-class performance [9], [20], [37]. However, while the advantages of LM are recognized how to go about achieving it has received less attention in the operations management (OM) literature. Especially, as a fully integrated management and manufacturing philosophy and approach [4], the LM adoption entails significant organizational change which requires companies to properly manage the key factors that might influence on the success of the adoption process [1], [25], [27], [28], [31]. As research among organizations achieving world-class performance shows that LM effectiveness requires an OM system based on measuring performance [6], daily direct shop floor contact, integration of employees in problem solving teams, and support for continuous improvement, then the need for a supportive processes and OM system coherent with LM requirements is forced and imposed.

Thus, the purpose of this paper is to contribute towards the clarifying vision of LM as an ultimate daily OM system. Especially, this contribution aims to define an OM system LOMS (Lean Operations Management System) to be adapted as a daily shop floor animation system.

In the following section, LM literature and related theory are briefly reviewed; then a review of OM systems related to LM and their analysis by structural typology is performed; this is then followed by the presentation of the model. The practical nature of the model is then showed, followed by an examination of each model element. Finally, the first applications of the model are showed in the conclusions that complete the article.

2. LITERATURE REVIEW

2.1. Lean Manufacturing

LM is an integrated and interdependent system involving many elements: the tools, the philosophy and management [29]. The LM system consists of multiple bundles of routines in production, quality management, and human resource management [33]. Referring to the Toyota production system (TPS), LM encourages processes and operations’ control, predictability, planning, and risk minimization through both symbolic leadership and a global OM system that emphasizes standardized global operating procedures and control systems [38]. However, despite a wide consensus that LM success implies a radical change in how the company manages its operations, few studies have focused on modeling LM as an ultimate OM system. Unfortunately, the non-development of specific OM system in line with LM tools deployment is one reason why [27] estimates that 90% of companies failed to recognize measurable improvement in performance except Toyota and his little group of suppliers.

Inevitably, LM adoption implies integration in the use of operations and human resource management practices [12]. Thus, if many firms failed to achieve expected benefits from their LM implementation because of the associated OM system is not well adapted and most often its importance is overlooked [35].

2.2. Operations and performance management

Building flexibility to respond quickly to changing market needs has been regarded as one of the major challenges in OM over recent years [3], [11], [21], [36]. In fact, competitive pressures and advances in product and processes technologies are forcing enterprises to revise their strategies and redesign their OM systems [13], [14]. More explicitly, it is to revolutionize their managerial approaches [29]. This is why experts
from academic circles, industry and consulting in both LM and OM presented results that emphasized moving away from what were described as the failures of classic management towards new attitudes and management techniques coherent with LM philosophy [8], [25], [26], [27], [28], [32], [40].

Actually, LM and quality approaches require a fundamentally different OM system than the traditional mass production approaches. As clarified by Fujio CHO, former Toyota Motor Corporation president, “even if the companies respect people and practice Kaizen as other LM tools, the important thing is to gather all elements in one system, which must be put into practice every day with great regularity - not in spurts – and concretely in the shop floor” [29]. Likewise, [23] emphasizes that the essence of the LM philosophy is that all business processes and functions integrate into a unified, coherent and dynamic management system whose single purpose is to continue to provide better value to customers. According to [12], LM should be based on an OM system that promotes cooperation and learning for facilitating process management, resulting in the constant improvement of processes, products and services, as well as employee fulfillment and customer satisfaction. For [29], LM must be accompanied by an explicit managerial conception whose fundamental principles are: Genchi Genbutsu, Challenge, Kaizen, and respect and team work. Still, trying to describe the LM organizational and operational requirements, [15], define the Lean Leadership model based on five pillars: 1) Improvement culture, 2) self-development, 3) Employees qualification, 4) Genba), and 5) Hoshin Kanri. Too, [24] present the SFM hexagon process model for shop floor management implementation. The six processes of the model are: 1) Visual management, 2) Standards and abnormality control, 3) Problem solving, 4) Change point management (CPM), 5) Communication and 6) Efficiency improvement. Further, Yamashina present the World Classe Manufacturing (WCM) developed by Fiat and partnering firms in 2005. It is an integrated management system inspired from LM principals and made up of ten technical - and ten managerial pillars, illustrated as a temple. The ten managerial pillars are: 1) Management Commitment, 2) Clarity of Objectives, 3) Route map to WCM, 4) Allocation of Highly Qualified People to Model Areas, 5) Commitment of the Organization, 6) Competence of Organization towards Improvement, 7) Time and Budget, 8) Level of Detail, 9) Level of Expansion, and 10) Motivation of Operators [17].

Thus, the common goal of these different management and leadership models is to break the link with traditional management methods and promote an exemplary and effective leadership. So, implementing LM requires a comprehensive view of the phenomenon, which should be based on a holistic model comprising the various dimensions of LM, Lean Leadership, and performance management [5]. Finally, it is important to believe that there will be a positive impact on overall organizational performance if the OM systems are designed, or redesigned, appropriately to the LM specifications.

3. LEAN OPERATIONS MANAGEMENT SYSTEM MODEL - LOMS

The model elaboration is based both on an extensive review of literature on LM and on the findings from a various multinationals’ operations management systems studied in the last ten years.

Starting with a detailed analysis of a various multinationals’ operations management systems, a draft version of the model was developed. After conducting
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literature review, semi-structured interviews with several academic researchers involved in lean projects were conducted. The final version of the model was refined using semi structured interviews with a number of experts working in various multinationals based in Morocco whose production processes related to automotive and aeronautic manufacturing, and which are involved in lean and continuous improvement projects. The consistency of proposed model was examined through his response to seven criteria considered common and fundamental in LM and OM literature reviews that are:

- Accelerating the decision-making process
- Boosting the quality of products and activities
- Customer needs consideration and satisfaction
- Enhancing productivity and efficiency improvement
- Realization of the strategic and operative targets
- Quick response and proactive management
- Creating improvement needs.

![Figure 1 Lean Operations Management System model](image)

The model consists of five levels as presented in Fig.1. The framework presented here regroups the main dimensions of LM and shares many common characteristics with previous LM and OM taxonomies and frameworks. Although the schematization differs from other models, the underlying constructs are all quite similar. The main similarity is the “customer satisfaction” which is the rationale of LM and the essence of total quality management. Likewise, what the proposed model terms as “internal processes performance” is a special feature in the various LM taxonomies as well as in the contemporary performance management literature based on internal processes performance and non-financial indicators [2], [13], [14], [15], [18], [19], [29], [31], [32]. In particular, “problem solving” is a dominant characteristic and the fourth “P” in Liker’s pyramid (Philosophy, People, Process, Problem solving) [29], [30]. Finally, “Genchi Genbutsu” is at the heart of Lean Leadership philosophy for [16] and [29].

Nevertheless, the model differs from previous taxonomies and frameworks in several important ways. In fact, besides consolidation and recognition of different organizational dimensions of LM, operations and performance management, the proposed model uses accessible and easily concepts more likely to resonate with practicing managers. Likewise, the proposed model levels are configured to control the sequential order of their execution and provide a daily agenda for practitioners in exercise (Fig.2.). In fact, since customer always comes first, the proposed model compels first to review customer performance as customer complaints and alerts. Next, internal processes performance review (production, quality, logistics, maintenance…) is the following step, and productivity, efficiency and effectiveness
should be key objectives. Since a fall in performance at the customer or internally shall automatically trigger a problem-solving process, that process is the third step in the model. Once major customer and internal processes issues are identified and addressed, selection of proposals and the monitoring of Kaizen actions is the fourth step in the model. Finally, the “Genchi Genbutsu” provided the most effective tool for monitoring and quantifying the effectiveness and efficiency of past solutions decided in step 3 “Problem Solving”, and actions proposed under step 4 “Continuous Improvement”.

The proposed model also differs from previous taxonomies and frameworks in another important way. The main five steps of the proposal follow one another in an iterative process and each step is shown to be providing the ultimate solution for the next step. Too, the relationship between the five steps of the proposal is dynamic since there is a continual feedback loop between them that leads to constant reflection and analysis of results and, if needed, to enable one to return to previous steps to refine prior decisions. More explicitly, to reach the "Customer Satisfaction", "Process performance" must be performed. To do, “Problem solving process” related to troubleshooting at the customer and in all internal processes and “kaizen activities” must be boosted. To get there, exemplary leadership based on a spirit of “Genchi Genbutsu” must take place among all leaders and managers.

Figure 2 LOMS as a daily management agenda
4. LOMS MAIN ELEMENTS DESCRIPTION

4.1. Customer satisfaction
Lean thinking is more than an additional organizational approach: it conveys a particular attitude towards customers [32]. This is to create a system in which each non-customer satisfaction must be considered immediately be resolved at source, without delay, one providing a reliable answer on the root causes and actions kept to avoid recurrence in the future. For this, the company must define for each process a set of customer satisfaction related key performance indicators. A daily review of these indicators enhances reactivity and increase customer satisfaction in the hope that in the long term, the satisfaction will translate into loyalty.

4.2. Internal processes performance
LM is a methodology used to transform complex processes to a smooth continuous production flow, which delivers customer value more rapidly, improves workflow, standardizes processes and eliminates waste [39]. Management focus should be on eliminating these non-value-added activities, which do not enhance the customer's image of the product or service and do not support the business process. For this purpose, internal processes performance review is required to encourage managers and shop floor employees to focus on the critical elements of efficient operations and to provide effective links across the value chain [8]. This review must take place for every process and every day (Quality, Production, Logistics, Purchasing ...). It should help to focus on the five main critical inputs data for each process (Methods; Materials; Machines; Mans and environment) to determine the causes of non performance and propose appropriate solutions. More, the establishment of processes performance animation system integrating the three organizational levels of the company (strategic, tactical and operational), will lead to a logical overview of the overall performance of the company and improve synergy between the various processes.

4.3. Problem solving and learning
LM entails company must learn from its mistakes, identifies the root cause of problems, defines effective countermeasures and gives people tools to implement them [29], [30]. This approach also include the provision of timely information for identifying and eliminating activities that add no value, and identifying causal factors that may lead to manufacturing improvements. Thus, the presence of a problem solving system linking the three companies’ levels may significantly improve the predictive performance of processes, improves responsiveness in respect of one claim or complaint, reduces employee stressors and will increase their level and amount of involvement. Adoption of some problem solving tools like 8D, PDCA-FTA, and DANTOTSU may provide all employees with methodology and the steps for elaborating action plans and drawing upon the lessons learned from each problem.

4.4. Continuous improvement
Continuous improvements or Kaizen refers to the continual search for improvement and is recognized as one of the key principles of LM as developed by Toyota [22]. It’s to continually improve company performances through focused and structured improvement action, using a dedicated cross-functional team to improve a targeted work area, with specific goals, in an accelerated time frame [7], [22]. Thus, a
structured and integrated continuous improvement program should provide opportunities for both incremental continuous improvement and radical process redesign [10], [39]. For this purpose, the LOMS’s goal is to create a culture of continuous improvement and innovation. Especially, as a daily operations management system, LOMS’s model was created with the intention to allow facilities to identify and proactively address opportunities for improvement before they escalated to large-scale problems. Nevertheless, the proposed model must be underpinned by an unshakeable top management commitment to continuous improvement by more focusing on individual improvement projects and capacity building, creating a stronger foundation for a continuous improvement culture to be developed over time. Similarly, implementing structured continuous improvement programs requires that organizations invest both monetary and human resources in training, leadership alignment, focus on the customer, reward and recognition of team members, and communication of success and failures [7], [39].

4.5. Genchi Genbutsu

The reality on the shop floor does not necessarily become evident during a performance review meeting. Whatever reports, measures and ideas are transmitted to management are only an abstraction of what is actually going on in the shop floor to create value [16]. The only way to report on the status of a process, project or problem is to get down there and find out yourself [29], [30]. Monitoring the achievement of actions and solutions embodied in problem solving process (level 3) or kaizen activities (level 4) and validate their effectiveness and impacts constitute distinctive features of Lean Leadership. That is why the LOMS’s model as a daily management system was based on a well-defined and pragmatic methodology that begins with going and seeing in the shop floor. In order to properly treat a problem or a kaizen activity, the discussion has to take place in the real place “Genba”, in front of the real parts “Genbotsu”, and with the real data “Genjitsu” retrieved from persons directly involved in the shop floor. This obligation concerns, first and foremost, managers who have to go see themselves what is happening rather than looking at information regarding process issues from their office [29], [30]. For this purpose, Genchi Genbutsu is a key approach in problem solving and monitoring kaizen activities and his principle must remain at the heart of the LOMS model deployment.

5. CONCLUSION

LM as a way to achieve process excellence implies a radical change in how company drives its operations. Improving existing management systems and operational processes in consistence with LM requirements is a critical task and an emerging research topic in operations management literature.

The paper provided a conceptual model of operations management system consistent with the LM philosophy. The proposed model provides a powerful and sustainable means to rapidly get an overview and operations performance appreciation. The model combines the most important points that need to be addressed on a day-to-day basis from response to customers’ requirements to the continuous improvement of internal processes. Especially, the LOMS’ model should enable informed decisions to be made and actions to be taken because it allows supervising and quantifying the efficiency and effectiveness of all processes each and every day. For the company, the model can be used not only as a performance management support but also as methodological way to improve LM maturity level.
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and Lean Leadership practices. As a matter of fact, if LM literature advocates that several behavioral adjustments and managerial interventions may be necessary in each LM adoption, the LOMS’ model will be necessarily able to contribute to these adjustments by improving leadership styles, individual routines, and organizational cultures.

REFERENCES


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