

LEAN MANUFACTURING – PATH TO PERFORMANCE

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ABSTRACT

Considering the current economic and social context, I believe that any organization must set the main objective, the efficiency of the management methods, so that to be able to improve substantially the performance and competitiveness.

Throughout this article, I have tried to suggest that a very viable solution at this time, for achieving the performance, is the Lean Manufacturing. For this purpose, I start by a briefly describing of the principles and concept of this process management system, followed by presenting the steps for a successful implementation in production of this management strategy. Next, I presented the methods, techniques and tools that can be used and applied in this system, highlighting the advantages and the real benefits brought to the operational and administrative level.

Finally, I presented a few opinions on the approach, objectives and ways in which it can be fulfilled the goals of the Lean Manufacturing.

KEYWORDS: customer, management, performance, losses, processes

1. INTRODUCTION

In the current socio-economic context and in the conditions of more and more conspicuous globalization, Romania faces a number of problems, most of which seem obvious: lack of jobs, variation of the currency exchange rates and increasing the excises. Against this background, the performance was severely affected, and thus, the competitiveness of the Romanian companies, which led to a large controversy about the effectiveness of the used management methods, taking into account the unpredictability and the quick changes occurring in the economic environment. Therefore, I consider that a good knowledge of the organization, coupled with the implementation of some modern management strategies, like Lean Manufacturing, could be one of the viable solutions that can be put into the practice by the companies in Romania. The Lean principles can be applied in any field of activity, beginning with the series industrial production and ending with the services, whether they are administrative or medical. Opting for Lean Manufacturing, we surely find the answer to the several questions, mainly related to the productivity of the company, the value of stocks, the impact of wage growth on the company profits, the influence of increasing the price of the raw materials and the energy tariff on the cost production, the machine tools working capacity and the main obstacles that we face in the current activity.

2. LEAN MANUFACTURING – CONCEPTS AND PRINCIPLES

Being considered a system that tackles the process management in a revolutionary manner within an organization, Lean Manufacturing aims the complete elimination of the losses and the customer

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satisfaction. Also known as the "Lossless Production", this system works with minimum cost, so it produces more, uses less, due to the reduced production time and minimizes the losses. Lean Manufacturing is used today in relation to a "Six Sigma", a flexible system for achieving, sustaining and maximizing business success which aims the continuous improvement of the production, by identifying and eliminating the activities, which do not add the product value.

In this context, we can say that Lean Manufacturing considers having the value only what the customer is willing to pay. From this point of view, it outlines the need for the careful examination of the internal processes, for the added value and their losses to be able to take the best decisions for the improving the process performance through the maximizing the effects that add value for the customer through the minimize the effects that lead to the losses, or through the combination on the both categories of effects.

As regards the losses, they can be grouped into seven categories, so: first of them concerns the overproduction, at the manufacture of the products without to be requested by the client, the second group takes into account the time spent waiting when there aren't tools, materials or information necessary for the products processing when there are required, follows the useless or too long distance transport, the unnecessary processing, the unnecessary stocks, the unnecessary movement and not least, the activities to correct the errors of design or execution.

When there are identified the losses, the philosophy of Lean Manufacturing production does not consider the guilty punishment as a solution, recommending the analysis of the causes in a team approaching, in an atmosphere of the mutual confidence, respect and total involvement of the employee. Therefore, the losses are treated in a constructive manner, so that, once they are observed they become a real "trampoline" to improve the processes and their elimination will certainly bring more value to the customer.

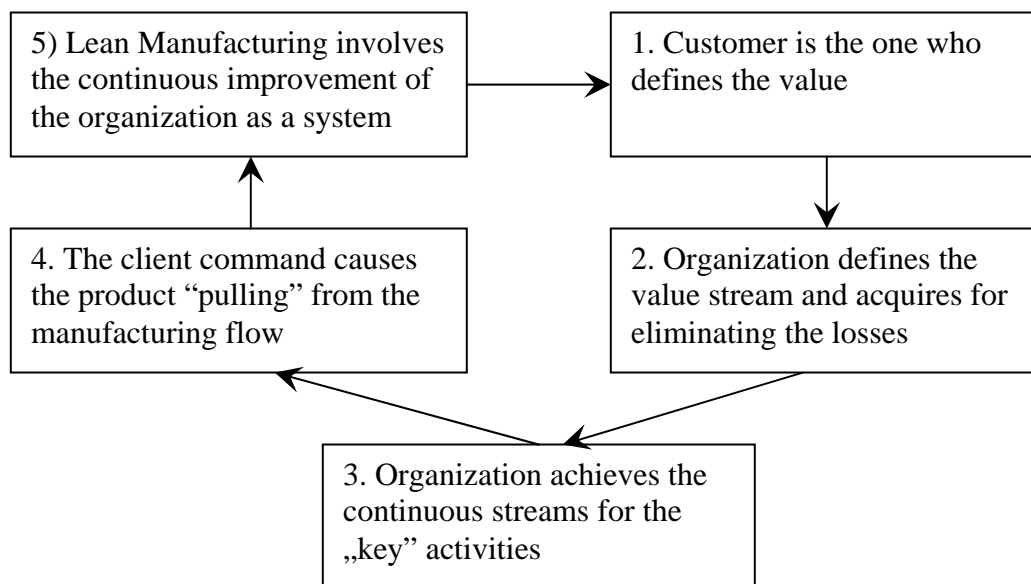


Fig. 1 – Introduction of the Lean principles in the manufacturing

Lean Manufacturing is based on the Kaizen production system implemented in the Japanese manufacturer of the Toyota automobile, subsequently being adapted by James Womack and Dean Jones in the U.S.A. and the Western Europe. In 2003, in the book "Lean Thinking Banish Waste and Create Wealth in Your Corporation" appeared in the U.S.A., the authors propose introduction of the

Lean system in manufacturing, recommending to the managers to take the following five steps: specifying the value of the products for the customer, identifying the activities that make the "value chain" and eliminating those that generating losses, optimizing the flow of the value-creating activities, providing facility for each client to apply the "pull" system for "pulling" the products from the manufacturing flow, and finally, the operational of the process and its repeated until it reaches the optimum level, when the losses are eliminated and the products value from the customer's point of view are maximized.

3. OBTAIN THE PERFORMANCE USING THE LEAN SYSTEM

To effectively implement of this strategy, there are required some steps, such as involving the analysis of the facts, determining actions to be taken to improve the processes and their implementation, followed by measurement of the results obtained in the new context and their evaluation.

The analysis of the initial situation is done using the synthetic or analytical data from the balance sheet, consulting the sales and revenue development and identifying the degree of satisfaction of the customer requirements, all to be able to ascertain what is the difference between what we could have achieved and what we have realized, in trying to maximize the results and minimize the consumption of human resources, materials, equipment, space and time. Doing so, the Lean Manufacturing objectives will aim to focus the efforts for creating the continuous flow of manufacturing, using a "Pull" production planning, which will involve all those on the production line, in a permanent effort to achieve the perfection. Basically, the Lean production becomes a flexible production, when the customers and suppliers are integrated in the production process, the workers have a proactive attitude at the workplace, the products have a wide range and can be executed in the required quantities at the high quality parameters and low cost, which allows the companies to react quickly and effectively both to changes the market conditions and to meet customer needs without using very complicated systems in conditions of the minimum investment.

To make the transition from the initial position to that desired, it may be used various ways, the Lean strategies grouped in two categories: on the one hand we find the revolutionary improvement strategies, such as "Blitz Lean" in which there are formed the internal team of specialists from all the departments who study and propose the process improvements with immediate effects in achieving the performance, but the costs are somewhat higher, on the other hand, we can address the Lean strategies for the continuous improvement, which involve identifying and solving the arisen problems with the help of an expert who observes the actual activities and a team of specialists who work together to find the appropriate technical solutions, taking action quickly to eliminate the unsuitable reported aspects. This last strategy has the advantage to eliminate of some losses, not affecting in any way the production volume or the rhythm during the intervention time, but and the disadvantage of some results not much different from the initial ones and whose sustainability can not be assured. Therefore, this type of strategy is only applicable when the company staff is fully loaded and there is not the opportunity to intervene simultaneously on the multiple organizational levels.

4. TOOLS, TECHNIQUES AND METHODS USED IN THE LEAN MANUFACTURING

The instruments used by the Lean Management system are diverse, and their application varies from one company to another, depending by the culture, strategy and the development of that organization. If we talk about a management system, we believe implicitly that this organization has achieved a certain level of maturity, and the continuous improvement of the process is already part of the organizational culture in a conjugate effort to eliminate of all it means non-value for the customers. In this process of

identification, solving the problems and fixing the value, all those involved are participated, and hence the customers, the solutions come from a good knowledge and application of the Lean tools, thus, there are eliminated the losses and the results have the long-term sustainability. However, if the organization is not ready to act as a whole, how it is required by the Lean philosophy, the improvements brought to the processes do not have a long life and are not sustainable, returning at the initial stage, simultaneously with the loss of enthusiasm and interest of those involved in their implementation.

To know the initial state of the processes, there are used calculating methods for the manufacturing time, methods of choosing and calculating for the manufacture indicators of effectiveness and efficiency, after which there are analyzed the processes and it is performed the Pareto analysis.

For the processes stabilization it is resorted to the statistical control - 6 Sigma, to the production planning methods as well as to the Theory of Constraints.

Lean Manufacturing provides to improve the processes, appealing to Jidoka (or the default quality), to TPM (Total Productive Maintenance), or TQM (Total Quality Management). Regards to the change management, the Kaizen methodology is used to solve the problems, to motivate the team, leadership and to reduce the rejections for the changing, so that for a continuous improvement by involving all the employees.

In the following, I shall present some of the methods, techniques and tools used in the Lean Manufacturing strategy, according to the field and their purpose ²:

- Necessary to know the state of the processes:
 - Choice and calculation methods for effectiveness and efficiency indicators of the manufacture;
 - Production flow chart;
 - Process analysis, cause analysis, Pareto analysis;
 - Work sampling;
 - Lean assessment.
- Necessary to improve the processes:
 - Work standards;
 - 5S;
 - Visual Management - Andon signals;
 - Poka Yoke;
 - Definition and analysis the product families;
 - Value Stream Map for the current and future state;
 - Methods of the production organizing in a continuous stream, of type "Pull" (production cells, Bucket Brigades, Kanban, Heijunka);
 - The rapid change of the manufacture through the SMED method (Single Minute Exchange of Die).

In the productive sections, where there is applied the visual management, to identify and to control effectively the processes, it is needed the order, cleanliness and strict rules for maintaining cleanliness. 5S is a methodology that contributes to improved productivity and maintenance, as well as to reduce problems that may occur on the line quality and safety at work, applied to a permanent organization benefit, cleanliness and discipline in the workplace. Its name comes from five Japanese words, all starting with "S" and includes five stages as follows: 1S (Seiri - Sorting and eliminating all the unnecessary objects in the workspace), 2S (Seiton – Stabilization, order, or in other words, reducing the time required to achieve the work tasks by storing accessories needed in a logical order so that they can be accessed quickly), 3S (Seiso - Shine, clean space in the workplace carried out by all employees, including managers), 4S (Seiketsu - Standards define the rules and procedures to be followed in order

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to maintain cleanliness) and 5S (Shitsuke - Support the changes, self-discipline in the current practice of the first 4S, supporting the change through total elimination of the unwelcome habits and using the best practices). When we refer to the activity in an office where the unsorted documents and not placed properly, might multiply until they take all the workspace, on the other hand, we take into account the Pareto principle, which states that only 20% of these documents help us to solve 80% of the assignments, we can say that 5S is the ideal tool necessary in order to break the deadlock, which will restore the order and remove the unnecessary documents from the work area.

Poka Yoke is a mechanism that is used to highlight the immediate production errors or to prevent their occurrence, thus not being allowed transmission of some damaged products on the downstream flow.

Using the Value Stream Map (VSM) it is plotted both a graph of the material flows and the people and information that contribute to a product family.

Kanban method provides the production control on the process flow, performing a downstream movement of the products, between the work stations.

Heijunka is one of the methodologies used in the planning of production for a given period of time, for a particular family of products, aiming the standardization of the charging position, respectively, the production line.

If we refer to the methods of reducing of the manufacturing change time, they include several options, such as Quick Changeover (QC/O), which reduces the resources required for the equipment adjustment when it occurs the manufacturing change, One-Touch Exchange of Die (OTED), where the manufacturing change is done "in one go" or Zero Changeover (zero change in manufacturing), which provides a lasting change in manufacturing or under three minutes, or at most equal with time which runs the full cycle of a processing operations. However, the best known is the SMED method, which reduces manufacturing change time less than 10 minutes, after there were performed a series of analyzes for reducing the losses caused by the organizational changes.

5. ADVANTAGES OF THE LEAN MANUFACTURING SYSTEM

Among the real benefits brought to the Lean production system at the operational level include: reducing of around 10%, the delivery time for an order for goods requested by a client, reducing the time spent for performing the process, increasing the productivity with a percentage close by 50%, increasing the product quality by identifying and reducing the defects, lowering the production areas by 20% - 50%, while maintaining the same performance, and reducing the inventory and the needed storage space by 20%. Also, the benefits will be at the administrative level by streamlining the order execution and by reducing the processing errors, increasing the number of orders taken from customers and processed by a single operator, while decreasing the time of delivery.

In addition to the aforementioned benefits, Lean Manufacturing has demonstrated that it can achieve a drastic reduction of losses, leading to a substantial reduction of the costs, which will have positive connotations in increasing the sales, improving the customer loyalty and hence increasing the profit margins, respectively of income, which will materialize later in the growth of self-financing and expanding the production capacity.

6. CONCLUSIONS AND OPINIONS

Lean Manufacturing System addresses in a revolutionary manner the process management within an organization and proposes a complete elimination of losses and customer satisfaction needs. Lean Manufacturing considers having value only what the customer is willing to pay.

Lean Manufacturing objectives aim to focus the efforts for creating the continuous flow of manufacturing, using a "Pull" production planning, which involves all those on the production line, in a permanent effort to achieve the perfection.

We can say that in the Lean Manufacturing must be understood that the value is given by the customer perception, so, when he wants something, he wants his request to be satisfied in the desired quantity, at the specified destination, quickly and at the best possible price. If there are deviations from these expectations, they will bring customer dissatisfaction and thus will affect the price of products, ultimately reducing the company profits.

Therefore, first of all, the Lean implementation must be reflected in an effort to change internally, knowing in detail the components of the real cost of production, allocated on the sources of expenditure, identifying and solving continuously the problems arisen, in order to change the organizational culture, and obvious, a continuous improvement of the processes.

The ways to achieve these goals are different and lead to a total or partial achievement of the proposed objectives, depending on the duration and the allocated resources, and accomplishments. If we consider that the prerequisites for the Lean approaching are satisfied, the processes within the organization are stable and controlled, we can decide to use the Lean Manufacturing, and then we must communicate to all employees (convincing them to accept it), together with the considered necessary skills to begin implementation of the proposed changes.

This improvement of the process must be ongoing, and if we start with the minor but numerous changes of the current work, the first improved results will soon appear, making felt their presence soon after the initiation of the changes. Instead, the efforts to create an organizational culture, which consider the continuous improvement process, require something more time. In addition, to achieve the performance, it is necessary to realize that the using of the Lean tools leads to the accomplishment of the objectives, only if in parallel there are addressed the specific aspects of the human resources management, beginning with the recognition of merit and ending with the implementation of a new motivating system of wages. The Lean principles can be applied in any field of activity, beginning with the series industrial production and ending with the services, whether they are administrative or medical.

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