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# Lean and Quality Management Integration: Improvement Program Implementation in a Service Company

## Abstract

Lean Thinking is an important pillar in the success of any program of continuous improvement process. Its tools are useful means in the analysis, control and organization of important data for correct decision making in organizations.

This project had as main objective the design of a program of quality improvement in Eurico Ferreira, S.A., based on the evaluation of customer satisfaction and the implementation of 5S. Subsequently, we have selected which business area of the company to address. After the selection, there was an initial diagnostic procedure, identifying the various points of improvement to which some tools of Lean Thinking have been applied, in particular Value Stream Mapping and 5S methodology. With the first, we were able to map the current state of the process in which all stakeholders were represented as well as the flow of materials and information throughout the process. The 5S methodology allowed to act on the wastage, identifying and implementing various process improvements.

## Keywords

Lean, Quality, Continuous Improvement, 5S, Value Stream Mapping, Visual Management

## 1. Introduction

The current global economic situation requires better management of the available resources, requiring a reduction in costs and improved levels of productivity and quality. The challenge of survival of organizations, allied to competition and technological agility, sprouted new organizational techniques, which seek to maintain the organizations in a constantly changing scenario, developing efficiently, agile and strong enough for the standards set by the new economic training of administrative systems society (Amasaka, 2007).

In this scenario, the global economy fits the concept of Lean Thinking. The basic principle of this philosophy is to combine new increasingly sophisticated organizational techniques to achieve higher levels of productivity and organizational efficiency with fewer resources.

Although it started in the automotive industry, Lean Thinking philosophy is increasingly used in other sectors of industry such as services, where Lean plays a role in reducing response times,

increasing levels of customer satisfaction, improving quality and reliability of service, optimizing business processes and reducing wastage, including time.

Programs for continuous improvement of processes have been increasingly a bet of companies. These programs have shown the efficiency of processes as well as the significant reduction of production costs / service.

In the case of Eurico Ferreira, S.A., because the market for energy and telecommunications is becoming more demanding, the quality and technological innovation of services and processes are increasingly impacting day-to-day operations in order to cope with the demand in the industry.

Accordingly, based on the criteria defined, it was considered appropriate to implement a program to improve the quality of the process in the landline telecommunication activity, particularly in the customer network to Vodafone at the level of backoffice and storage of materials, based on the following objectives: Framework themes of Quality Management and Lean concepts and methods of implementation, mainly focusing on the tools to use in the project's progression ; Identification/diagnosis of the process; Definition of the methodology of intervention; Set up of the Initial State Map Process; Implementation of improvement tools; Standardization of processes/procedures; Set up of the Map Final Status Process.

Thus throughout the project, various quality tools and lean, including flowchart, histogram, check sheet, 5S were developed and implemented as well as value stream mapping.

## 2. Methodology

This project was conducted following a case study in which five different main steps were followed: Literature Review, Diagnosis, Design and Implementation, Result Analysis and Conclusion.

The literature review focused on Quality Management, Lean Thinking, as well as some of the associated tools. Three methods for gathering information, including the consultation of databases and scientific publications were used.

After the collection phase, we analysed and sorted the information obtained in order to acquire a solid theoretical basis to support the project's progress thus enabling a detailed study, focused on improving the quality of Eurico Ferreira, S.A.

After reviewing the literature, we proceeded to the general diagnosis of the company's activities using certain tools and support, including 5W2H cause and effect diagram, to understand the planning of activities, delivery of service and subsequent measurement and validation of the results. Criteria for selecting the area of expertise that helped to identify and determine the area of acting were also established. Subsequently, the tools to use, especially the 5S methodology, value stream mapping and visual management were set up. The tools have been in place from the first day of May 2014, except for the 5S methodology that will continue being implemented until the end of 2014, however the improvements implemented were monitored and the customers' interviews recorded.

This paper is organized as follows: Section 1 introduces the scope of the paper. Section 2 presents the methodology used. Section 3 approaches the principles of Lean Thinking briefly. Section 4 describes the company and the process analysis; Section 5 identifies all the issues; Section 6 presents the lean tools and their implementation; Section 7 analyses the results of the implementation. Finally, in Section 8, conclusions from the project presented are drawn.

## 3. Lean Thinking

Lean thinking is a set of concepts and procedures intended to simplify how an organization produces value for its customers while eliminating all wastage.

Womack's book (1990) - "The Machine That Changed the World: The Story of Lean Production" was

the publication that popularized the Lean definition. The meaning of Lean reflects the fact that it seeks to use half the human effort in the factory, half the manufacturing space, half the investment in tools and half the time in engineering, in the design and development of a new product.

Taiichi Ohno and Shigeo Shingo cited by Womack (1995) during the development of Total Productive Management (TPS), defined seven major types of wastage in business or manufacturing processes which can be applied not only to a production line, but also to product development, order taking or the office. The term value can be metaphorically defined as quality divided by price. *"If you can provide the customer with a better car without changing price, value has gone up. If you can give the customer a better car at a lower price, value goes way up."* (Chase et al., 2006)

The seven major types of wastage are described in Womack (1995), as Overproduction, Waiting Time, Unnecessary transport, Incorrect processing, Excess inventory, Unnecessary movement and Defects, to which we add two extra types, unused employee creativity (Liker 2004) and energy consumption (Pinto 2009).

Techniques such as Visual Management, 5S, Value Stream Mapping were applied and evaluated in this study.

## 4. Company Description

As part of the Proef Group, Eurico Ferreira, S.A., works in the field of engineering infrastructures for Energy, Telecommunications and Renewables, with skills which the company to offer their customers integrated solutions covering the entire value chain.

This project focuses on telecommunications, especially Fiber To The Home (FTTH) project in the Client Network, as well as the associated logistics. The process includes the following steps.

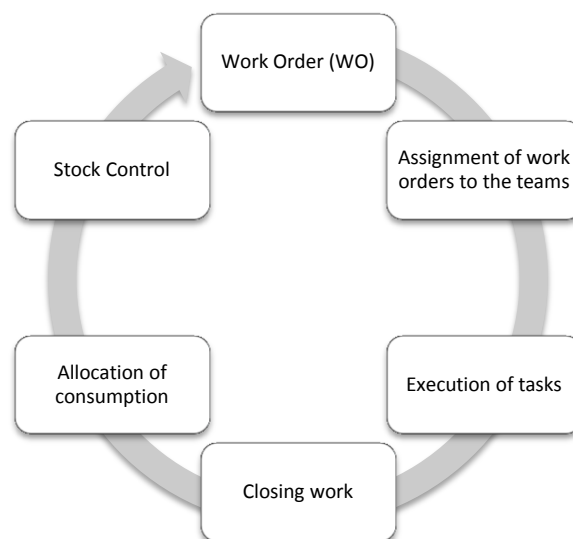


Figure 1 - Key steps of the process

### 4.1. Process Analysis

From a critical viewpoint, intent on identifying wastage in the process and how to reduce it, the process flow was analysed by value stream mapping, evaluating the company as a supplier to Vodafone, and later, during the 5S project, an ABC analysis of the most critical materials was made .

**Value Stream Mapping:** This tool enabled us to visually represent all the steps involved in the flow of materials and information. This mapping helped to identify the sources of wastage, providing a

common language to address the processes, making the flow visible and allowing discussion and decision making with supporting action plans. Thus, it is possible to achieve a continuous flow from raw material to the final service, guided by customer needs.

**Result of Client Review:** By analysing the issues needing improvement which were sent by Vodafone based on the suppliers' evaluation of, we were able to segregate the issues within the scope of the project (FTTH - Client Network) to create tools, define actions, plan strategies, and appoint those responsible for the necessary resources, as well as estimate the expected time for implementation. With the implementation of these actions, we expected to increase the quality of service with the goal of achieving operational excellence as desired by both companies.

**ABC Analysis:** As there is a large variety of products stored in the organization, a study to understand which products are the most important to management had to be carried out so that the project focused on this specific product or products. The ABC analysis proved perfect for this purpose. This analysis was done with the history of products stored and consumed by the teams in the previous semester.

## 5. Problems Identified

After carefully analysing the process in question, various aspects for improvement were identified. The problems were formalized through action plans, which listed solutions, deadlines for implementation and those responsible for monitoring and implementing the tasks.

Some problems were detected, such as the delay in the closing of the work and the consequent turnover of labor; failures in delivery of work orders; general lack of control of the operation, lack of space and organization of storage materials.

As possible solutions, we recommended the creation of a computer application that automatically synchronizes with the client's management software to eliminate loss of time at the end of work; analysis, selection and implementation of a new management software for the project in question; implementation of visual management in the backoffice and also in logistics; design and implementation of 5S in the warehouse; creation of multiple management tools for hierarchical levels and the creation of an Operational Performance Report often to share with the customer in order to analyse the course of the project and take actions to improve the results; establishment of operating procedures that support all activity and facilitate the integration of new technical teams and new employees for backoffice and logistics. Finally, to address the shortcomings found with the lack of storage layouts of various scenarios which were studied, it was possible to use more than 315 positions, corresponding to 50,400€ in storage, which were until now not being considered, as well as other management solutions which were implemented, namely the creation of carts for storage of small materials.

## 6. Lean Tools and Implementation

Value stream mapping made it possible to systematically identify all activities required for the process. Figure 2 shows the process flow before and after the implementation of Livesolution platform.

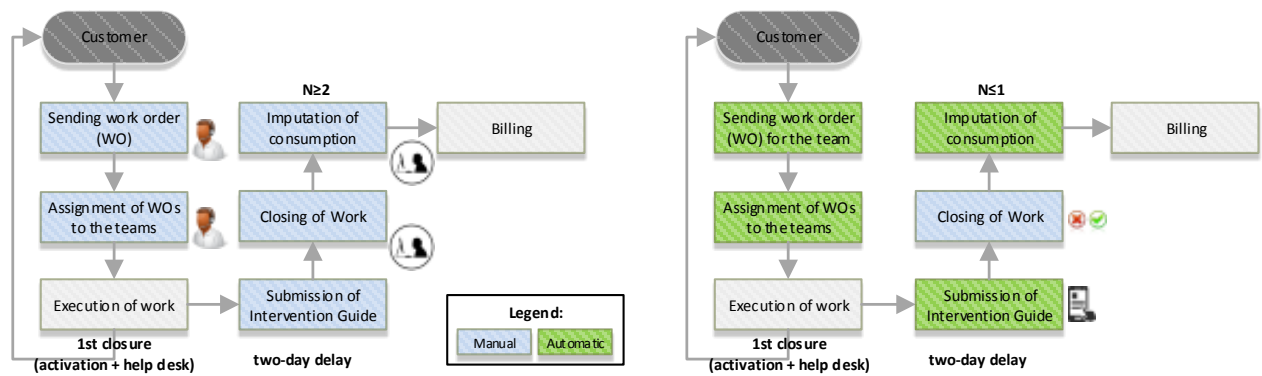


Figure 2 – Process flow before and after changes

With the introduction of the Livesolution platform there were several processes which are now made by the software itself, decreasing manual labor, routine, time on task, delivery errors of work order (WO) and also the integration of the materials used in the work (imputations), increasing control accuracy of the information flow, once it has come to be automated.

The Livesolution contributed greatly to the improvement of the process, including the charges, managing to keep  $n \leq 1$ , the production is being monitored in real time, and there is virtually no case pending.

It should be noted that the implementation of the platform was very successful, since the task consisted of 150 people align. At the end of the first week, nearly 100 employees has already used the platform, and at the end of the second week all teams, coaches, backoffice, managers and client were properly aligned with the new management process.

With the implementation of visual management in the backoffice, it has become possible to check the status of work orders in real time, see Figure 3.

Green means that the work order was opened and the set deadline was met, and that a new installation or support can be allocated to the free team. Yellow means that there is some problem with the work order: the team may not have opened the work order in time, they may have forgotten to close the work order or may be taking longer in the installation or support than the time defined. The color orange presents the unfulfilled facilities or supports.

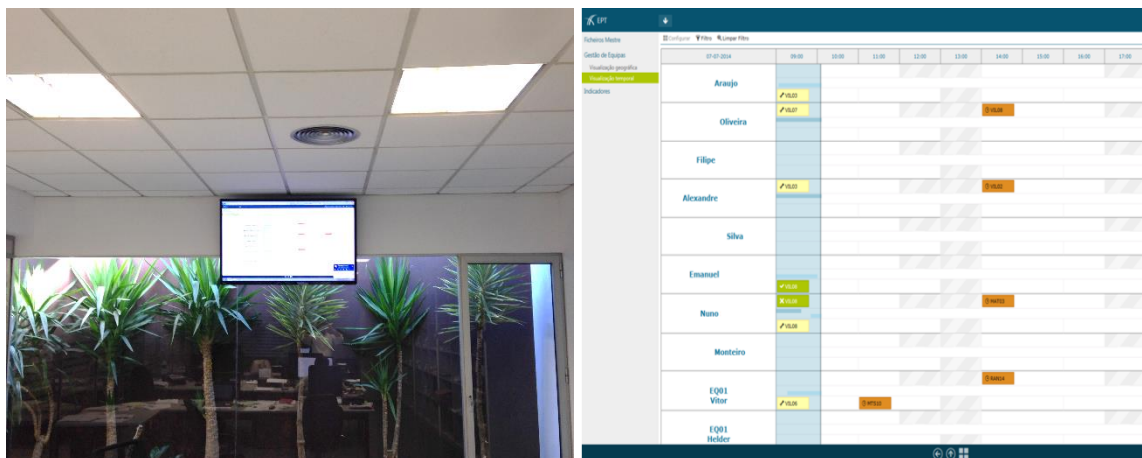


Figure 3 - Visual management - Map of daily situation (real time)

As a requirement of continuous improvement, we decided, with the logistics coordination, to proceed with the implementation of the 5S tool in Eurico Ferreira, S.A.'s warehouse for products dedicated to the Vodafone customer. This tool was chosen for its strategic importance and also because of the problems previously found, regarding the organization of the physical environment.

In the first S, (SEIRI), all materials were separated by utility factor. Materials found useful were properly stored in locations defined for this purpose, taking into account the frequency of use.

The materials that were of no use were separated and disposed of or taken to each local team, tool, reuse, other business areas, etc.

This step counted with a major involvement of all employees in the area, as they contributed to the identification and assessment of the relevance of each object.

By connecting the ERP inventory management to a worksheet, the removal of visual information on the current state of the stock was possible, see Figure 4 and 5.

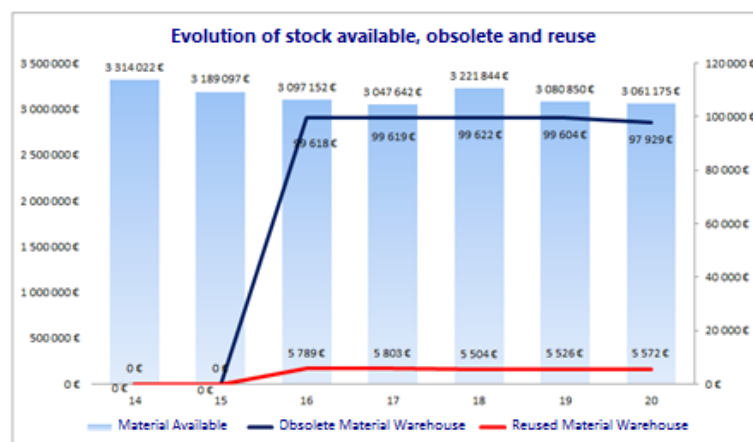


Figure 4 - Evolution of available stock, obsolete and reuse. Source: CEO Department at EF

Figure 4, shows the progress of materials available, obsolete materials, and materials reused from week 14 to week 20.

Initially we considered obsolete materials and reused 0, which meant that there was no material needed for the construction work, which would take up storage space and cost the company with no practical purpose.

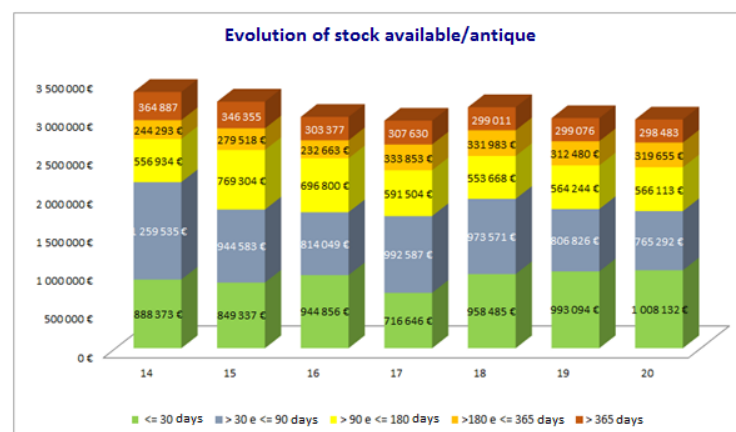


Figure 5 - Evolution of stock available/antique. Source: CEO Department at EF

In Figure 5, you can check stock progress by number of days of storage. Within 7 weeks, 365 days old stock, which fell € 66,404, was redirected to the wastage operator or reused in other business areas, such as exports.

It is important to note that no procedure existed in this area, and some of the implementation time of the project was spent on this activity.

Several changes in the physical layout of the confined space of the warehouse were made, allowing the use of another 315 positions corresponding to 50,400€ for storage which had not been considered, until the moment.

Regarding the standardization of the job, the main proposal made involves the implementation of the first three S's, which is why a decision was made to train employees and create two visual instructions to assist this task on a daily basis.

Carts, to accommodate sixty small boxes of materials, were also acquired for the point of entry of the materials. These carts have enabled employees to keep a better posture in the workplace, thus contributing to the reduction of accidents at work, see figure 6.



**Figure 6** - Solution for the reception and packaging of small sized material

One of the high advantages of implementing such tools and methods is the low cost of implementation.

## 7. Result Analysis

The implementation of Livesolution management platform has eliminated several manual steps in the procedures that were carried out by the user so far, and which induced consecutive errors due to the excess of information to be entered manually in the system. The platform thus promoted a greater control and accuracy of information flow.

The success rate was very high and in two weeks all employees, approximately 150, were properly aligned and synchronized with the platform.

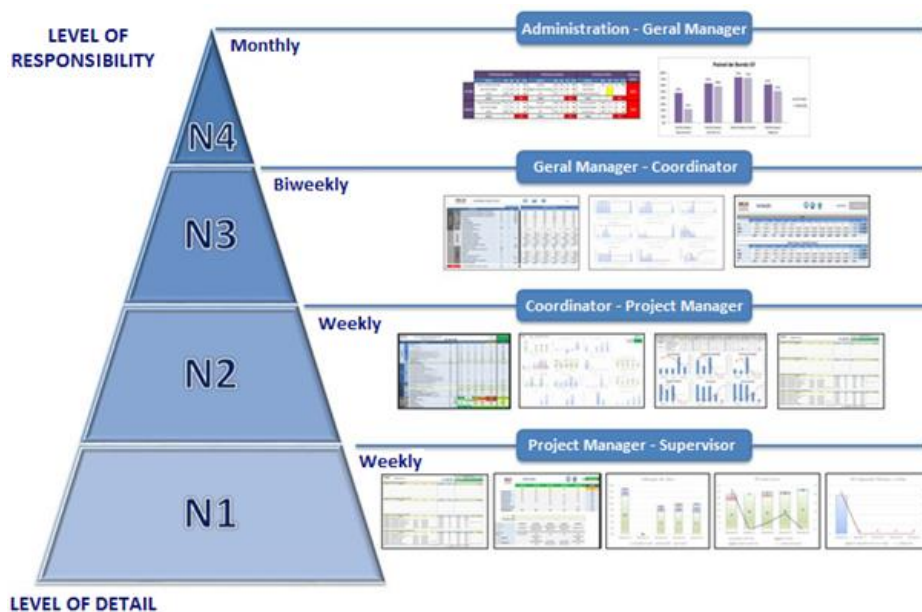
We can say that the implementation of Livesolution met the company's objectives; increased the service quality and achieved operational excellence. The objectives are measured / monitored using a Service-level agreement with Eurico Ferreira, S.A.; bonuses received in recent months attest performance.

As for the implementation of 5S in the warehouse, we can say that it was a valuable tool because one of its main objectives was to improve organizational efficiency that identified the commitment to quality.

The results obtained so far demonstrate the importance of implementing 5S, to which an increase in

productivity of around 35%; the efficient use of space packing materials; the use of over 315 positions, corresponding to € 50,400 worth of storage which was being wasted until then, testifies.

Beyond the implementation of the platform and the 5S project, different hierarchical level management tools were created such as a report on the general direction of economic operational performance, customer and overall business performance at the level of administration; the coordination of the executive summary and billing at the level of general direction; the project management report operating performance and analysis 10+ there at the coordination level; and, finally at the level of project management, 10+ supervision analysis, detail of penetration, use of graphs on workforce, ongoing projects and projects awaiting completion for more than five days; see figure 7. These tools allow us to monitor the entire operation of the customer's network in real time and can make important decisions and act on the field or raise backoffice operation to levels of excellence.



**Figure 7** - Tools by Level of Responsibility. Source: CEO Department at EF

## 8. Conclusion

As demonstrated in this study, the Lean philosophy as well as quality management are an innovative aspect in services, making them more competitive for their potential to reduce costs and increase customer satisfaction by reducing wastage, improving service quality and guarantee deadlines.

The proposed model had at its core the application of tools: Value Stream Mapping, 5S and visual management methodology. All the tools applied showed that it is possible to visualize the losses and opportunities for improvement of the system, centered on the process as a whole (optimization of information flows) rather than just the conversion operations (localized optimization).

Being implemented with the cooperation of stakeholders helps to improve the relationship between them, establishing a common language to find solutions that fit the interests of all parties.

The application of tools alone does not suggest solutions; it merely highlights the problems encountered in the process. The solutions depend on the team's theoretical, technical and process implementation and also on how staff perceive the improvements.

The model provides a top-down approach with top management and decision-makers intervening and enforcing it. The tools provide them with more control over the status of the process. Because these



records provide easy reference, which can be obtained daily or weekly through charts, tables, diagrams, pictures or indicators, and updated regularly.

This work helped deepening the knowledge and understanding of some problems and wastage related to the sector of telecommunications and logistics in Portugal, and to introduce concepts and tools that emphasize the need to improve process efficiency in line with a "doing more with less" approach instead of high investments in technology.

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