

Optimization of Backorders Processing using Lean Principal

*Camille M. Gerena Fonseca
Master of Manufacturing Competiveness
Rafael Nieves, PharmD.
Industrial Engineering Department
Polytechnic University of Puerto Rico*

Abstract — *In this article we discuss the optimizations made in the area of drugs controlled specifically in the narcotics vault, in a distribution center. The distribution center dispatches narcotic pharmaceutical products for pharmacies and hospital institutions that request it. A team of employees identified the problem that was the visibility of the backorders, together with them they collaborated to find solution methods. As tools for problem solving, the Lean Six Sigma philosophy is used. With this philosophy, ideas were shared and the DMAIC methodology was implemented. Through this methodology, a SIPOC diagram was made, which helps to understand the whole process that takes place in the area of narcotics. As a result of all the implementations, the backorders were visible, thus making a faster dispatch, because the narcotic is immediately available.*

Key Terms — *Backorders, Distribution Center, DMAIC, SIPOC.*

INTRODUCTION

The Drug Distribution Centers it is an infrastructure in which products are stored and orders are issued for their distribution. These are responsible for the sale and delivery to hospital institutions and independent pharmacies. This project will focus on the area of distribution of narcotics where there is a process that seeks to optimize to be of greater benefit to employees. This process is that of the backorders that are generated daily due to the lack of the merchandise requested in inventory. As these are generated, they are notified to the pharmacy or hospital by a document that is attached to the narcotics box dispatched. The company takes a copy of the backorder document and it is placed in a file, which makes it invisible to employees. As there is no visibility of the

backorders this delays the process, because once the narcotics are available they are not dispatched immediately, taking the risk of being sold to other customers or ending up with the time granted of sixty (60) days to dispatch the order and it ends canceled. With the creation of a method to make visible the backorders, this would support the form being canceled due to lack of visibility

Research Description

Together with the team of employees, it looks for the creation of methods for improvements in the process of backorders. The optimization methods are based on Lean Six Sigma [1]. This philosophy helps us with the tools of design, analysis and implementation, for a better quality and speed, as a support in the improvement of the process with the arrears. With these tools the current and future process must be improved, this project is helpful for the distribution center because it can improve and increase the dispatch of pending orders.

Research Objectives

The main objective of this project is to standardize the process of making visible the backorders. Standardizing the process would be of great support to the employees because they would not have to look in the file where the backorders are placed, making this process a faster one. With the improvements it is expected that they will be dispatched as soon as the narcotic is received, for these dispatches there is a period of sixty (60) days after sending the notification. It also seeks to make a fixed location for these narcotics. With the fixed location is expected to support the employee to have a better visibility than they had previously. As another objective is that for the implementation of the methods the company does not incur expenses, thus making a cost effective project.

Research Contributions

This project aims to achieve the method created to make visible the pending orders of standardized funds. Achieving standardization of the process would be an increase in productivity and in the dispatch of narcotics. The employees have not had to invest time in constantly searching the archives, since all the information was accessible, therefore, this is a faster and more efficient process. As part of the project, it is also sought to place narcotics in fixed locations, in order to support employees to have greater visibility of these and to identify backorders.

LITERATURE REVIEW

Distribution Centers require logistics for their operation, since they are responsible for storing and selling different products to companies that request them. In the case of this project the distribution center is one of drugs and medical surgical articles, the area of impact for this project will be the area of narcotics. In this area, what is sought is to improve the process of dispatching backorders, making this a more efficient process. The improvement of this process means an increase in the dispatch and distribution of narcotics. Considering the needs of industries for the improvement of processes, there are different philosophies with several applications that can be implemented in all types of business.

LEAN AND SIX SIGMA

Lean in the Industry is one of the most famous methods for the optimization of processes eliminating waste, which means that it simplifies everything to reduce costs and increase efficiency in employees. Constantly in the processes there is waste without being visualized, making this process a longer one. When waste is considered as processes that do not add value, what this represents is problems in execution [2]. With Lean you can perform case studies to find if there is any waste, this analysis is not limited to the industry, it can also be done in centers that offer some type of service. Of the things that stand out from Lean is quality and

productivity. When working with Lean on many occasions it is complemented with Six Sigma, which is a strategy that seeks the capacity of a process to reduce variations, focusing on critical aspects for the client [3].

This strategy is based on statistical methods that employ quality tools and mathematical analysis, these can be used for the design of products or for the improvement of processes. Lean Six Sigma are two processes that combine to create a procedure that is efficient and capable of reducing waste and variations.

DMAIC

DMAIC [4] is a structured problem-solving methodology that directs a lean team's activities by defining a problem, implementing solutions linked to underlying causes, and establishing best practices to make sure the solutions stay in place. The overarching focus of the methodology is understanding and achieving what the customer wants, since that is seen as the key to profitability of a production process [5]. Each acronym has a meaning from Six Sigma: Define, Measure, Analyze, Improve and Control. In Define is where the problem and goals are established. For the second phase, which is Measure the performance of the process is measured after that, with the third step Analyze, all the variations and deficiencies in the execution of the process are verified. The last two steps of DMAIC that are Improve and Control, are where the faults are eliminated from the process and a new one is implemented with a view to improvements in the future.

The first three steps of this methodology are for an in-depth study of the process, steps four and five are implementation and continuity. This methodology helps to establish the priorities of a project as well as to understand the real requirements so that it can be carried out. For the successful implementation of this methodology in a process, it must be documented and transferred to make the new procedure known.



Figure 1
DMAIC

5S PROCESS

The 5s methodology is a very famous and widely used in companies, to create risk-free work areas. For the creation of an organized, clean, safe and high performance work area [6], all the steps covered by 5s must be implemented and these are; Sort, Simplify, Shine, Standardize and Sustain. Sort is the first phase, where objects that are not needed in the work area are searched and identified. For step two, we have Simplify, this is where the work area is visually organized, the borders are established and the areas are labeled. In the third step Shine where continuous cleaning processes will be created, to keep the work area ready for daily operations. Standardize is the penultimate step where the implementation of the previous steps is reviewed, using visual controls helping the employee to maintain a safe and orderly work area. All these processes must be documented in an order of operation in order to have a record of what is being implemented and how it is implemented. As a final step we have Sustain is the discipline that makes this process a continuous and that is in constant improvement. All these processes must be constantly reviewed to know if they are being executed in the way they were established or if they need to be modified for improvements.



Figure 2
5S

METHODOLOGY

For this project the main objective is the search for visibility in the backorders that is why several methods will be implemented with the help of the Lean Six Sigma methodology. The DMAIC methodology will be used as a support tool for the improvement of the backorder procedure. The first phase in DMAIC is where the objectives of the project are defined, the criteria that must be taken into account to make changes and a SIPOC diagram is created, which helps us to have a strategic plan identifying risks in the process. In the Measurement phase, the current performance of the process will be determined. Modifications will be made so that the process is completely effective. With the notes taken in the process measurement, you will support us in the Analysis phase. During the Analysis the causes of the problem will be determined and opportunities for the improvement of processes will be identified. As methods of implementation in DMAIC are the last two phases these are key to all the improvements that want to be implemented correctly. The last two phases are the Improvement and Control, in Improvements the optimization of the process is implemented, the final solution is verified and how this will impact the employees and the company. As a final phase we have the Control, where the project will be developed in order to maintain the improvements in the process. Before the processes

to be implemented, you must have an exact date when the change will be in order to keep all the employees informed.

As another method of implementation, the 5S methodology will be used to maintain an organization and a continuous evaluation for the maintenance of optimal work areas. Also as part of this methodology will be placing fixed locations to expedite the process at the time of being dispatched. In Sort, everything that is not necessary in the work area in the vault will be removed. For the Simplify stage, the relocations made of the narcotics will be shown, the changes will be labeled and edges will be marked in the relocated work areas, as part of these steps, the Shine stage will also need to be implemented. Shine is where the equipment and work area are cleaned, stop them daily in optimal conditions. The fourth stage is standardized, in this case a process of everything achieved is established and kept within reach of employees. For the last stage we have the Sustain, we must sustain what has been done and establish the changes with the company's standards. In order to maintain a continuous improvement process, employees must be guided and maintained with continuous information.

RESULTS AND DISCUSSION

As part of this project we took into consideration the Lean Six Sigma philosophy that supported us in solving the problem of having backorders not visible to employees. For the development of the project Lean Six Sigma philosophy was introduced. The DMAIC methodology was implemented, with its five steps to solve problems. For the implementation of this methodology, it began by listing the goals and objectives that were to be obtained as a final result of the project, then began to work with the phases of DMAIC to have an organization and documentation in the process.

DMAIC Phase

As part of the first phase is Define, a sponsor was selected to evaluate the problem and a SIPOC diagram was made (figure 3). This diagram allowed us to visualize step by step in a simple and clear way what was the root of the problem in the dispatch of backorders. Also as part of the first phase it was chosen to implement a 5S project (figure 4) to obtain an optimal work area so that the work can be executed quickly, having at hand the necessary tools.

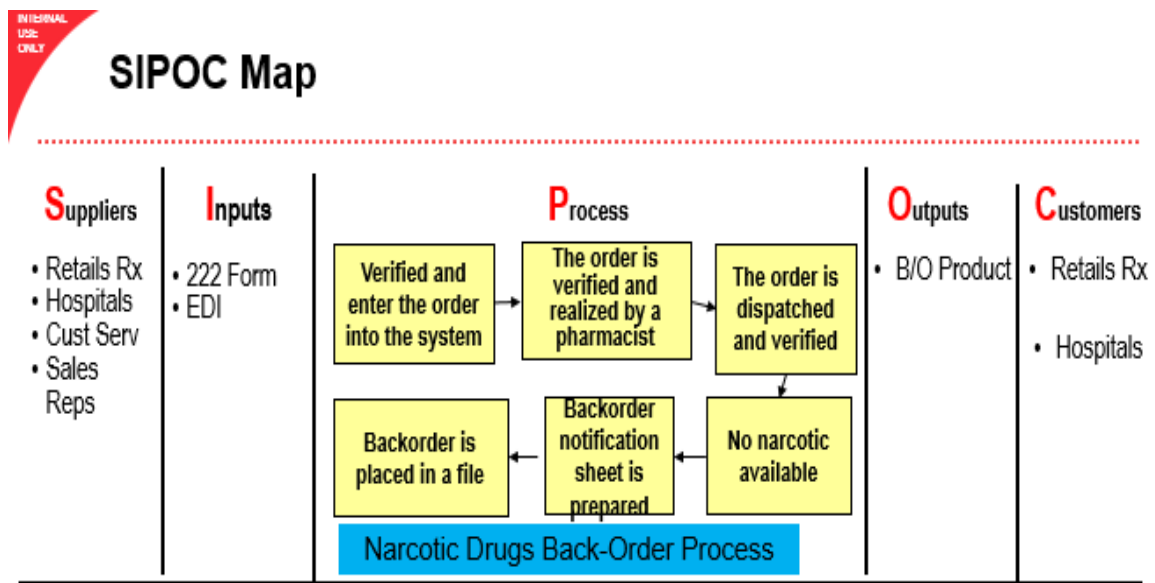


Figure 3
SIPOC Diagram

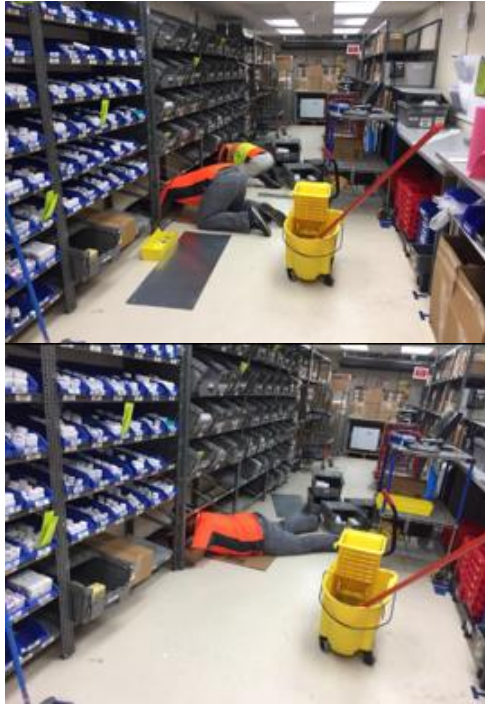


Figure 4
Implementation of 5S

The second phase, which is Measure, here the team identified the variables in the process and made recommendations for actions to be implemented. For the Analyze phase, the steps that give value to the company and those that do not give it value were identified. It was identified that the problem in the process is one that adds value to the company because it is one that requires delivery time. When the visible backorders were placed, I support that the orders are immediately dispatched, the available

narcotic, avoiding the client having a longer waiting time, thus fulfilling all before 60 days. For the penultimate step we have Improve, here the solutions evaluated in the previous phase were implemented. The sheets of backorders were placed in the trays and the space was optimized. Some narcotics were relocated (figure 5) that required more space because they are more mobile, they were placed at the beginning of the rack where they had nothing located. Every plan implemented was in accordance with all regulations to which the company is governed. As a final step we have the control, where the transition plans were documented, the operational processes with the modifications and a plan for process control was created. Every process implemented was documented to have evidence of how it was carried out and also in case of an internal or external audit.

5S Phase

As part of 5S the narcotics were placed in fixed locations. These locations were prepared with an exclusive coding for that narcotics, as well as with an identification card (figure 6) where it was prepared with a photo. By placing the identification card it is easier for employees to identify and dispatch faster. This process will be carried out with the passing of the weeks, since there are several locations.



Figure 5
Narcotics Relocation



Figure 6
Identification Card and Narcotics Relocation

CONCLUSION

During the design of the project methods were presented to solve the problem, when the viable alternative was implemented, it was studied for possible modifications in the process. These modifications in the process were possible due to the implementation of the Lean Six Sigma philosophy. This was implemented with the purpose of making improvements in the process without affecting the employees as well as the clients. To be able to dispatch an order when it becomes a backorder, the distribution company has 60 days. When the sheets of backorders were placed in the trays of the narcotics, this immediately increased the dispatch and the orders leave more quickly because you do not have to spend time searching them in the file where they were located previously. Customer satisfaction is supposed to increase because

backorders are dispatched once they are available. Dispatching once they are available avoids the risk of the narcotic being sold to another pharmacy or hospital institution that so requests. The DMAIC methodology was also used, where the 5 steps were carried out to solve the problem in a more organized way, and a SIPOC diagram was also made. With the diagram we define all the steps in the process and how they could be modified without the need to affect other steps.

REFERENCES

- [1] GoLeanSixSigma. (n. d.). *The Basics of Lean Six Sigma* [Online]. Available: <http://www.GoLeanSixSigma.com> [Accessed: 15 Noviembre 2017].
- [2] GoLeanSixSigma. (n. d.). *DMAIC: The 5 Phases of Lean Six Sigma* [Online]. Available: <http://www.goleansixsigma.com/wp-content/uploads/2012/02/DMAIC-The-5-Phases->

of-Lean-SixSigma-www.GoLeanSixSigma.com_.pdf.
[Accessed: 21 Noviembre 2017].

- [3] D. Hadfield, S. Holmes, S. Kozlowski and T. Sperl, the Lena Healthcare Pocket Guide, 2012.
- [4] M. L. George, D. Rowlands, P. Mark and J. Maxey, *Lean Six Sigma Pocket Toolbook*, Mc Graw Hill, 2005.
- [5] F. R Jacobs, R.B Chase, "Operation and Supply Chain Management", 3rd Ed., New York: McGraw-Hill, 2013, Ch. 10, sec. 2, pp. 313-315.
- [6] Lean Manufacturing Tools. (n. d.). *Benefits of implementing the 5s process* [Online]. Available: <http://leanmanufacturingtools.org/194/benefits-of-implementing-the-5s-process/>. [Accessed: 21 November 2017].