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Lean Six Sigma in the Energy Service Sector: A Case Study

Mihnea-Dorin Bloj[a], Sorina Moica[a], Cristina Veres[b,*]

[a]George Emil Palade University of Medicine, Pharmacy, Science and Technology of Tirgu-Mures, Gh. Marinescu street, 38, Tirgu-Mures 540142, Romania

[b]Technical Universiy of Cluj-Napoca, Memorandumului street, 28, Cluj-Napoca 400114, Romania

Abstract

Nowadays, the pressure of competition in the energy sector is high. A company that wants to make a difference should continuously run optimization projects. The purpose of this paper is to illustrate the application of Lean Six Sigma in the service sector of one big energy company. Following the specific Lean Sig Sigma steps, the company exceeded the established target, significantly improving actualization rate from 2.6% to 20% in just 3 months.

Keywords: energy sector; improvement; lean six sigma; project charter; sipoc map.

1. Introduction to Lean Six Sigma

Lean Six Sigma (LSS) integrates two distinctive management philosophies: Lean and Six-sigma [1] complementing each other in order to improve enterprises processes and results [2]. Lean Six Sigma combines the "lean" emphasis on waste reduction with the "six sigma" emphasis on quality improvement as the means to increase efficiency and reduce cost in all processes. This fusion occurred as Lean cannot bring a process under statistical control and Six Sigma alone cannot dramatically improve process velocity [3, 4]. The evolution of Lean Six Sigma (LSS) within the optimization process in services presents a positive ascending trend and this is confirmed by the

* Corresponding author. Tel +4 0 741 353 853.
E-mail address: cristina.veres@tcm.utcluj.ro

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increasing number of publications in the last years. In his work, R.G. Schroeder et.al. defined Six Sigma as "an organized, parallel-meso structure to reduce variation in organizational processes by using improvement specialists, a structured method, and performance metrics with the aim of achieving strategic objectives" [5].

Lean Six Sigma approach uses the problem-solving methodology DMAIC:

1. Define - in this step the team is formed, the Project Charter is developed, the Costumers' voice is analyzed, a process map is created;
2. Measure - the actual performance is measured;
3. Analyze the results of measurements, determining the causes of process imperfections and possible solutions for them [6].
4. Improve - the team generates and selects a set of solutions to improve sigma performance [7].
5. Control – ensuring that improvement sustains over time [8].

2. Case study concerning Lean Six Sigma Implementation at a Call Center department

The project was done for a Call Center managed through the Residential Customer Relations teams, the interaction of the company with its customers, by telephone and email, constantly focusing on shortening the customer's waiting time, preparing colleagues for the most enjoyable interaction and promptly solving requests by improving internal processes.

Call Center activity takes place through four Residential Customer Relations teams to respond to customer questions and requests on topics such as: terminating, changing or terminating the contract, explaining the invoice, explaining how the invoice is paid, disconnect / reconnect, and other information. By telephone, IVR (Interactive Voice Responder) gives customers the ability to automatically transmit the self-counting index and obtain general information. For the success of these actions, retention strategies are constantly updated and verified from the point of view of effectiveness, so as to maintain the customer portfolio and increase it by attracting other potential clients.

In the context of market liberalization and the diversification of customers' preferences in looking for the best energy company, it's very important to adapt quickly to market needs and develop a certain level of agility, to rapidly test products and new services, improve them throughout their lifecycle and adapt the sales approach.

2.1. Define

A project charter is the first step in the Lean Six Sigma methodology. It takes place in the Define step of DMAIC, and the charter can make or break a successful project. It can make it by specifying necessary resources and boundaries that will in turn ensure success; it can break it by reducing team focus, effectiveness and motivation.

Table 1. Project Charter

Problem Statement	**Project Scope**	**Objectives**	**Key process measurement**
The company receives 60.000 calls/month. The established target for 2018 was to update the data base with 10% of calls (add e-mails and phone numbers). The company achieved only 2,87% in 2018.	Increasing the efficiency of interaction from 2.87% to 10%	-Digitalize the data base collection; -Maintaining actualized their data base of customers; -Reach easier the customer; -Increase retention rate; -Increase lead generation for product sales; -Standardize the process data base collection;	-60.000 calls/ month; -80% of them are answered; -The target for each call is 3 minutes; -The average waiting time for each call is 90 seconds;
Timeline	**Deliverables**	**Leveraging Opportunities**	**Project Team**
Define February, 15 Measure February, 20 Analyse March, 1 Improve March, 10 Control March, 25	-Reports; -Process data; -Process steps; -Documents plan; -Internal information; -Standardized process steps	-Tools; -Test results; -Project Plan; -Intern process; -Prioritized time; -Standardized work flow; - Achieved performance improvement in Operational Excellence	- Green Belt team - Supervisor Operational Excellence - Process owner

Beside the Project Scope, Objectives, Deliverables and Team, in the Project Charter we define what are the measures that we'll use to determine effectiveness of the project. In our case the cycle time of call center activity and numbers of calls/month as well as the waiting time are necessary measurements and they are within the scope (process start/stop points) of your project.

After this, we created a SIPOC (suppliers, inputs, process, outputs, customers) map – that is a visual tool for documenting a business process (please see fig. 1), and we analyzed the Customer's voice. The main process of call center activity can be divided in three steps: 1) Gather customer information; 2) Checking the problem and 3) Solving the problem. This steps were defined as a preparation for measurement system analysis.

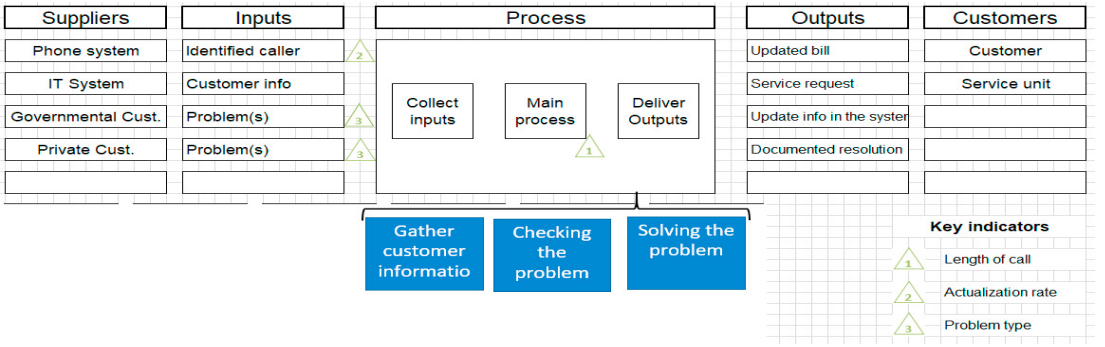

Fig. 1. SIPOC Map. Identifying Suppliers, Inputs, Process, Outputs and Customers.

2.2. Measure

Then, we passed to the Measure step, by continuing the DMAIC process described in the 1st chapter. The data was operated with Minitab18 and we tested our collected data to see the differences between the operators and check the process capability. In the fig. 2 (a) we can see the call duration by each of the 3 operators. All of them show fluctuated process data results, under and over 180 seconds. A Process Capability Report for duration of calls was generated. Our initial hypothesis was that we don't have significant statistical differences between the operators and that our process is stable for the three process steps defined initially: 1) Gather customer information; 2) Checking the problem and 3) Solving the problem.

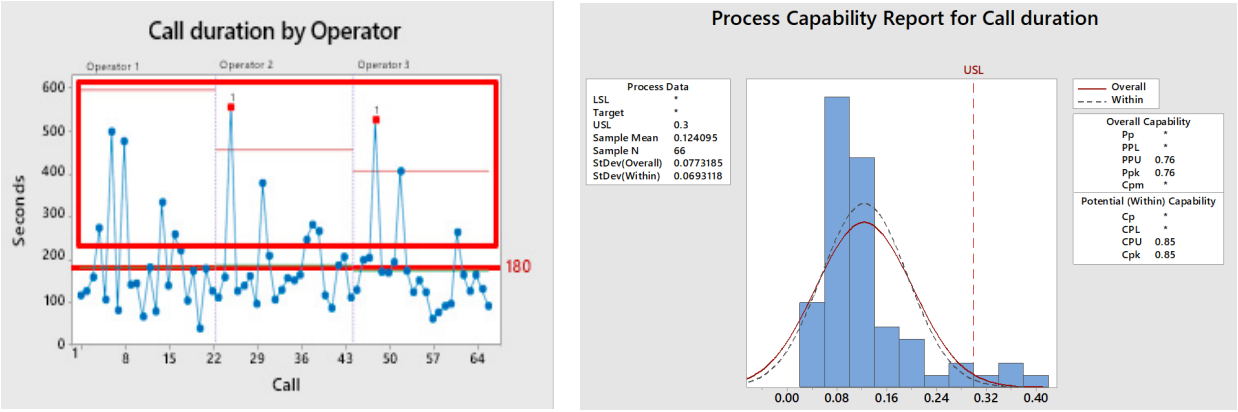

Fig. 2. (a) Call duration by operator; (b) Process capability report for calls duration.

In figure 2 (a) we can see the total call duration by operators. This graph indicates some difference between them: the 3rd operator have the average time under 3 minutes and reach the best talk time, for the first operator we want to identify the cause of variance, for the second one - identify the cause of the increasing trend.

The results of calls duration for all the operators are visible also in the Process Capability Report (see figure 2 (b)), and we observe a capability value equal to Cpk =0.85 having upper superior limit (USL) of 3 minutes. With those results we have to investigate what is happening when the call is not in the establish target limit.

2.3. Analyze

Firstly, the analysis aimed to understand the reasons why customers are dialing the call center. Figure 3 (a) presents the results of this analysis. We can notice that 65% of the calls are about bills. Further we will to concentrate our attention on this issue. We have used ANOVA analysis (figure 3 (b)) to check if there are important statistical differences between the main process steps, and as we can see the average time for checking the problem and customer information have almost the same values (50 seconds), and the operators are using the biggest part of the call for solving the problem. By this we observe that the company focuses on their clients and in general they succeed to offer the solutions for almost all problems.

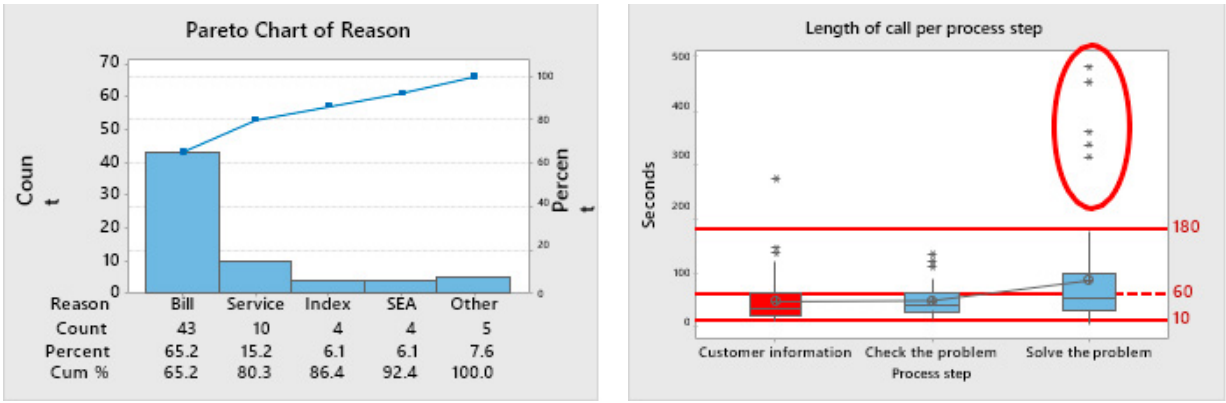

Fig. 3. (a) Pareto chart of call reasons; (b) Length of calls per process steps.

Because we have a target of 3 minute per call, we considered that checking customer information takes a lot of time and we decided to start the detailed analysis by observing the cycle time variation of collecting customer information by reason and by operators and this is illustrated in figure 4 (a) and (b).

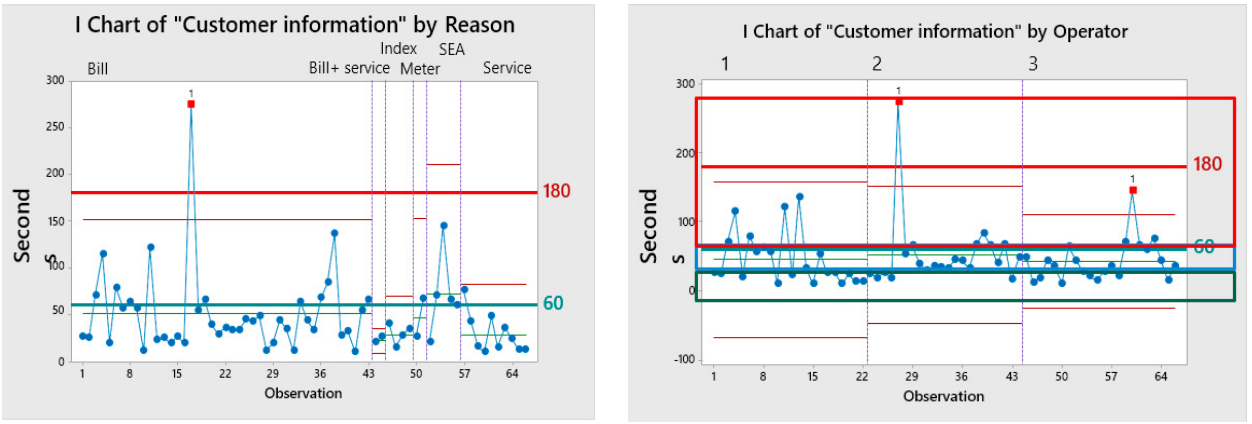

Fig. 4. (a) Process chart – Customer information by reason; (b) Process chart – Customer information by operator.

From the Pareto Diagram we can clearly conclude that the majority of the customer are calling for the bill problem and we will try to focuses further our detailed analysis on this parts of the problems.

By analyzing in more details the figure 4(b) it seems that there are three modes for collecting the customer information: 1) green part of graphic - Registered with phone number, 2) Blue part - remember their phone number and 3) red part - looking in the system for their phone number. This red part represent the critical part and is above the targets time limit and here we need to find the real root cause of this problems.

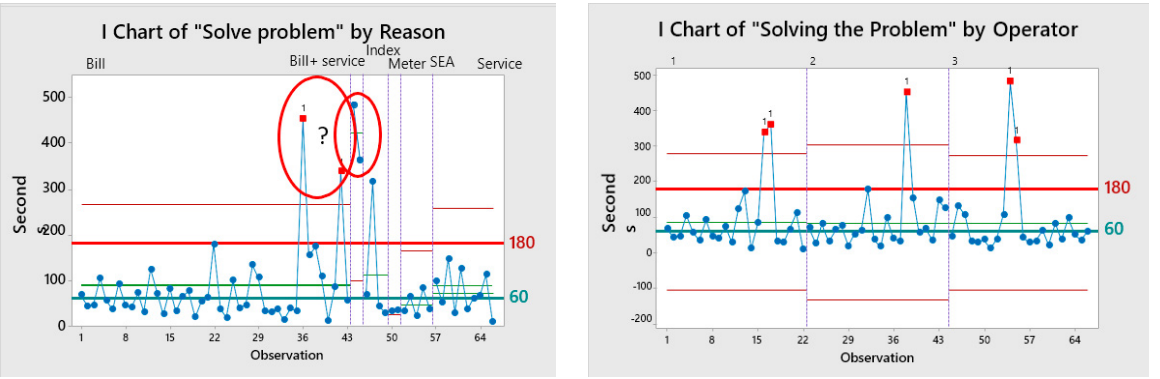

Fig. 5. (a) Process chart – Solve the problem by reason; (b) Process chart – Solve the problem by operator.

By making the detailed analysis of the second process step: “Check the customer problem” and the third one: “Solving the problem”, we can conclude that it is not an operator problem, it is consider noises or uncontrollable factors that cannot be changed without additional resources or process redesign, an abnormal situation and to solve it we need more time (See figure 5 (a) and (b)). The distribution of the calls was made according to a normal distribution, so that each operator received random types of calls. We can also conclude that having a call with bill issue and with service problems takes a very long time, much above the target.

2.4. Improve

The process was identified and formally described, different customer cases were developed and scripts (standard work) for operators were developed.

A new deployment diagram (See figure 6), more structured and designed for all possibilities during the call, was proposed in the Improve steps. This new procedure is helping the operator in his duty, because it simplifies getting a feedback loop and one can’t ignore by mistake the step of customer data actualization.

With those improvements we reduce the level of uncertainty and focus on high-priority risk. Having those standardized scripts and procedures will help the operators have a high-quality customer experience and will be easier for the beginners to learn and to do their jobs better from the first day.

Other improvements are done regarding the daily management where we introduce the data analysis e.g. ANOVA / I chart of length of call and I chart on daily actualization rate. Improving daily management also consist in gathering improvement suggestion from workers weekly and having a short training on a new customer case per reason for calling.

Updated process description increased customer data actualization rate from 2.6% to 20% in 3 months.

2.5. Control

In the Control phase, the workers are engaged when using following methods:

- Documenting standard work;
- Mistake – proofing;
- Statistical control.

Due to Control activities, a standard improved way of working is developed and maintained. People tend to do the things differently – some ways are more optimal than others. Without standards, there can be no improvement.

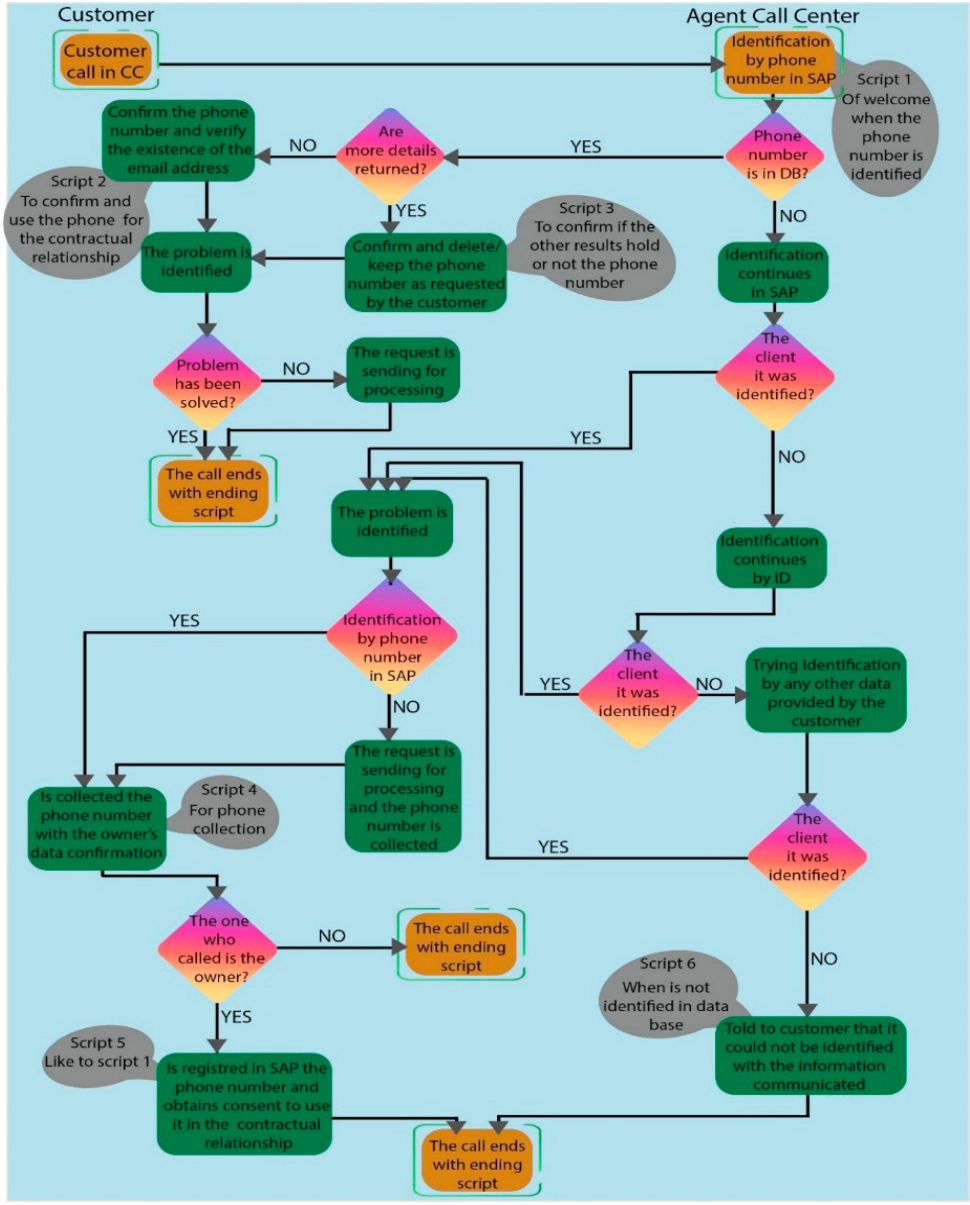

Fig. 6. New deployment diagram of analyzed process.

In the Control phase we developed a Control Plan and a Monitoring Plan document. For each of them people were nominated to control the process and intervene, with concrete steps to be taken in order to avoid deviating from the established targets. The Control Plan defines key process outputs, measurements to control the outputs, and responses to abnormal situations.

3. Conclusions

Lean Six Sigma is often used in production as a method of improvement. Through this study we demonstrated its applicability in a service activity for the energy sector. In this research work we described the taken steps to identify the main problem, to improve the process and reach the established target.

As a result of the Lean Six Sigma implementation, the company significantly improved the actualization rate from 2.6% to 20%, outperforming the 10% target in just 3 months, updated the internal procedures, identified the main issue of the calls and improved the overall process. Catching mistakes and errors is important before they turn into defects. Now the company is working on optimizing the bill issue in order to decrease the dials in the call center.

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