Cycle time reduction in an administrative process using Six-Sigma tools

Eduardo J. Sanchez
Master in Engineering Management
Hector J. Cruzado
Graduate School
Polytechnic University of Puerto Rico

Abstract *— The long cycle time in the outsourcing process of niche skill set has been an obstacle for program execution and customer delivery. The administrative process was addressed with the use of Six Sigma tools to reduce waste and cycle time. It was segregated into two phases: Phase 1 – Standardize the process with documentation, training and procedures and Phase 2 – Systematic changes to automate. Because of the use of Six Sigma tools, the cycle time was reduced from 32 days to 23.75 days, on average to date. Lastly, the deliverables include standard documents, training package and standard procedure.*

Key Terms *— Six Sigma green belt, Process Improvement, Process Waste reduction.*

INTRODUCTION

The Aerospace industry is extremely challenging and complex due to the nature of the product. It ranges from manufacturing and services for airplanes, to defense and space applications. The customer deliverable can range from design to manufacturing of an engine. Second, the Aerospace business is on a competitive environment that it needs to stay ahead of the competition in quality and cost. The best way to drive the competitive edge is by implementing process improvement tools like Six Sigma tools, lean manufacturing, etc. These tools main purposes are to remove waste from the process in an environment in which there is a tangible product and there is a high volume of production.

The Six Sigma philosophy was developed by the Motorola company in 1984 for reducing defects in their production line, the goal was less than 3.4 parts per million [1]. The administrative process that needs to be improved does not have a final tangible product, which is cumbersome to identify the waste. That has been one of the main difficulties in implementing Six Sigma in administrative processes, to identify what would be the process and how to identify the wastes and defects.

The administrative process to be improved supports defense and space programs for the US government. These programs typically last less than a year from inception to fruition. As part of the program, planning and customer requirements there are certain skill sets that the need to be outsourced, but the onboarding process its cumbersome and not streamlined. The average cycle time of the process is 32 days, in which greatly impact program execution. In this project, Six Sigma tools will be used to reduce cycle time and wastes around an administrative process to improve the customer delivery. The critical part of the process is the ability to identify the processes and steps to be evaluated and capture the value-added activities and the impact they have.

The objective of the project is streamlining the process for an improve onboarding process with administrative steps by 15 days. The areas of the process that will be addressed are the human error by implementing standardize processes (standard documentation, training, documented procedures) and systematic change (procurement system change); the plan reduction are 10 days and 8 days, respectively.

METHODOLOGY

The methodology used to manage the project will be Six Sigma (DMAIC) and its tool set. The first tool used was the process map, which enabled the capture of all the process steps, inputs and outputs of each step, and all the stakeholders per step. This helped to understand the process and where the gaps were. Then, the SIPOC (Supplier Input Process Outputs Customer) was implemented

to access a deeper level of details on each step by identifying who is the customer, owner requirements and documents required at each step. The FMEA (Failure Mode and Effects Analysis) and Control plan go hand on hand, as the problem identifier and the steps to mitigate and control. The FMEA was used to identify the many ways the process and each step could fail and the impact it would have. These are the tools that will be used to reduce waste in the process and reduce the cycle time.

The intent of these is to understand the process, identifying the inputs and outputs of each step within the process. This is the key for success in the project; to be able to identify what are the requirements at each step to be able to be completed correctly and what would be the outcome of each step. This supports the need to standardize, implement poke-yoke or even revamp the system to a more efficient one. They are the lifeblood of any consistent business, allowing it to repeat its successes, avoid mistakes, increase efficiency, and create effective to do lists. Without them, there is no hope of even knowing what you're doing right or wrong.

The challenge of this methodology is that it was developed for the manufacturing environment in which there is a repetitive workflow in production and there is tangible deliverable in the process for the customer. The key was to have a deep understanding of six sigma and its tools, then identify the similarities between a manufacturing and a service deliverable [2].

RESULTS

In any improvement project, there needs to be a failures analysis for root cause correction. The main ones used are FMEA, root cause analysis and 5 Why's [3]. These tools capture data that can be analyzed to identify the bottle neck and the main failure that are impacting the bottom-line.

The FMEA results were segregated into two phases since there were failures driven by human error and the other by systematic challenges. These two changes will impact the cycle time of the project, by controlling the human error with standard documentation the reduction will be by an estimated 10 days and with the systematic changes it will reduce the cycle time by an additional 10 days, results are shown on Table 1.

Table 1
Cycle Time results

Month	Cycle time (days)
2019 Year End	32
Jan-20	27
Feb-20	22
Mar-20	23
Apr-20	23
YTD	23.75
2020 Goal	22

The phase 1 deliverables to reduce human errors was identified in the FMEA that had the highest recurrence in the process and failures, as shown in Figure 1. These the failures were linked to the 2 specifics documents, the SOW and SSJ and the remaining were linked to not understanding the process. This drove the need to develop standard documents to mitigate these failures from occurring and then to develop a training package to train process users.

The failure in the documentation were on specific fields, in the SOW it would be the period of performance, not mentioning supplier name or any cost associated to the work to be performed.

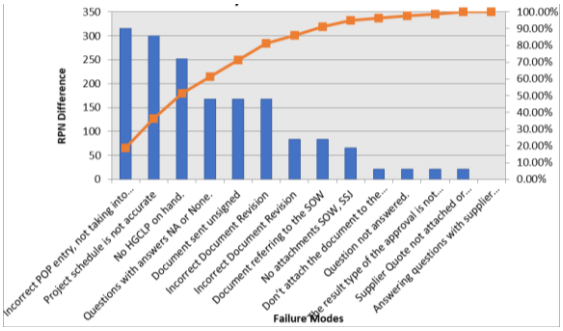

Figure 1
FMEA RPN Results and Analysis

The standard documentation and procedure that have been deployed are the standard statement of work that 3 templates were created for the 90% of

the projects and for single source justification 2 templates were created [4]. Also, standard procedure was documented to share with the teams through quality central and it enables the teams to develop training to mitigate the failures from any reoccurrence.

The implementation of these standard documents from Phase 1 (Standard SOW and SSJ) drove a reduction of 8.25 days in average. Also, there seem to be a trend that the process is in control by the cycle time being closer to the goal of 22 days.

Phase 2 was de-scoped from the project, but the intent was to transfer the current manual procurement process to the standard electronic process. It has shown results on other projects of more than 10 days.

CONCLUSION

In this project there were several aspects that were reviewed as a potential deliverable for improvement. The procurement process change had the greatest impact, but it was the most challenging to implement. The main reason is that it needed to have customer sign-off and approval to move from the approved system to the new one. They needed evidence on how the costs were going to be tracked and specific flow downs that needed to be in each purchase order. Finally, contracts and sales orders needed to be amended to have final deployment of the new process. The reason it was not pursues is due to the COVID-19 situation around the world, it was not feasible to be completed within the next 12 months.

The service environment needs a dedicated tool to be developed for their specific service, this will drive competition and help the company to have the advantage by being lean and agile. The Six Sigma tool is a great starting tool that can be used, but if the user does not understand the tools and processes it could misinterpret the results and not have the success that in prompt to have.

The main purpose of the paper was to show that process improvement tools can be used to any environment, not just manufacturing. Its challenge relies on the knowledge of the tools and how to implement them to any process by identifying the key tools that are relevant to the process. This will support process efficiency and enables the company to stay ahead of the competition.

REFERENCES

[1] Peterka, P. (2008). Why Six Sigma Will work in Service Environments. Available: https://www.6sigma.us/six-sigma-articles/why-six-sigma-will-work-in-service-environments/

[2] Staff Team (2014). Six Sigma Benefits in the Service Industry. Available: https://www.sixsigmadaily.com/six-sigma-benefits-service-industry/

[3] Williams, T. MINIMIZING RISKS: HOW TO APPLY FMEA IN SERVICES. Available: https://www.isixsigma.com/tools-templates/fmea/minimizing-risks-how-apply-fmea-services/

[4] Mulholland, B. (2017). Standardizing Processes: How to Create a Documentation Style Guide. Available: https://www.process.st/standardizing-processes/