

Implementation of a 5S Project to Improve Office Layout and Functionality in a Small Consulting Firm

*Heidi Vimar Ruiz Jiménez
Master in Manufacturing Competitiveness
Rafael Nieves, Pharm D
Industrial Engineering Department
Polytechnic University of Puerto Rico*

Abstract — *Planning is key to improve and maintain daily operations on an office environment, making it a challenge sometimes for small companies to accustom to this. Lack of organization and planning leads to poor usage of time, resources and can eventually lead to losses. This project focuses on proving small companies can obtain benefits when applying lean and six sigma tools. For the execution of this project, 2 issues were targeted: organizing the office and the implementation of a billings process. For the first issue, a 5S project was executed for 6 days. Items were sorted, organized and have now a designated place. To aid in the purchase and inventory, an inventory list was created. Now the company knows what items has, when to purchase and can track its administrative expenses easily. For the second issue, a short-term solution was applied, which was creating an invoice template. With the implementations of these simple tools, employees now spend 50% less time preparing an invoice. Employees are now aware of how they spend their time, manifesting the continuation of this project on other areas. Goals for this project were fulfilled and continuation of the same was highly requested and recommended. This project proves small companies can benefit from lean and six sigma tools with a minimal investment.*

Key Terms — *5S, Billing Process, Lean, Office Environment, Planning, Six Sigma, Small Companies, Template.*

PROBLEM STATEMENT

Globalization and competitiveness have contributed for companies to develop regulations and specific guidelines for a given process. The high demand of quality over quantity has forced companies to implement process performance

techniques using lean thinking and six sigma tools [1]. The key into achieving goals inside an organization is planning, good planning yields good results [2]. The small engineering firm (the "Company") under study provides service to different sectors such as construction and legal field. Management manifested their space is not properly organized and currently, the Company does not have a standardized billing process for its clients. Lack of these two (2) elements sets back the office functionality and daily operations.

The Company gives consulting services to the Puerto Rico Electric Power Authority ("PREPA") and prominent law firms and corporations of the Commonwealth of Puerto Rico since 2011. Since its inception, the Company has prepared expert witness reports for PREPA, helping PREPA save millions of dollars on litigation. The same is seen on prominent law firms, aiding in the winning or settling of litigation on local and federal courts.

Since their workload requires complying with local and federal courts deadlines, planning is key for this Company to bring quality to their customers. The Company's slogan is "You need ideas, we have them". Therefore, this project is to prove small companies can benefit from lean and six sigma tools, and my ethical beliefs into supporting local companies, encouraged me to develop the ideas the Company under study needs.

RESEARCH DESCRIPTION

The research to be performed during this project will be regarding the application of lean and six sigma tools within an office environment. Research will also cover be the importance of planning within a Company in order to achieve specific goals. Discussing some of the lean and six sigma tools to be implemented, including but not limited to

DMAIC, 5S, process improvement, standardization and planning..

RESEARCH OBJECTIVES

Successfully implementing a 5S project to improve layout and daily office tasks. Implement a billing process with a minimal investment, because the Company has only three (3) employees, and also, fulfill the ethical values of the Company which includes doing more with less.

RESEARCH CONTRIBUTION

This project helps create precedent in our Country that local companies can also benefit from lean and six sigma tools. Well established or startup companies can carry out this initiative. Small companies believe they cannot afford the expenses that come with executing an improvement project within their organization. Sometimes, it just requires planning. This project reinforces the importance of planning in small companies. Small companies cannot afford the luxury of not planning. More importantly, when it's a Company such as the one under study, which has to comply with deadlines from local and federal courts. There are many resources available and simple solutions that can aid in office improvement, as shown in the execution of this project.

LITERATURE REVIEW

The Company under study provides professional services which are included but not limited to engineering consulting for construction and or performance, expert witness reports (the "EWR") covering the area of forensic engineering, installation of electrical equipment, analysis of equipment, answering complaints, interrogatories, counter interrogatories regarding engineering concepts and participating in depositions or hearings of civil or criminal cases in the local and federal courts, among other services as requested by customers. Their primarily workload regards EWR, which can be extensive and requires detailed

information. Since most of these EWR are presented as evidence on civil or criminal litigation, the Company needs to comply with Courts deadline. In order for this Company to properly comply with local and federal rules, court deadlines and satisfy their customers, process development and planning is essential.

The philosophies of lean and six sigma were first introduced by Toyota, with the sole purpose of reducing waste [3]; these have eventually emerged to different sectors, from the manufacturing to the service industry. One of the activities to be performed is reorganizing physical configurations, in order to properly have a more functional working space. The posture, a good organization and the proper layout of the environment and workplaces have a positive influence on the income of an employee [4]. Once space is reconfigured, using a 5S project, items are going to be kept, discarded, or reconfigured. 5S stands for the following:

1. Sort. Maintain clean work areas; eliminate materials or information not needed to do the work.
2. Set in Order. Ensure files are properly documented for easy access; place all tools and equipment accessible for the employee.
3. Shine. Maintain working areas clean so abnormal conditions can be easily seen.
4. Standardize. Ensure work tasks are performed in a standardized manner using checklists, procedures and instructions. If the work is complicated, then separate operations that can be standardize (back office) and ensure the customized operations are tightly controlled.
5. Sustain. Use control plans and deploy continuous improvement teams [5].

The goal of this project is to demonstrate how to implement lean and six sigma tools within an office environment. Lean and six sigma tools are the two (2) major process improvement initiatives used to reduce and eliminate one or more types of these seven types of process waste [5]. Since the Company has two (2) major issues that need to be addressed,

which are organizing the office space and develop a billing process, a 5S project will be put to the test.

METHODOLOGY

In order to achieve the research objectives, a 5S project will be launched, divided in the following phases: sort, set in order, shine, standardize and sustain. In the first (1st) phase, office materials will be categorized, using a colored tag labelling system using four (4) colors and giving those colors a meaning (Table 1). Green are very important items, yellow are important items, red not important but needs to stay in the office in compliance with rules and regulations; and black means the items can be tossed.

Table 1
Proposed Colored Tag Labelling System

Color	Category (high to low importance)
Green	Very Important
Yellow	Important
Red	Not Important, but needs to stay in compliance with rules and regulations.
Black	Toss

Once all items are categorized, the second (2nd) phase set in order will be performed. Items will be broken down in its previous categories, as explained above and assigned a specific location (Figure 3). Their location will be selected based in one-on-one meetings with the Company employees; process will be documented using a template form attached hereto. The third (3rd) phase is shine, where all items will be cleaned and properly arranged in its location. The fourth (4th) phase is standardize. For this, labelling will be used and a simple inventory list created, to aid the administrator when it's necessary to buy office supplies and materials. The last and fifth (5th) phase of this project is sustain. Training and follow up meetings of all employees will be performed twice a week in order to develop new strategies based on future occurring necessities and demands of the office, all led by the administrator.

A time table will also be develop in order to execute the project, properly documented by minutes of meetings with the Company's employees, as shown below (Table 2).

Table 2
Summary of Proposed Timetable for Design Project to be Executed

Day number	Phase to be executed	Time
1 and 2	Sort Set in order Shine	3 hours 3 hours 1 hour
3	Standardize	3 hours
4	Sustain	TBA

The timetable is expected to be completed on 4 four (4) days because the Company has one (1) office and three (3) employees as previously stated (Table 2). A summary of completed tasks will be generated for the Company, for it to have accessible the tools and designs executed during this project, for future reference.

After the implementation of the 5S project, hiring a subcontractor or IT specialist, in order to suggest a software not too complicated and user friendly for the needs of the Company, will purchase billing software. A small Company does not need to spend high amounts on a product that will not benefit process performance. On the contrary, the Company pretends to simplify billing process, eliminating the practice of creating each invoice using Microsoft Word. After the summary and data collection, information will be processed using computer software, including but not limited to Microsoft Excel.

No change in infrastructure, desks, tables, walls and décor was made because they are in good condition. Walls will remain white because reflects light, thereby, generating an almost-total lightning in the room, without a lot of bulbs.

RESULTS AND DISCUSSION

This section presents the problem, analysis, results and improvements executing a 5S project based on lean and six sigma tools.

Sort

The office was visited for the initiation of the 5S project. Frequency was determined using a numeric scale from 1-3. One (1) defined as not important, two (2) defined as important and three (3) defined as very important (Figure 1 and Figure 2).



Figure 1
Desk Drawer of the Office before the Implementation of a 5S Project

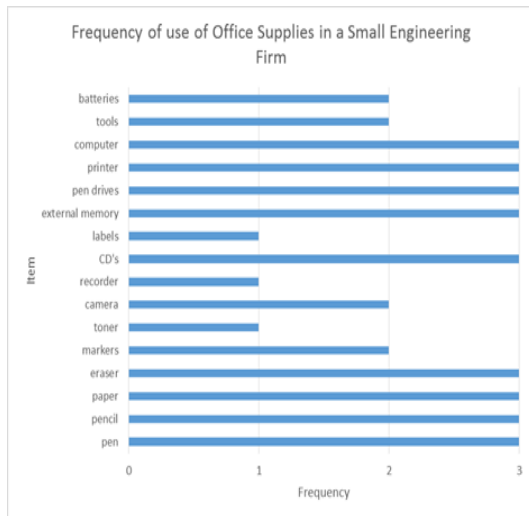


Figure 2
Frequency of Use of Office Supplies in the Small Engineering Firm under Study



Figure 3
Sorting out of Office Items in Previously Identified Bins

For files and books a stainless steel rack was purchased. This model was selected because the Company likes industrial looking items.

Set in Order

Once items were classified, different stations were created for different items. The desk drawer was organized using plastic trays (Figure 5). Items were placed based on employee's needs. Because there are two (2) desks, office supplies were placed on a plastic cart with wheels, for easy access for both employees.

Shine

For the third phase of this project, the office was cleaned, to ensure a clean environment for the employees. The desk was cleaned using a product for wood surfaces; chairs were cleaned with a damp towel with water, tables and floors were sanitized with a sanitizing solution and the air conditioner filter was cleaned. No abnormality or misplaced item was found after this phase.

Standardize

Using the frequency data shown in Figure 1 above helped identify what items need to be accessible in order to perform daily tasks within the Company. An inventory list was created, in order to aid the administrator to keep track of the materials available and when to purchase the same (Figure 3).

Inventory List										
The Company								Start Date:	10/1/15	
TBA								End Date:	TBA	
Product ID	Description	Unit Price	Quantity In Stock	Inventory Value on Hand	Reorder Level	Reorder Date	Reorder Quantity	Total Inventory Value	Discontinued?	
809957	Binder Clips-Large	5.29	1	5.29		11/7/15	2	10.57		
825100	Binder Clips-Medium	18.49	1	18.49		11/7/15	4	73.95		
808297	Binder Clips-Small	0.99	2	1.98		11/7/15	4	3.96		
202114	Highlighters	9.99	2	19.98		2/7/16	1	29.97		
655266	Retractable Ballpoint Pens	9.99	1	9.99		11/7/15	2	29.97		
403620	Labels-Shipping-White	41.49	1	41.49		12/7/15	1	82.98		
516590	Duracell Batteries-AA	14.99	1	14.99		2/7/16	1	29.98		
676992	CD-RW	40.99	1	40.99		2/7/16	1	81.98		
701692	Toner-HP95041-Black	44.99	1	44.99		TBA	1	89.98		
701402	Toner-HP95041-Color	67.99	1	67.99		TBA	1	135.98		
202349	Sharpie-Black	12.79	1	12.79		12/7/15	1	25.58		
107590	Pencils	1.67	1	1.67		12/7/15	2	5.07		
911599	Pages-Legal-Stream	10.79	1	10.79		12/7/15	2	32.37		
617206	Pages-Letter-10 Reams	53.99	1	53.99		2/7/16	1	107.98		
695434	Pen Drivers-RGB	54.99	1	54.99		2/7/16	1	109.98		
434732	External Memory-1TB	74.99	1	74.99		2/7/16	1	149.98		
625064	Pocket File-Legal	29.99	1	29.99		12/7/15	2	89.97		
802991	Lysol Cleaning Wipes	14.99	1	14.99		12/7/15	1	29.98		
861299	Suffler-Dust Remover	9.99	1	9.99		12/7/15	1	19.98		
7266	Plastic Containers-17 Gallon	6.47	8	51.76		11/7/15	2	64.70		
N/A	Tools-MISC	100.00	1	100.00		11/7/15	1	200.00		
Total Inventory Value								\$	1,430.69	

Figure 3
Inventory Template Created using Microsoft Office Excel for MAC

In order to aid the invoice preparation, an invoice template was created (Figure 4), because purchase of billing software was not realized. A short-term solution was implemented to aid the second issue the Company had. As requested by the Company, no information relating the same has been used in this project, included but not limited to name, address, phone number, email and fax has in these templates.

The Company Invoice			
You Need Ideas, We Have Them			
[Address Line 1] [Address Line 2] [Address Line 3] [Phone] [Web Site] [E-mail] [Fax]		Invoice No: 2015-10-XXXX Invoice Date: [Date]	
		Bill To: [Contact]	[Company]
		Address: [Customer Address Line 1] [Customer Address Line 2]	
		Phone: [Customer Phone]	[Customer F-Mail]
		Fax: [Customer Fax]	
Description	Hours worked	Cost Per Unit	Amount
Professional services rendered in its re (Case Name, Case Number, matrix).	1	\$ 125.00	\$ 125.00
Traveling Expenses	1	\$ 40.00	\$ 40.00
Invoice Data 2	1	\$ -	\$ -
Invoice Data 4	1	\$ -	\$ -
Invoice Data 5	1	\$ -	\$ -
Invoice Data 6	1	\$ -	\$ -
Invoice Data 7	1	\$ -	\$ -
Invoice Data 8	1	\$ -	\$ -
Invoice Data 9	1	\$ -	\$ -
Invoice Data 10	1	\$ -	\$ -
Invoice Data 11	1	\$ -	\$ -
		Invoice Subtotal	\$ 165.00
		Tax Rate	4.00%
		Sales Tax	6.60
		Other	
		Deposit Received	
		TOTAL	\$ 171.60
Make all checks payable to [Company Name] Total due in 30 days. Overdue accounts subject to a service charge of 2% per month.			
Thank you for your business!			

Figure 4
Invoice Template Generated using Microsoft Office Excel for MAC



Figure 5
Desk Drawer of the Office after the Implementation of a 5S Project

After the creation of the invoice template, the Company now spends approximately 20 to 25 minutes completing the same, versus the previous completion time of 30 to 45 minutes. To measure the amount of time consumed preparing an invoice of one (1) page before the implementation of a 5S project, six (6) attempts were made and average was calculated. This was also performed to measure the amount of time consumed preparing an invoice after the implementation of the 5S project. Average measurement before the implementation of the 5S project for creating an invoice was 38.67 minutes. Average measurement before the implementation of the 5S project for creating an invoice was 22.83 minutes. Time completion for preparing an invoice was reduced up to a 50%, saving time that can be applied to other projects within the Company (Figure 6).

Sustain

A "To-Do List" template was created, in order for the Company to keep track of its activities and deadlines (Figure 7). With this template, employees can keep track of their daily tasks, deadlines and meetings for office improvement. With this, employees can plan ahead, prepare and execute a task.

To-do lists

Completed by: [Name]
Deadline: [Date]

Done?	Office Improvement	Due By	Notes
No	Planning	10/15/15	
No	Preparation	10/22/15	
No	Task a	11/1/15	
[Summary of task]			
No	Task b		
[Summary of task]			
No	Task c		
[Summary of task]			
No	Follow-up		[Summary of observation]

Done?	[Project Name]	Due By	Notes
Yes	Planning	9/5/10	
Yes	Preparation	4/18/10	
No	Task a	4/18/11	
[Summary of tasks]			
No	Follow-up		[Summary of observation]

Done?	[Project Name]	Due By	Notes
Yes	Planning	9/5/10	
Yes	Preparation	4/18/10	
No	Task a	4/18/11	
[Summary of tasks]			
No	Task b		[Summary of tasks]
No	Task c		[Summary of tasks]
[Summary of tasks]			
Follow-up [Summary of observation]			

Figure 7
To-Do List Part of the 5S Project in Order to Keep Track of Tasks and Projects within the Company

CONCLUSION

The objective of this project was to prove lean and six sigma tools can be implemented in small companies within an office environment; and create a simple yet effective billing process. In order to fulfill the objectives, a 5S project was executed, that lasted five (5) days. The sort phase determined which items were necessary to perform daily office tasks, by measuring the frequency of use of each item. The set in order phase was to document the process of ordering the office and finding the right space for each item, in order to improve office space. The shine phase helped with the cleanliness of the office, and to detect any abnormality or misplaced item. Design of two (2) templates was performed in the standardize phase, which included an inventory list and an invoice template. Time of completion of an invoice was measured before and after the implementation of a 5S project. By incorporating the invoice template, the Company reduced its invoice completion time from 39 minutes to 23 minutes. The last phase, sustain proved employees have more accessible office items and complete invoices

quicker, reducing time completion up to a 50% (Figure 6).

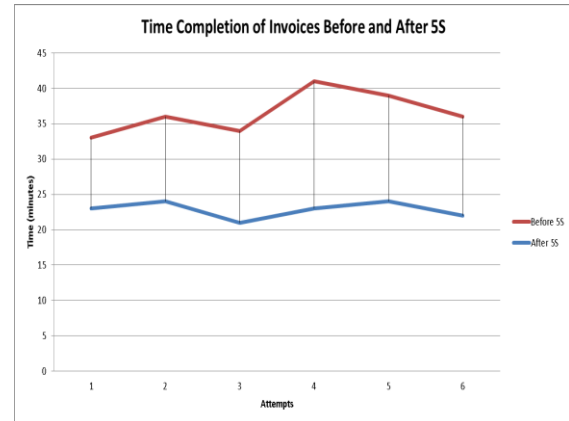


Figure 6
Time Completion for an Invoice before and after the Implementation of a 5S Project

The office looks less cluttered and items are easier to find. Labeling proves to be an effective method for organizing items within an office environment. The inventory list is helping in the purchase and tracking of expenses from the Company. The inventory template will be used starting November 2015, because the Company is currently on vacation.

Due to the fact that there was no time for an IT technician to visit the Company and recommend a billing software, a short-term solution for invoice preparation had to be executed. This solution proved to be effective, but on the long-term, purchase of billing software is highly recommended. The extension of this project is also recommended to aid other areas the Company manifested need to be addressed, which is the filing department. With the help of lean and six sigma tools, a small company proved these can be implemented within an office environment.

REFERENCES

- [1] L. Spakman. (2009, April 1). *Change that sticks. Quality Progress*. [Online]. Available: <http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=13&sid=34ce1c66-ccf7-470a-a5b2-bc3c7f39dd86%40sessionmgr4003&hid=4112>
- [2] Industry Weekly/IW. (2008, July). *Path to the lean enterprise: The continuous improvement office*. [Online]. Available: www.industryweek.com/whitepapers/TBM_CI

- [3] T. Bendell, "A review and comparison of six sigma and the lean organizations," *TQM Mag.*, vol. 18, no. 3, pp. 255-262 (2006).
- [4] L. C da Silva, M. Eckhardt and G. P da Motta, (2012, February 2). *Change of the layout of an office of a metallurgical company: simple projects, big solutions*. [Online]. Available: <http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=34ce1c66-ccf7-470a-a5b2-bc3c7f39dd86%40sessionmgr4003&vid=5&hid=4112>.
- [5] J. W. Martin, "Lean Six Sigma Basics," in *Lean Six Sigma for the Office*, Boca Raton, FL: CRC Press, 2009, pp 80-82.