Improving Customer Satisfaction through Property Operations in Hospitality Industry

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Abstract — *Corrective Maintenance used to be the most common course of action in both service and manufacturing industry. Even though the new tendencies are moving towards Preventive Maintenance, many industries are stuck in the old days where "extinguishing fires" were the only way they know how to work. New generations are bringing a more broad perspective were preventing a problem before it happens, results to be more efficient, less expensive and more customer-friendly. The service industry is benefiting from this approach creating more value within their customers and differentiating themselves among other competitors. The use and development of technologies like softwares specifically created to meet the needs of the service industry are key to custom-made every experience according to the basic principles of each providing company.*

By using the DMAIC methodology, a new system is created within the hospitality industry to target opportunities to improve the guests experience during their stay, with the purpose of repeating it and bringing more guests.

Key Terms - *Air Handling Unit (AHU); DMAIC (Define, Measure, Analyze, Improve, Control); HVAC (Heating, Ventilation, Air Conditioning); Satisfaction And Loyalty Tracking (SALT).*

INTRODUCTION

Customer satisfaction is one product that is difficult to sell and it carries the most rigorous parameters of them all [1]. It differentiates one from another not only because of its nature, but from the way its provided, how its handled, by whom is given, its quality, was it efficient, did it satisfied the need which it was acquired for, and so on. Each of these questions will be answered in the level customer satisfaction meets expectations.

Customer service industries are one of the most profitable nowadays. They depend on how well they are managed to offer unique experiences to their customers and how every resource spent is maximized in to the highest level. Six Sigma is a young science developed in the mid 1980's at Motorola. Over the last few years it has received recognition and many companies such as General Motors, Ford, GE and Honeywell have adopted it in order to achieve their goals [2].

Six Sigma is a business strategy that provides businesses with the tools to improve the capability of their business processes. The purpose of process improvement is to increase a process' performance and decrease its variation. Which will lead to a reduction in defects and improvements in profits, organizational culture, product quality and business excellence.

This project will acknowledge the importance of introducing Six Sigma methodology as a way to standardize procedures inside a customer service platform that will result in overall benefits to both the acting company and the customer.

Research Description

Customer satisfaction requires a 9 or 10 score from guests for the HVAC system. From a total of five buildings, two major offenders have being identified as 55% of the overall bad outcome. The approach will be a preventive maintenance (PM) plan for the A/C fan coils that includes unit interior cleansing, draining unclogged and filter changes as well as complete system validation.

Research Objectives

- Increase customer satisfaction from 85% to 90% in six months.
- Reduce response time to guests from 30 to 15 minutes.
- Increase employee's productivity by 15% per shift.
- Reduce costs by increasing preventive maintenance to 80% and decreasing corrective maintenance to 20%.

Research Contributions

The conditions of the rooms and the overall structure will be in excellent shape and if assistance is needed, the customer will receive a first-class service from the property operation department in a timely manner.

This approach concerns the business operation when service efficiency delivers an outcome of a satisfied guest that provides excellent reviews. Positive feedback ensures a next visit from the same guest and reassuring a new one. Therefore, the revenue increases and the company establishers itself as a gold-standard operating facility.

LITERATURE REVIEW

A young science developed by Bob Galvin and Bill Smith at Motorola in mid-1980's, Six Sigma is defined as "…a quality objective. It is an organization wide, leadership driven; process oriented initiative, design so that processes produce no more than 3.4 defects per million opportunities (DPMO)." [3]. Young but effective, is the new business orientation of excellence that many industries are implementing nowadays. In the implementation process the companies are reinventing themselves to do more with less, it accomplishes to "do things right" [4]. By bringing together known problem solving and project management tools and the use of statistical thinking, this philosophy has managed to overshadow other quality initiatives.

Six Sigma has two approaches: DMAIC and DMAVD. "Each one of these terms is related to the major phases in the cycle. Six Sigma DMAIC is a methodology that defines, measures, analyzes, improves and controls process that do no match the six sigma objective (3.4 defects per million) see Figure 1. Six Sigma DMAVD defines measures, analyzes, designs and verifies new processes or products that are to be designed for six sigma quality." [3].
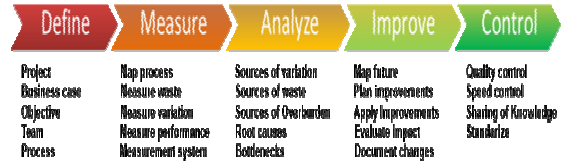

Figure 1
DMAIC Method

By using this initiative, companies enable all their team members to approach quality improvement with a simple tools oriented common sense methodology. The DMAIC cycle is similar to the "plan, do, check, and act" (PDCA) (shown in Figure 2) developed by W. Shewhart. It requires strong management commitment teamwork and communication.

Figure 2
Model for Improvement: PDCA Cycle

The service industry exhibits some distinct features that are not found in the manufacturing industry. Based on the work of Sasser, Olsen and Wyckoff (1978), these distinct features include:

- Many services are intangible; they are not things like hardware.
- Many services are perishable; they cannot be inventoried.
- Services often produce heterogeneous output.
- Services often involve simultaneous production and consumption.

No matter what type of service organizations you look at, there are three aspects of services that are detrimental to service quality and customer satisfaction (Ramaswamy 1996). These are: service product, which refers to the service output attribute to the customers, or the service items provided to the customers; service delivery process, refers to the process that delivers service products to customers or maintains the service products; and, customer-provider interaction, that is the interaction between customers and service providers. The quality of this interaction will greatly influence customer satisfaction. [4]. Currently, most reported Six Sigma activities in the service industry involve using either Lean Six Sigma or DMAIC in improving service delivery process.

Compared with other quality initiatives, the key difference of Six Sigma is that it applies not only to product quality, but also to all aspects of business operation by improving key processes. For example, Six Sigma can be used to help create well-designed, highly reliable, and consistent customer billing systems, cost control systems and project management systems.

"Convincing the service industry of Six Sigma's benefits is a major challenge… many companies still conforms to the idea that the methodology is only for manufacturing". [5]. The most obvious reason why service companies keep away from Six Sigma is because they perceive it is a manufacturing tool. Service organizations feel that because their companies have a large amount of human work force, there are no measurable defects to be corrected. However, experts say this is not true. A recent survey has shown that service companies that have invested in Six Sigma are all saving millions of dollars for every project. Human resources makes up a large part of all service organizations. To conquer this problem, leaders of the industry can be trained in Six Sigma to balance their employment expertise with statistics-based analytical tools.

"Six Sigma goes in to the details of improving customer service, generating business expansion and gaining knowledge about the service sectors business processes. Most service industries revolve around areas of finance, human resources and sales and marketing. Hence, Six Sigma delves deeply into the subject of soft skills. Six Sigma can be applied to a company that provides housekeeping services. Firstly, the companies working processes would need to be understood. Using the DMIAC method or the define-measure-improve-analyze-control method, Six Sigma can definitely implement quality in any industry. As the main aim of this methodology is to reduce defects, the first step would be detecting the particular defect. Secondly, data will be collected to observe how, why and how often these defects occur. Next, the Six Sigma team implements an outstanding employee's method of working as the normal method for all employees. Finally, new employees are taught the correct techniques". [6]

METHODOLOGY

A preventive maintenance plan (PM) was created in order to fulfill the needs of guests and the staff. In order to work, the plan will be implemented in two phases: First, give the employees all the tools needed to complete a PM in a reasonable time according the occupancy; second, use the SYNERGY software to create dispatch and complete work orders (WO) automatically according to the staff and occupancy.

For this purpose the DMAIC methodology is going to be implemented to achieve the best possible outcome with the current resources, that is "Do more with the same", see Figure 3.
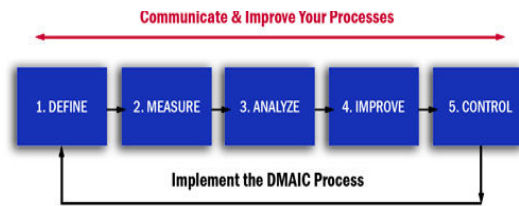
Figure 3
Six Sigma DMAIC Process

Define Phase

Develop a clear business case by identifying the problem that wants to be solved, the voice of the customer and the project goals, specifically.

- Problem Definition & Problem Statement - Define the specific problems that want to be solved. A well-defined problem is 50% of the work.
- Goals/Objectives/Measures of Success – the scope of work have to include goals and objectives that are measurable and can be verified.
- Background on the process and customer – A list of what is important to the customer and how the process is behaving according to the guest needs.
- Expected Benefits (including estimated cost savings) – what benefits are expected for the customer once the project is completed.
- Project Timeline – Based on the desire results a timeline will be establish in order to obtain results in realistic and attainable deadlines, This will assure that the time spend in each step is appropriate and the project in kept on track.
- Voice of the Customer (VOC) – A process used to describe customers' needs and their perceptions of the products or services provided. Identify key business drivers of customer satisfaction
  o Decide what products and services to offer.
  o Identify critical features and specifications for those products and services.
  o Decide where to focus improvement efforts.
  o Get a baseline measure of customer satisfaction.
  o Identify key drivers of customer satisfaction.

If the voice of the customer requirements are done well, planning becomes easier; if planning is done well, execution becomes easier! (see Figure 4)

Figure 4
VOC Plan

- Project Charter – It is an agreement between management and the teams where the scope, goals, responsibilities and metrics of the project are develop. This keep the team working together toward organizational priorities and keep the team focus.
- SIPOC - High-level view of a process helps to define project boundaries (starting and ending points) and focuses the team on where to collect data. (see Figure 5)
  o Process steps
  o Inputs that feed the process
  o The Suppliers (sources) of those Inputs
  o Outputs that result from the process
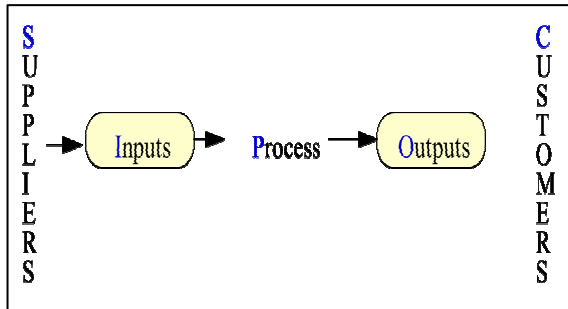 o The Customers (recipients of those Outputs)

Figure 5
SIPOC Diagram

Measure Phase

Keep in consideration the mesure of the input data from the suppliers, the process measures and the measure from the output to the customers.

- Visualize potential issues within the process
- Develop the metrics needed in order to evaluate the data collected, the most eficient way.

Analyze Phase

Identify the problem by investigating cause and effect. If a problem is recurent there must be a relationship of what is causing it and ensure that all factors have been considered. (see Figure 6)

- Identify the Problem
- Identify Possible Causes
- Sort Possible Causes into Reasonable Clusters
- Choose a Cluster and label a main Bone
- Develop and Arrange Bones for that Cluster
- Develop Other Main Bones
- Add Title, Date, and Contact Person
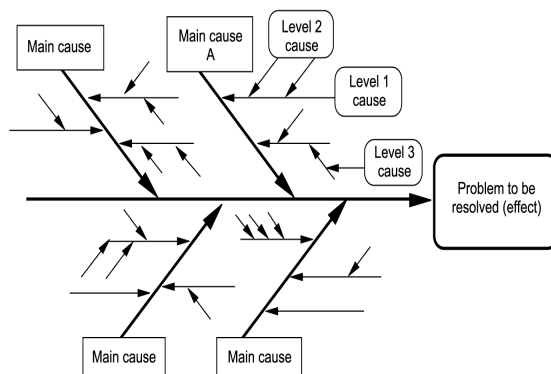- Select Possible Causes to Verify with Data

Figure 6
Cause and Effect Diagram

Improve Phase

Optimize the current services using the data obtained from the measure phase, Develop a pilot to implement the solutions that address root causes.

- Candidate Solutions to Process Root Causes
- Evaluation and Selection of "Best" Solutions (including cost-benefit studies, risk assessment)
- Pilot Tests of Solutions
- Full-Scale Implementation Plans

Control Phase

It is the fine tuning of the process is where all the implementation have to be controlled and keep being monitored to find if there any deviation from the target. From here on can be outlined the next steps for on going improvement.

- Make sure that everyone is using the new process according to the tested methods. These are the methods you *know* will produce desired results.
- Verify the results and validate that changes adhere to all operating company change control, GMP, and compliance policies.
- Document the new methods in such a way that people will find them easy to use, and provide training to everyone who will use the new methods.
- Monitor implementation and make regular course corrections.
- Summarize your findings and share them with co-workers involved in similar projects, with customers, and with managers who need to know the final outcome.
- Think about what should be tackled next in the process to further improve the sigma level.

RESULTS AND DISCUSSION

This section discusses all the implementation activities for the research project using the DMAIC methodology.

In the define phase a project charter was developed, see Figure 7. The document provides the project description, scope, project goal and measures, expected business results, the team member that are going to be working directly with the project, the support that is required from upper management and others departments in order to make this a successful project.

Also included is the expected benefits to the customers, which is the ultimate goal of the project, bring to the guest the best experience possible, that include a stay free of problems and if there is a problem, is going to be resolve in the less possible time.

After the schedule for the project charter is discussed with the upper management and it is approved, a meeting of all the operational department is conducted to inform all the departments about the project and ask for their collaboration when informing the issues to the engineering department, this will allow the department to have a faster answer to the guest problems, making the project a success.

Figure 7
Project Charter

A SIPOC diagram, see Figure 8, was done to identified the real problem and how address them to ensure the desire output.
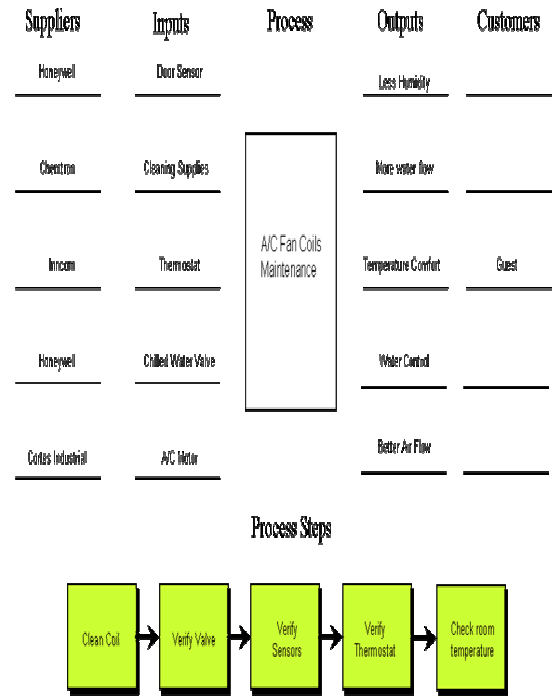

Figure 8
A/C Maintenance SIPOC

The measure phase took place when after careful consideration the engineering department decided to only use the data pertinent to the engineering department, the SALT questionnaire is randomly sent to all the customer that have stayed at the hotel and their email address is in the system.

From the entire questionnaire that the guest have to answer three items are pertinent to the engineering department, Quietness of the guest room, HVAC working properly and room smell.

Figure 9 is a graphic representation of the scores by building. In the graphic you can see that all the building have theirs up and down but CLV1 is the one with the highest score because it is one of the fares buildings in the property.
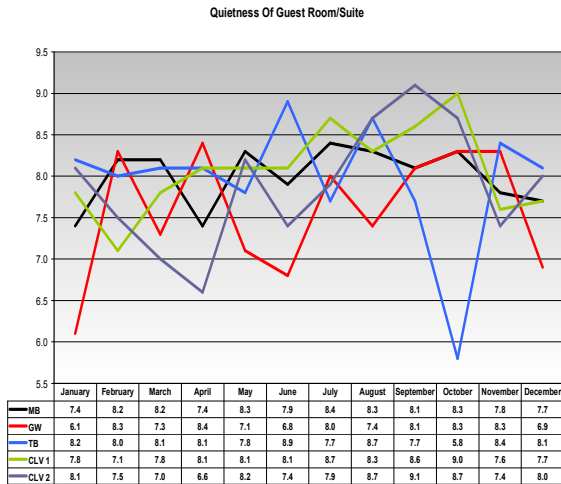
Figure 9
Quietness of guest room

Quietness Of Guest Room/Suite

	January	February	March	April	May	June	July	August	September	October	November	December
MB	7.4	8.2	8.2	7.4	8.3	7.9	8.4	8.3	8.1	8.3	7.8	7.7
GW	6.1	8.3	7.3	8.4	7.1	6.8	8.0	7.4	8.1	8.3	8.3	6.9
TB	8.2	8.0	8.1	8.1	7.8	8.9	7.7	8.7	7.7	5.8	8.4	8.1
CLV 1	7.8	7.1	7.8	8.1	8.1	8.1	8.7	8.3	8.6	9.0	7.6	7.7
CLV 2	8.1	7.5	7.0	6.6	8.2	7.4	7.9	8.7	9.1	8.7	7.4	8.0

Analyzing the data by the beginning of the third quarter, an improvement in the overall score was noticed in the months of June, July and August. This is represented in Figure 10.

2012 SALT Scores for the Engineering Department

Month	Quietness of guest room/suite					Heating/Cooling/Ventilation Work Properly					Room/suite smelled fresh/clean					Average
	MB	GW	TB	CLV 1	CLV 2	MB	GW	TB	CLV 1	CLV 2	MB	GW	TB	CLV 1	CLV 2	
January	7.4	6.1	8.2	7.8	8.1	7.9	8.3	8.5	7.7	7.2	8.5	8.4	8.5	7.0	7.7	7.9
February	8.2	8.3	8.0	7.1	7.5	8.3	8.6	8.3	6.9	8.1	8.3	8.9	8.3	6.5	8.2	8.0
March	8.2	7.3	8.1	7.8	7.0	8.2	8.2	8.0	7.5	8.5	8.6	7.9	7.8	7.2	8.3	7.9
April	7.4	8.4	8.1	8.1	6.6	8.0	8.6	8.5	7.3	6.5	7.7	7.8	8.6	7.2	7.2	7.7
May	8.3	7.1	7.8	8.1	8.2	8.2	8.2	7.5	7.9	8.1	8.7	8.2	7.3	7.4	8.0	7.9
June	7.9	6.8	8.9	8.1	7.4	8.3	7.6	8.7	8.1	8.0	8.9	8.6	8.2	7.8	8.0	8.1
July	8.4	8.0	7.7	8.7	7.9	8.3	8.3	7.6	8.0	7.7	8.3	8.5	7.8	8.2	7.9	8.1
August	8.3	7.4	8.7	8.3	8.7	8.3	8.3	8.7	8.5	8.6	8.6	8.4	8.5	8.2	8.9	8.4
September	8.1	8.1	7.7	8.6	9.1	8.4	8.4	7.7	8.4	8.8	8.4	7.8	7.5	7.9	8.3	8.2
October	8.3	8.3	5.8	9.0	8.7	9.1	7.7	8.6	8.9	8.9	9.2	6.9	8.0	8.4	8.4	8.3
November	7.8	8.3	8.4	7.6	7.4	8.8	9.2	8.3	7.4	8.9	9.1	7.6	8.4	8.0	8.5	8.3
December	7.7	6.9	8.1	7.7	8.0	8.1	8.5	8.0	6.9	7.6	8.1	8.3	7.5	7.6	8.6	7.8
Average	8.0	7.6	8.0	8.1	7.9	8.3	8.3	8.2	7.8	8.1	8.5	8.1	8.1	7.6	8.2	8.1
	7.9					8.1					8.1					

	MB	GW	TB	CLV 1	CLV 2
Average	8.3	8.0	8.1	7.8	8.0

Figure 10
Scores for 2012

In a root cause analysis done with all the team members involve in the project was notice that all three categories where the engineering department was being measure. It all boiled down to one cause, the working order of the HVAC system, the quietness of the room was related to the noise make by the A/C motor when it was not lubricated because of the lack of maintenance.

The smell in the rooms that is usually related to the cleaning the rooms which usually is a housekeeping problem, result to be a malfunctioning of the thermostat, the equipment malfunction did not allow the A/C unit go into the dehumidifying cycle. This cause mold and bad smell in the room, also when the balcony sensor do not work the unit wont turn off when the balcony door is open. This let hot air from the outside into the room the combination of hot and cold air cause condensation in the room and the carpet get wet and the bad smell is worse.

With this new scenario the data will be analyzed again and new metrics will be develop to ensure that the root cause of this problem is resolved. Figure 11 presents the data of the HVAC system and how it behave each month.

SALT 2012 Engineering Department Scores

Month	Heating/Cooling/Ventilation Work Properly					Average
	MB	GW	TB	CLV 1	CLV 2	
January	7.9	8.3	8.5	7.7	7.2	7.9
February	8.3	8.6	8.3	6.9	8.1	8.0
March	8.2	8.2	8.0	7.5	8.5	8.1
April	8.0	8.6	8.5	7.3	6.5	7.8
May	8.2	8.2	7.5	7.9	8.1	8.0
June	8.3	7.6	8.7	8.1	8.0	8.1
July	8.3	8.3	7.6	8.0	7.7	8.0
August	8.3	8.3	8.7	8.5	8.6	8.5
September	8.4	8.4	7.7	8.4	8.8	8.3
October	9.1	7.7	8.6	8.9	8.9	8.6
November	8.8	9.2	8.3	7.4	8.9	8.5
December	8.1	8.5	8.0	6.9	7.6	7.8
Average	8.3	8.3	8.2	7.8	8.1	8.1
	8.1					

Figure 11
HVAC Scores

The Pareto chart in Figure 12, describe the major two offenders in the property where CLV1 is the building with the major number of complaints in the whole property followed by the Tower Building. With this information an action plan will be implemented through the Synergy software where Preventive Maintenance and work orders can be manage in real time to ensure that all the A/C fan coils and equipment are having the necessary maintenance to eliminate the guest complaints and have a increase in the scores and as a side effect a reduction in response time.
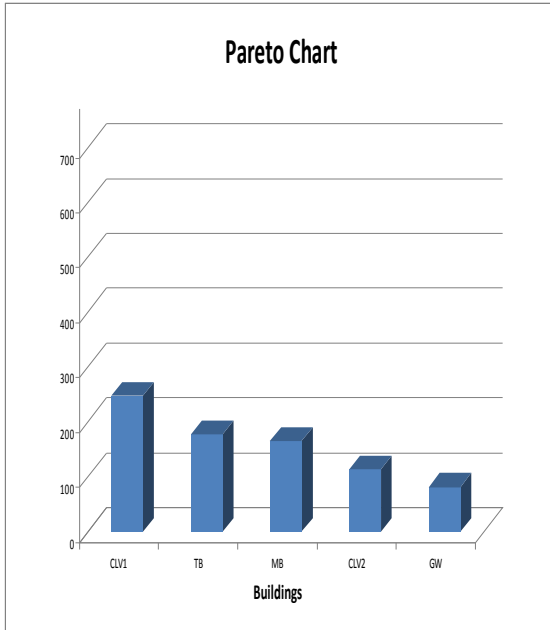
Figure 12
Pareto Major Offenders

After Implementing the preventive maintenance and using the synergy to keep track of the maintenance of the A/C fan coils in the rooms not only the improvement prove to be effective but this opened a door to do the same not only with the pm from the fan coils. With this initiative 19 now PM where develop to cover all aspects of the operation of the engineering department.

The new PM schedules allowed the supervisors to accommodate their resources according to the occupancy, events and even buy parts in advance to have all that is needed for a specific equipment or maintenance. (see Figure 13)

As part of the control phase, which has the objective of monitoring and verifying process improvements to sustain results; Figure 14 shows that after three months of implementing the system the number of WO that the engineering department where unable to complete in a timely mater was drastically reduce from 260 WO to 160. This was accomplish by focusing in the root cause of the problem and attacking it, once this was accomplish it was then supplemented with the preventive maintenance to not let it slide back into the old habits.
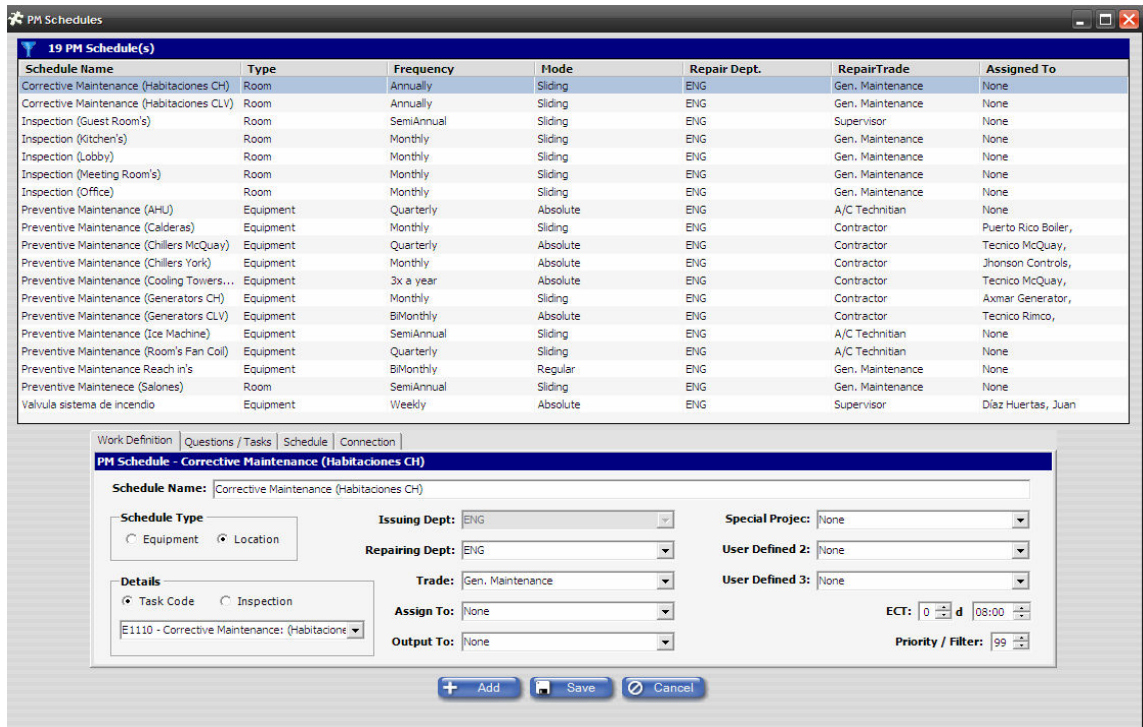
Figure 13
PM in Synergy Software

Figure 14
Work Order Reduction

Figure 15 is a graphic representation of the data collected. The blue line marks the point where the project starts to show results. The average of each building score start to increase even though fine tuning its necessary to have a higher score in SALT.
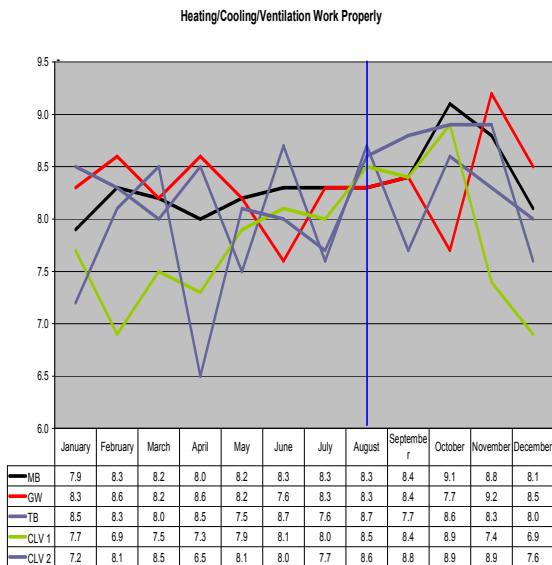
A series of checklist and PM forms where created to make sure that all the points in a preventive maintenance are verified during the inspection. After the employees realize the inspection and fill the checklist this is verified by the supervisor. This way the work is double checked and the possible errors are less likely. When this process is done if there is any observation by the employee or the supervisor is put into the synergy system and a work order for this specific work is issued and tracked. When all the works are done the system will automatically schedule the next maintenance 6 months from the day that the previous maintenance was completed.

A daily report is automatically send by email from the system to the engineering director, this report can be customized and it show the maintenance that where done in the previous day, who was the employee that did the maintenance and if there is any observations about the equipment.

Heating/Cooling/Ventilation Work Properly

	January	February	March	April	May	June	July	August	September	October	November	December
MB	7.9	8.3	8.2	8.0	8.2	8.3	8.3	8.3	8.4	9.1	8.8	8.1
GW	8.3	8.6	8.2	8.6	8.2	7.6	8.3	8.3	8.4	7.7	9.2	8.5
TB	8.5	8.3	8.0	8.5	7.5	8.7	7.6	8.7	7.7	8.6	8.3	8.0
CLV 1	7.7	6.9	7.5	7.3	7.9	8.1	8.0	8.5	8.4	8.9	7.4	6.9
CLV 2	7.2	8.1	8.5	6.5	8.1	8.0	7.7	8.6	8.8	8.9	8.9	7.6

Figure 15
HVAC Improvement

CONCLUSION

Six Sigma is the fastest growing business management system in the industry today. It has been credited with saving billions of dollars for companies over the past 10 years. Having the opportunity of analyzing customer service date through a Six Sigma Methodology "filter" confirms that aligning every day process to a standard procedure that maximizes every resource capability, can only results in benefits. Through the study of data that was compiled for this analysis, it was discovered how many tools and information is gathered every day with no purpose at all. Also, it was understood of how relevant is to acknowledge every feedback customers give related to the service they received. Every detail is an opportunity for growth.

As said before, DMAIC methodology is not only for the Manufacturing Industry, it can be applied to many aspects of the Service Industry. Specifically in Hospitality Industry it can help manage not only customer satisfaction, but also it can run many other internal processes.

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