Six Sigma: Achieving And Sutaining Operational And Customer Service Excellence

Michelle Ackerman and Maryam Davodi-Far*

Many US corporations fail to understand that significant profits can be realized simply by changing their methods and perhaps integrating Six Sigma into their work process. The Six Sigma method requires significant employee/employer interaction and depends heavily on an engaged workforce. Six Sigma uses a method called the DMAIC (Define, Measure, Analyze, Improve, and Control) to strip down a process into its basic elements and remove those parts that have no significant value and therefore are deemed to be wasteful.

Introduction

Staying competitive in the marketplace can be extremely difficult. Insurance companies try to increase profits while maintaining low premium levels. (Fouladvand 2004) contends that "the Company's attempt to raise income through increasing premiums may fail due to decrease of the number of insured, which obviously reduces the premium income" (pg. 378). The drive to increase profitability while maintaining low premium levels has been the swinging pendulum for years. The cries to increase premiums for increased profits are then shifted to decrease premiums in order to increase, the customer base and back again. However, this cycle however is not a recipe for sustained growth and has recently forced many US organizations to look at reducing operating costs and thereby increasing profits by revising internal processes.

Vouzas (2007) asserts that as organizations begin to engage in quality improvements, they usually do not allow for sufficient staff contributions (pg. 4). Research also shows, that the stronger the individual linkage to the objectives of an organization, the more successful the organization is overall (Gratton, 1999). The relationship between individuals and the organization's success places great emphasis on selecting the best process improvement methodology. Today those options range from Total Quality Management and ISO 9000:2000 to Six Sigma and Lean (Vouzas, 2007, Spencer, 1994, Halliday 2001). The purpose of the paper is to utilize the most effective research-based process improvement methodology to reveal inefficiencies, while lowering costs to increase profits.

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Process Improvement Methodologies

Total Quality management – Spencer (1994) states that "TQM establishes quality enhancement as a dominant priority and one that is vital for long-term effectiveness and survival (pg. 1). TQM focuses on customer satisfaction and maintains that an increase in quality will actually decrease costs. Employees are monitored and tracked so that all unnecessary processes can be eliminated. New processes are set by management, and quality audits are put into place on the new standards (Motiska & Shalliff, 1990). TQM process methodology relies heavily on employee interaction with the customer, but has a lack of employee involvement in the development of the process. As discussed above, the involvement of the employee was identified earlier as a requirement for success.

ISO 9000:2000 – (Vouzas 2007), states that while previous versions of the ISO 9000 model had many shortcomings, those have been changed in the ISO 9000:2000 version (pg. 2). The new model closely resembles that of the Total Quality Management theory. Many corporations having gone the ISO 9000:2000 route have either lost their quality improvements or have continued their improvements by moving towards the TQM model instead leading large numbers to believe that the greatest rewards are realized when both are utilized together (Magd & Curry, 2003). TQM was eliminated above because of limited employee interaction; ISO 9000:2000 was eliminated as well.

Lean – Mainly used in the manufacturing sector, Lean is a method that focuses on the elimination of waste while also focusing on the importance of an internal customer base (McManus, 2007). This method can be implemented successfully in areas of an organization that has easily quantifiable processes, but does not have a structured format for service industries. In turn, this makes it much more challenging to implement in a service environment. Many organizations are beginning to take elements of the lean methodology and apply them with Six Sigma to increase the effectiveness of both programs (George, 2003, pg. 4).

Six Sigma – Developed IN 1985 by Bill Smith, an engineer at Motorola, (Halliday, 2001), Six Sigma was the answer to the question posed by Motorola executives regarding how to increase production and maximize resources. "Six Sigma is a business strategy and a systematic methodology, use of which leads to breakthrough in profitability through quantum gains in product/service quality, customer satisfaction and productivity" (Antony, 2002). The Six Sigma methodology is based heavily on customers, employees and data-driven decision making. The methodology follows a rigorous outline and relies on data collection to arrive at an appropriate solution based on stated objectives. "The objective of Six Sigma is to deliver high performance, reliability, and value to the end customer by identifying, analyzing, and improving work processes and eliminating waste" (Sherman, 2007). Research shows that Six Sigma takes into account both external and internal customers and process improvements while recognizing the importance of incorporating the employees, ideas and innovations in the improvements. It also has a detailed flow of information to ensure improvements are not done in a vacuum (Anthony, 2002, Hoerl,

1998). Hoerl (1998) also states that “Six Sigma is currently getting much more favorable press in financial circles than TQM ISO 9000 (pg.4).

Process Selection

Understanding that “most business improvement initiatives can be integrated, depending on the application, to benefit an organization” (Carnell, 2008). the road map was set. This paper will focus on the General Department of Administrative Services and the specific unit of imaging services. The Lean Six Sigma teams were selected from the existing employee base and would be given extensive training on the methodology. Employees will be removed from their traditional work function and specifically aligned to process improvement. The study is a review of current practices within the imaging services area and will not address issues of employee performance or engage existing perceptions.

Table 1. Definition of Terms (as defined by Gygi)

Term	Definition
Customer	Anyone who uses or consumes the output of the process, whether internal or external to the providing organization or provider.
Cycle Time	The total amount of elapsed time from the time a task, product, or service is started until it is completed.
Defect	An output of a process that fails to meet a defined specification or requirement, such as time, length, color, finish, quantity, temperature, and so on.
Deployment	The planning, launch, training, implementation, and management of a Six Sigma initiative within a company.
DMAIC	The acronym for the five core phases of the Six Sigma methodology: Define Measure, Analyze, Improve, and Control; used to solve process and business problems through data and analytical methods.
Function	Usually distinguished by the service level agreements made with customers. Items which have to be accomplished to meet those agreements.
Lean	Creates standard work and eliminates non-value added activities.
Non-value added (NVA)	Any activity performed in producing a product or delivering a service that does not add value, where value is defined as changing the form, fit, or function of the product or service and is something for which the customer is not willing to pay.
Poka-Yoke	A transliteration of a Japanese term meaning “to mistake-proof.”
Processes	Specific items which must be accomplished under a set of functions.
Six Sigma	A proven and proscriptive set of analytical tools, project control techniques, reporting methods, and management techniques that combines to form breakthrough improvements in problem solving and business performance.
Sponsor	A high level manager or executive.

Term	Definition
Task	Items which when put together make up a process.
Waste	Material, effort, and time that does not add value in the eyes of key stakeholders (customers, employees, investors, etc).
Unit	Area having the same operational responsibility

Background

Although the focus of the paper is the use of Lean Six Sigma in the private sector, various process improvement techniques have also begun to take hold in the public sector. “Though Quality Management in the public sector has had mixed results, many government agencies at all levels – federal, state and local – continue to implement various aspects of Quality Management” (McNary, 2008). These improvement techniques have varied widely in their deployment, implementation and follow through. “Governments are being pushed like never before to measure and improve program performance” (Abramson, 2007). Some public administrators have even begun to incorporate the Six Sigma principles within their departments. “Terms such as input, process, output, outcome, effectiveness and efficiency are used in the context of performance measurement across the States” (Melkers, 1998). Some examples of Six Sigma application in the private sector are, the cities of Fort Wayne, Indiana; Coral Springs, Florida; and Kingsport, Tennessee (Furterer, 2005). The largest example, however, is in Columbus, Georgia, where Muscogee County and the City of Columbus combined to form the Columbus Consolidated Government. “The consolidation combined 44 departmental services into 22 departments and agencies with 2,700 employees that service a population of nearly 192,000 citizens” (McNary, 2008). Now, “All but three states have performance based budgeting requirements, and most have established these requirements within the last few years” (Melkers, 1998).

With the weakening economy, one can only assume that the process improvement trend will continue. “Quality Management at its core is about creating more effective and efficient processes” (McNary, 2008). Studies show that incorporating Six Sigma in a traditional sense within the private sector can be difficult since the focus of a Six Sigma deployment is usually driven by a financial goal (Furterer, 2005). “Indeed, in the public sector, a majority of the projects most likely will not have a huge dollar savings; however, the increased efficiency due to leaner processes can have a huge impact on the citizenry” (McNary, 2008).

Methodology – Case Study

The imaging service unit has a staff of 38 individuals at capacity, whose salaries range from $21,000 – $29,000 per year (excluding benefits). The unit is responsible for converting all paper documents received into electronic documents for claims handling.

The unit recently went through a technological “upgrade” which, when implemented significantly changed the accuracy levels and response times of the imaging unit. Before the “upgrade” the unit had an accuracy rating of 97% and after the change, the rating dropped to 89%. The drop in accuracy is significantly affecting claims handling. It is the shift in customer satisfaction which prompted the need for a study. This Lean Six Sigma project will show that with proper problem identification, training, data collection, waste reduction, implementation, and control, we will bring success back to the unit. These goals must be done without any additional staff members or budgetary increases. The project will be deemed successful if we are able to maintain staffing levels, increase customer satisfaction to a good level, increase production numbers to 97% of SLAs and retain skilled employees through engagement and ownership.

Problem Identification

The selection of improvement areas is critical to the successful application of Lean Six Sigma. “Lean Six Sigma lives and dies with project discovery, prioritization, and selection” (George, 2003). Many items must be taken into account and will be based significantly on the culture of the organization in which the project is occurring. The process begins by identifying a Six Sigma project which seeks to identify and eliminate causes of errors and defects which are critical to the customers (Antony, 2004). Problem identification selection process can be done by using one of two methods, a Pareto priority chart or a prioritization matrix. The Pareto chart method is usually used within organizations with strict manufacturing processes and when hard numbers are readily available to compare and show levels of importance. In contrast, a prioritization matrix is often used in service industries to determine the customer impact on a specific process or function. Customers and employees are surveyed to determine areas of concern, and those areas are placed into a matrix. Next questions are applied to each area and weighted to signify their importance, and then, added together to determine the largest Critical to Quality (CTQ) area for improvement. Because CTQ areas change with the needs of the consumers, the consumers’ needs must be constantly observed and revised as necessary (Antony, 2004).

Within the example, employee engagement was identified as a significant improvement area in order to increase retention numbers. The entire unit was brought into a conference room and asked about the areas of concern within their day-to-day work practices. These meetings were done not only to identify improvement areas, but also to help build a since of urgency and ownership around the process. To encourage free expression, supervisors were excluded from all aspects of these conversations. The unit selected various issues and rated them in order of importance using a prioritization matrix. The issues they selected were listed across the top and the prioritization questions were listed down the left side (Figure 1). From the matrix we can see that the issues of greatest concern were Document Research, DARA Requests, and Mandatory Keeps. Once the improvement areas were selected, an improvement team was identified. An improvement team is made up of a sponsor, a Six Sigma professional, Subject Matter Experts (SME), and any additional stakeholders in the process. The

improvement team is fluid in nature and usually has 5-10 full time members. The improvement team was be trained on the DMAIC model and tasked with data collection.

Training

Proper training around the process was essential to the successful deployment of a Lean Six Sigma study. Training included common language utilization of DMAIC for metric development. The importance of common language cannot be overstated. Common language sets the basis for understanding within a process team. Many terms remain constant

Table 2.

Selection Matrix **Imaging**		Document research	Micrographics	IR Paperwork prep	Fire Prep	Mandatory Keeps	DARA Requests	CA&P Liaison
Project Characteristic	**Priority**	**Answer based on 1 - 10 scale. 1 = Not likely to meet question criteria. 10 = Likely to meet question criteria.**						
Can the project be completed in a reasonable timeframe?	5	5	10	3	7	5	7	2
Will success have a positive impact on Ad. Services budget?	8	5	2	2	2	5	7	1
Do you feel the improvement will have a positive return on investment (labor, morale, material, cost)?	5	8	3	8	5	6	7	4
Will this improvement have a significant savings in time?	10	9	3	3	4	7	6	3
Are potential resources to complete the project readily available?	3	9	9	7	5	9	7	7
Is the cause of the problem known?	3	5	5	4	4	2	6	2
Will success significantly improve stakeholder satisfaction?	8	7	2	3	2	3	4	1
Is the process currently measured?	3	5	7	9	5	5	8	1
Is the process measurable?	3	9	9	7	5	9	9	2
Does improving this process contribute to our department's strategic objectives?	7	4	2	3	3	7	10	2
Will improvements have a negative impact on our business partners' processes?	-5	1	1	3	4	5	1	1

Selection Matrix **Imaging**		Document research	Micrographics	IR Paperwork prep	Fire Prep	Mandatory Keeps	DARA Requests	CA&P Liaison
Project Characteristic	**Priority**	**Answer based on 1 - 10 scale. 1 = Not likely to meet question criteria. 10 = Likely to meet question criteria.**						
Will there be an enterprise-wide change that will affect this process in the near future?	-10	1	1	1	1	1	1	1
Is success likely?	8	8	5	5	3	5	7	3
Sub-Totals		**412**	**256**	**242**	**204**	**318**	**419**	**135**

Within any Lean Six Sigma Study (see Table 1. Definitions of Terms) terms of art are especially important in order to implement the principles underlying the model. Within the imaging study, the DMAIC model served as an important tool in managing the project. The DMAIC model consists of key elements including Define, Measure, Analyze, Improve, and Control. Proper use of the DMAIC tool ensures that the project stays within the set parameters and that the information collected relates directly to the project to mitigate possible scope creep or project shift. The key elements for the DMAIC model are described as follows:

- *Define* – A project is defined through the use of a project charter. The charter defines the problem, identifies the business need for improvement (cost, schedule, or quality), defines the scope of the project, identifies the stakeholders, and tries to develop deliverables for consideration. At this point, developing deliverables can be quite challenging as people tend to try to jump to solutions, however, it is a necessary step to take because it helps to define the end point of the project. During the define process, one also develops the workflow stream that is currently in place. Workflow development can often help to identify possible areas for measurement and critical-to-quality elements that have been overlooked in the past.
- *Measure* – Measurement is the process of assigning metrics to quantify the areas' performance. Measurements need to be customer-service focused and specifically developed to ensure a true picture of the problem. If the metrics are not comprehensive you can easily miss the root of the problem.
- *Analyze* – Compressive analysis of the data is essential to success of the project. It is through analysis that one is able to determine the root of the problem and begin to brainstorm possible improvement areas. It is at this point that the project charter needs to be brought out again to ensure that the improvements are in line

with the project scope. It is often at the analyze phase where scope creep can easily occur.

- *Improve* – The improve phase is also a good time to celebrate successes within the unit. It is time to show the unit what they are doing right and what they can do better. Encouragement can often bring about a "second wind" to the process. Improve is also when ideas brought forth in the brainstorming sessions can be mapped out and pilots developed. Solutions are often implemented simultaneously to see which ones have a greater effect over the others.
- *Control* – The culmination of all the work from the other phases is the control. In the control phase, the solution has been implemented and is being closely followed to ensure its continued success. It is the time to Poka-Yoke implemented solutions. If the solution begins to falter, it is up to the project sponsor and work group to make the necessary tweaks to ensure the project stays on track.

Data Collection

Once training was completed and all individuals were able to utilize the DMAIC properly, they were sent to the unit to conduct data collection. Summary of data collected is as follows:

- *Mandatory Keeps* – Currently there are 18 items which when scanned immediately get pulled and then sent up to claims to be placed within a paper file. Frequently these items are requested a second time by the claim handler. The mandatory keeps operator then has to conduct rework to ensure that the item was indeed routed and not lost in the flow of other documents. Data collection consisted of a tick sheet to account for types of documents requested per day and was tracked over a two week timeframe.
- *DARA requests* – Documents which are imaged into the claims system are able to be retrieved by the claims operator in paper copy. DARA is the computerized system which allows for the transaction to take place. The requesting process can not be altered for business reasons, however the way in which they are labeled and routed can be very time consuming. Information will be captured through a time study.
- *Research* – The research area of imaging is rotated among all imaging employees. Each employee can expect to rotate through both of the research areas one time per quarter. One focuses on paper research requests and the other focuses on the electronic requests through the electronic research queue.
- *Paper Research* – Paper research enters the research waste stream at the time of mail opening. Mail which is opened and the claim number or underwriting file number is not immediately identifiable is placed within a research basket. The research operator collects these documents and moves to a separate side of the building to begin the identification process. The research operator has four programs which he uses to determine the appropriate claim or file number. Each program must be accessed independently and has only specific fields capable of lookup features.

- *Electronic Research* – Documents enter the research waste stream after the point of scanning. Items which have an incorrect claim number or have been rejected by the indexing operator for numerous reasons are then examined by the research operator to determine the correct placement for the image. The imaging researcher uses the same programs and lookup features as the paper research operator.

Results

Research shows that approximately 55% of small to medium- sized organizations today have no documented end-to-end processes (Sherman, 2007). This is also true of most large public or private companies as well. Various authors agree that the importance of understanding the processes of one's organization cannot be over emphasized (Anderson, 1994, Vouzas, 2007, Sherman, 2007, Spencer 1994).
Mandatory Keeps – The data was collected over a two-week period and showed a high volume of items to be pulled and processed each day. Each item pulled needed to be logged into an access database and an individual routing slip needed to be printed and attached for correct mailing purposes. The mandatory keeps process often took one individual a full day to complete and often times documents were left to be processed the following day.

Table 3.

Affidavit of Loss/Release of Interest	13
Affidavit in Lieu of Title	24
Lien Release/Lien Satisfaction	33
Statement of Lien Satisfaction	14
Power of Attorney	369
Titles and Salvage Certificates	599
Vehicle/Vessel Reassignment Form	9
Odometer Mileage Statement	20
Bill of Sale	21
Application for Replacement Title or Application for Duplicate Title	14
Recall Notices	25
ROI/POA	161
Total	**1302**

DARA Requests – There is an average of 150 requests per day in the DARA system. Of the 125 requests per day, approximately 90 need to be printed and pulled each day. When a document is pulled, there are four fields in the electronic routing slip to be filled in before it is printed. The copy and paste required for each of these documents takes 28 seconds totaling 42 minutes per day.
Research – The turnover in the research area makes it extremely difficult to collect usable data. Each employee has a different level of skill sets and therefore there is not a continuity of data in the research area.

Waste Reduction

Where the Six Sigma method is mainly focused on data collection, the Lean process is focused heavily on waste reduction. George, 2003 states that the 7 forms of waste are:

- Over processing – trying to add more value to a service/product than what your customers want or are willing to pay for.
- Transportation – Unnecessary movement of material, products or information.
- Motion – Needless movement of people.
- Inventory – any work-in-progress that is excess of what is required to produce for the customer.
- Waiting time – Any delay between when one process step/activity ends and the next step/activity begins.
- Defect – Any aspect of the service that does not conform to the customer need.
- Overproduction – production of service outputs or products beyond what is needed for the immediate use.

Through analysis of the data collected, it was important to identify the areas which could be removed because of no added value to the customer.

Implementation

Mandatory Keeps – Careful analysis showed that significant time was being lost pulling and processing mandatory keeps. A full-time employee was staffed to pull, log, and route the previously scanned items to the department. After working with our business partners, we were able to eliminate the waste from the process.

1. Over processing – removal of the logging system. The database was built in excess and the system was used to show that an item was routed to the owning department, however was rarely referenced.
2. Over Production – Removal of the routing slip on every piece of paper.

Removal of these two items ultimately resulted in a savings of 25.75 hours per week.
DARA Requests – The documents which were collected showed a large variance in the type of document requested and the number of claim handlers requesting the documents. The variation caused a limitation on improvements which could be made.

- Over processing – Removal of the manual process of copy and paste for individual routing slips. A technological enhancement was created to improve the routing procedure. The solution lowered the process time from 28 seconds per document to 13 seconds per document.
- Total savings 15 seconds per document On average they need to print 90 per day = 1350 seconds per day savings = 22.5 minutes per day 22.5 x 5 = 2 hours saved per week

Research – Data collected and analyzed in the research area showed that the process first needed to be brought under control. In order to bring the system under control the recommendation were made to:

- Reduce motion – Remove the function from the current job rotation. By limiting the number of individuals who perform the research function, you increase the number of documents processed by removing the acclimation time.
- Transportation – Remove the transportation of paper. By imaging all documents, the paper research area can be eliminated and transferred to the electronic system, thus reducing the amount of rework in the process.

Control

In the case study above, the imaging unit was plagued with plummeting customer service numbers, high employee turnover, and significant employee disengagement. Using the fundamentals of Lean Six Sigma process, the improvement team was able to identify areas of improvement, engage the employee base, and once again bring job level performance back up to good standing. These gains were so significant that employee count numbers for 2008 were reduced by 3. This reduction will be realized through attrition and shows a true cost savings of $81,000.00.

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Michelle Ackerman joined a workgroup in 2007 to focus on process improvement and in 2008 she was promoted to Project Coordinator. This paper does not necessarily reflect the views of the State Farm Insurance Companies.

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