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Six Sigma as a modern tool of Business Excellence

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Abstract

In today's fast changing world, the customers expect quality products and services with satisfaction. The main aim of business is to reduce cost and at the same time without fall in quality of the product. To maintain quality the business organizations adopt various technologies that can suit to them. In order to survive in this competitive world, the companies have to maintain balance between quality and piece and cost. Only that company can survive which can balance these three variables. The 'manta' for success in the 21st century is "Best quality, Least Price with least cost. Globalization and instant access to information, products and services have changed the way our customers conduct business — old business models no longer work. Today's competitive environment leaves no room for error. We must delight our customers and relentlessly look for new ways to exceed their expectations. This is why Six Sigma Quality has become one of the modern tools of business excellence. This paper is about role and significance of six sigma in today's quality conscious business environment

Key words:
Business Excellence, Six Sigma, 5 Why, 5 S

Introduction

Six Sigma is a quality program that, when all is said and done, improves your customer's experience, lowers your costs, and builds better leaders. — Jack Welch

Six Sigma originated at Motorola in the early 1980s, in response to achieving 10X reduction in product-failure levels in 5 years. Engineer Bill Smith invented Six Sigma, but died of a heart attack in the Motorola cafeteria in 1993.It is based on various quality management theories (e.g. Deming's 14 point for management, Juran's 10 steps on achieving quality).

Six Sigma at many organizations simply means a measure of quality that strives for near perfection. It is Six Sigma is a disciplined, data-driven approach and methodology for eliminating defects in any process – from manufacturing to transactional and from product to service. The statistical representation of Six Sigma describes quantitatively how a process is performing. The word Sigma is a statistical term that measures how far a given process deviates from perfection. The central idea behind Six Sigma: If you can measure how many "defects" you have in a process, you can systematically figure out how to eliminate them and get as close to "zero defects" as possible and

specifically it means a failure rate of 3.4 parts per million or 99.9997% perfect. It is a methodology for pursuing continuous improvement in customer satisfaction and profit as well as to improve effectiveness and efficiency.

Six Sigma is a business-driven, multi-dimensional structured approach for: o Improving Processes

- Lowering Defects
- Reducing process variability
- Reducing costs
- Increasing customer satisfaction
- Increased profits

Key elements : There are three key elements of Six Sigma Process Improvement:

- **The Customers:** Customers define quality. They expect performance, reliability, competitive prices,on-time delivery, service, clear and correct transaction processing and more. Thismeans it is important to provide what the customers need to gain customer delight.
- **The Processes:** Defining processes as well as defining their metrics and measures is the central aspect of Six Sigma. In a business, the quality should be looked from the customer's perspective..By understanding the transaction lifecycle from the customer's needs and processes, one can discover what one is seeing and feeling. This gives a chance to identify weak areas within a process and then we can improve them.
- **The Employees:** A company must involve all its employees in the Six Sigma program. Company must provide opportunities and incentives for employees to focus their talents and ability to satisfy customers.

It is important to Six Sigma that all the team members should have a well-defined role with measurable objectives

Benefits from Using Six Sigma

Small- and medium- sized businesses Lean Six Sigma works for small and medium businesses (SMBs). The benefits are many as Lean Six Sigma increases revenue and reduces costs, while freeing up resources that can be utilized toward any endeavor your organization wishes to pursue. For example:

- A new product or service
- Other improvement projects
- Expanding your sales force

Six Sigma not only increases revenue and reduces costs; it positively affects people by engaging them in improving the way they work. Since employees are the closest to the actual work (production of a product or delivery of a service) of any organization, they become the best resources to understand how to improve the efficiency and effectiveness of business processes. By

participating in successful Lean Six Sigma projects, employees are able to build the confidence and develop the capability to become your business' most important assets. Studies show that when employees feel that they have a positive affect on the organization, they perform better, are more accountable and live happier lives. And once your employees get comfortable with Lean Six Sigma skills, they can continue to find and remove problems and waste in your organization. (https://goleansixsigma.com/wp-content/uploads/2012/02/The-Basics-of-Lean-Six-Sigma-www.GoLeanSixSigma.com_.pdf)

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Methodology of Six Sigma

Six Sigma has two key methodologies:

1. **DMAIC Methodology:** It refers to a data-driven quality strategy for improving processes. This methodology is used to improve an existing business process. This methodology consists of the following five steps. Define --> Measure --> Analyze --> Improve --> Control
   - **Define:** Define the problem or project goal that needs to be addressed.
   - **Measure:** Measure the problem and process from which it was produced.
   - **Analyze:** Analyze data and process to determine root cause of defects and opportunities.

- **Improve:** Improve the process by finding solutions to fix, diminish, and prevent future problems.
- **Control:** Implement, control, and sustain the improvement solutions to keep the process on the new course.

2. **DMADV Methodology**: It refers to a data-driven quality strategy for designing products and processes. This methodology is used to create new product designs or process designs in such a way that it results in a more predictable, mature and defect free performance. This methodology consists of five steps: Define --> Measure --> Analyze --> Design -->Verify
   - **Define:** Define the Problem or Project Goal that needs to be addressed.
   - **Measure:** Measure and determine customers' needs and specifications.
   - **Analyze:** Analyze the process to meet the customer needs. Design: Design a process that will meet customers' needs.
   - **Verify:** Verify the design performance and ability to meet customer needs.

DFSS Methodology

DFSS is a separate and emerging discipline related to Six Sigma quality processes. This is a systematic methodology utilizing tools, training, and measurements to enable us to design products and processes that meet customer expectations and can be produced at Six Sigma Quality levels. This methodology can have the following five steps.
Define --> Identify --> Design --> Optimize --> Verify

- **Define:** Define what the customers want, or what they do not want.
- **Identify:** Identify the customer and the project.
- **Design:** Design a process that meets customers' needs.
- **Optimize:** Determine process capability and optimize the design.
- **Verify:** Test, verify, and validate the design

Tools of Six Sigma

Six Sigma can be learned for implementing in your business or organization. This includes Six Sigma tools like: control charts, SIPOC and others.

5 Whys	Process Mapping
5S	Project Charter
Affinity Diagram/KJ Analysis	Pugh Matrix
Analysis of Variance (ANOVA)	QFD/House of Quality
Analytic Hierarchy Process (AHP)	RACI Diagram
Brainstorming	Regression
Calculators	Risk Management
Capability Indices/Process Capability	SIPOC/COPIS
Cause & Effect	Sampling/Data
Control Charts	Simulation
Design of Experiments (DOE)	Software
FMEA	Statistical Analysis
Graphical Analysis Charts	Surveys
Hypothesis Testing	Templates
Kanban	Value Stream Mapping
Kano Analysis	Variation
Measurement Systems Analysis (MSA)/Gage R&R	Wizards
Poka Yoke	Normality
	Pareto

5 Why as tool of excellence

The 5 Whys is an iterative question-asking technique to identify the root cause underlying a particular symptom. Consider a situation in which a child throws a tantrum and refuses to go to school. Table 1 shows the application of the 5 Whys to this situation.

Table 1: Example of 5 Whys – A Child's Tantrum

	Why	**Answer**
Why #1	Why does the child throw the tantrum and refuse to go to school?	The child says, "I feel warm."
Why #2	Why does the child feel warm?	The child has a body temperature of 101 degrees.
Why #3	Why does the child have a body temperature of 101 degrees?	Yesterday, the child did not wash his hands before eating dinner in a restaurant. In addition, many of his classmates have been coughing.
Why #4	Why did the child not wash his hands?	The parent gave up trying to convince the reluctant child to wash his hands.
Why #5	Why did the parent give up trying to get the child to wash his hands?	The parent did not want to feel embarrassed by the child's behavior.
Why #6*	Why would the parent feel embarrassed?	The parent was raised to believe that you should not cause a scene in public.
* Note: Sometimes it take more than 5 Whys in order to reveal the root cause of the situation.		

The deeper the questions of "why" go, the more likely that the root cause of a situation will be revealed. In this example, the parent needs to address the situation – the child's temperature needs to be brought down. The root cause, however, is how a parent manages themselves during the power struggle. In this case, the way the parent was raised is not something that the parent can change. But awareness of the underlying assumption means it can be questioned or changed. (https://www.isixsigma.com/tools-templates/5-whys/case-study-using-the-5-whys-to-validate-assumption/)

5 S as tool of excellence

5S is a system for instilling order and cleanliness in the workplace. Through an emphasis on organization and visual cues, it is a means to reduce waste and improve efficiency.

With its roots in Lean manufacturing in Japan, 5S is a tool now used throughout the process improvement community and may be applied to any workspace – from an office to the factory floor. It is often the first Lean tool a company will use before moving on to other optimization techniques.

In Japanese, the 5S's stand for the following:

1. ***Seiri*:** Put things in order – remove what is not needed and keep what is needed
2. ***Seiton***: Proper arrangement – place things in such a way that they can be easily reached when they are needed
3. ***Seiso***: Clean – keep things clean and polished; no trash or dirt in the workplace
4. ***Seiketsu*:** Purity – maintain cleanliness after cleaning; perpetual cleaning
5. ***Shitsuke*:** Commitment – a typical teaching and attitude toward any undertaking to inspire pride and adherence to standards established for the first four components

In English, the 5S's have been translated to keep the "s" as the first letter of each word as follows:

1. Sort
2. Straighten
3. Shine
4. Standardize
5. Sustain

In some businesses, a sixth S is added: safety. 5S is not a tool to be applied one time; rather the principles should be embedded into the daily culture of an organization. Emphasize the fifth S, sustain.
(http://cdn.intechweb.org/pdfs/17406.pdf)

Factors that needed for a successful implementation of Six Sigma

Following are important organizational factors to have a success lean manufacturing implementation:

1. **Training:** Training is one of the key organizational factors to successfully implement techniques Six Sigma
2. **Employee involvement:** The involvement of employees is the most important human factor needed for the success Six Sigma managers. This factor is necessary for the planning and implementation techniques of Six Sigma.
3. **Teamwork:** Increasingly, companies encourage teamwork training (quality circles, teams consisting of product development, etc.). A task force is a self-directed team that organizes people in a way, be responsible for a certain performance or area.
4. **Empowerment:** It is important that the company delegated authority to its workforce and let them know their limits of authority. To be autonomous, it is important that the workforce possesses various skills, such as the ability of diagnostic, analytical skills, decision making skills, etc. One feature of empowerment is that the maximum benefits from information technology are achieved.
5. **Compensation system:** Systems of compensation, reward or recognition develop pride and self-esteem and workers are vital to achieve the goals of the company. People with authority are an inherent sense of pride in their achievements and contributions to the company. Recognition systems, both psychological and concrete can increase these feelings.
6. **Management support**: The factor "management support" is an important pillar in the design, development and continuity of the Six Sigma.. When making a plan to implement the Six Sigma in a company, it is necessary that the conception of the idea is approved and encouraged by the highest levels of the company
7. Communication: Communication within any organization is essential for good performance and system feedback. Communication systems play an important role as they should be effective.
8. **Resistance to change:** It is necessary when performing the program and implementation plan of the Six Sigma it is necessary to consider that if a company worked a long time under a production system and now want to switch to another system, there is resistance to this change.
9. One of the reasons for employee resistance is personal, involving a desire for change, for example, motivation, custom operating systems already defined and training.

Conclusion

Six Sigma helps to handling competition, which has increased considerably in today's business world. Business organizations worldwide have realized that in order to beat the competition, they will have to offer better quality products or services to their customers and that too at competitive rates. Six Sigma is anticipated to maintain its dominance over all other existing quality improvement techniques because it is flexible and can be altered to suit the requirements of new businesses that might come up in the near future. The importance of Six Sigma has increased manifold in the last two decades and is set to increase even more in the coming years as more and more businesses realize its benefits. We can never be too sure about the future but as far as the present is concerned, Six Sigma is certainly calling the shots across all types of industries worldwide.

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