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A Study on classification a six Sigma

Dr. Nishant Labhane
Assistant Professor, Masters In Business Administration (General Management), Presidency University, Bangalore, India,
Email Id-nishantbhimrao@presidencyuniversity.in

ABSTRACT:

Six Sigma is a data-driven management style that seeks to boost overall organisational performance by enhancing business processes and reducing errors. An overview of Six Sigma, its core ideas, and its applicability in a variety of sectors are given in this abstract. It examines Six Sigma's systematic methodology, its emphasis on statistical analysis, and the DMAIC (Define, Measure, Analyse, Improve, Control) process improvement technique. It also examines Six Sigma's function in promoting quality and efficiency in organisations, as well as its advantages and disadvantages in terms of implementation. Understanding Six Sigma provides useful insights into how organisations may pursue excellence and constantly enhance their operations to satisfy customers and achieve commercial success.

KEYWORDS:

Approach, Design, Improvement, Process, Quality.

I. INTRODUCTION

A potent approach called Six Sigma tries to enhance corporate operations by minimising variance and removing flaws. Six Sigma, which was created by Motorola in the 1980s, has since been embraced by multiple organisations all over the globe in a variety of sectors, including manufacturing, healthcare, finance, and services. In order to attain a level of performance where the process creates only 3.4 faults per million chances, the term "Six Sigma" refers to a statistical measure of process performance. This degree of precision and accuracy is accomplished via a methodical, data-driven strategy that concentrates on comprehending and enhancing process capabilities. Customer focus, data-driven decision making, process improvement, and organisational dedication are at the heart of the Six Sigma methodology. It emphasises how crucial it is to match process performance with client needs and expectations. Businesses may find areas for development and come to informed conclusions by monitoring, analysing, and enhancing processes using statistical tools and methodologies[1], [2].

The foundation of Six Sigma is the DMAIC technique. Define, Measure, Analyse, Improve, and Control are all represented by this acronym. Each stage denotes a distinct step in the process of process improvement. Clarifying the issue, establishing objectives, and determining client needs are all part of the Define phase. To comprehend the process's present condition, the Measure phase focuses on gathering data. In the analyse phase, data are analysed to find the underlying causes of errors and variances. Potential solutions are tested and implemented during the Improve phase. The Control phase creates safeguards and methods to maintain the process performance improvements.Since implementing Six Sigma often entails considerable organisational and cultural changes, senior management must be fully committed. It necessitates the participation of qualified and trained Six Sigma practitioners who oversee improvement initiatives and coordinate the use of statistical methods. Adopting Six Sigma has several advantages. It gives businesses the potential to reduce faults, boost customer happiness, improve process effectiveness, and boost profitability. Organisations may improve their levels of quality, productivity, and performance by methodically identifying and removing the sources of issues[3], [4].

Six Sigma implementation is not without its difficulties, however. Building the required knowledge and maintaining the improvement initiatives need devoted resources, time, and training. To accept data-driven decision making and continual improvement, it also need a mental and cultural change. We'll go into more detail about the guiding principles, operating procedures, advantages, and difficulties of Six

Sigma in the discussion that follows. We'll look at Six Sigma's practical applications and how businesses have used it to significantly raise their standards for quality, effectiveness, and customer happiness. Organisations may start a path of continuous improvement and attain operational excellence by grasping the foundations of Six Sigma.

II. DISCUSSION

Motorola initially used the term Six Sigma in the middle of the 1980s in the United States to describe a quality improvement approach or process whose goal was to raise quality by lowering variance. The procedure was known as "The Six Steps to Six Sigma" by Motorola, and it is said to have saved the company billions of dollars over the next years. In reality, Florida Power and Light (FPL) was the organisation that first used the Six Sigma approach in the US in 1985 when it chose to submit an application for the Deming Prize, a Japanese quality award. The JUSE (Japanese Union of Scientists and Engineers) advisors who assisted FPL in getting ready for the Deming Prize application taught FPL about the Six Sigma technique. Since Motorola and other well-known firms, like GE and Samsung, successfully implemented Six Sigma, the approach has expanded around the globe and is applied in a variety of fields, including manufacturing and services, in both the private and governmental sectors. This article examines several Six Sigma alternatives as techniques or road maps. The article starts out by going through the basics of Six Sigma, including its tools, methodologies, and effects on applying it. The relevance and restrictions of Six Sigma are covered in the entry's conclusion[5], [6].

Fundamentals

The Motorola Six Sigma method was first created and used in the 1980s for manufacturing, then starting in 1990, it was modified for use in non-manufacturing sectors of the business. The following is a summary of Motorola's "Six Steps to Six Sigma" in non-manufacturing: (1) Identify the product you make or the service you offer to external or internal customers; (2) identify the customer for your product or service and ascertain what he or she considers important (your customers will inform you of the critical requirements that must be met; failure to satisfy a customer's critical requirements is a defect); (3) identify your needs (including needs from your suppliers) to provide product or service so that it satisfies the customer; and (4) define the According to the Six Steps to Six Sigma technique, the goal is to increase customer happiness, reduce waste, time, and costs, and enhance the quality of process outputs. Six Sigma focuses on finding and eliminating the causes of failures and defects, minimising variation by employing a set of statistical tools, and other quality management strategies in order to accomplish that challenging goal. It follows that the approach is aa structured data-driven improvement strategy that gradually reduces failures and variances and orderly manner. The approach is used to well defined projects, such as those involving products, services, or business processes. Each Six Sigma project formed has specific objectives for reducing failure rates, costs, or turnaround times. The phrase "Six Sigma" denotes a level of process capacity and is connected to statistical modelling of variance in any process or product. It is recognised that process output will most often fluctuate within +/-3 sigma when a process, for instance, is "in statistical control," which denotes that only systemic or common reasons impact the variance. Sigma is the standard deviation of the measured output characteristic. The natural variety is another name for this period. By lowering sigma (the standard deviation), or variance, one means the inherent fluctuation of process output. The natural variation of the process output may have been reduced to half of the allowed variation as stated by design engineers or the customers after improvement initiatives have been carried out consistently for some time. In this instance, the "final goal of Six Sigma"—defined as having the produced goods mostly free of defects has been accomplished. With those presumptions, we may anticipate that 3.4 faults per million manufactured outputs, or 99.99966%, of the goods will be defect-free. The procedure in question is referred to as "a six sigma process[7], [8]."

The Evolution and Tools of Six Sigma

We presented and spoke about Motorola's "Six Steps to Six Sigma quality"—that is, Motorola's plan to attain six sigma quality (= 3.4 faults per million)—in the preceding paragraphs. General Electric (GE) eventually superseded these six phases when Jack Welch, chairman and CEO of GE, announced the Six

Sigma process to be GE's corporate strategy for enhancing quality and competitiveness on April 24, 1996, at the annual meeting. The following passage from his speech immediately leads to the modification of the route map: For each of the tens of millions of procedures that generate the products and services a firm offers, Motorola has established a strict and tested methodology. The Six Sigma process is the approach, and it consists of four easy-to-follow but exact steps:First, measuring every process and transaction, then analyzing each of them, then painstakingly improving them, and finally, rigorously controlling them for consistency once they have been improved.Later, GE improved the DMAIC (design, measure, analyse, improve, and control) method by further developing the sigma improvement process. The DMAIC technique, however, was quickly realised at GE and other firms to be ineffective for the crucial areas of innovation and new product development[8], [9]. As a result, a modified approach was offered, which later developed into the so-called Design for Six Sigma methodology (DFSS), where the DMADV project methodology was advised:

1. Define design goals based on customer needs and the company's strategy for new product development.
2. Measure and identify CTQs (Critical to Quality characteristics), product capabilities, production process capability, and risks.
3. Analyze to develop and design alternatives, create a high-level design, and evaluate design capability to select the best design.
4. Design details, optimize the design, and plan for design verification.
5. Verify the design, set up pilot runs, implement the production process, and hand it over to the process owner(s).

Many well-known quality management tools, such as flowcharting, cause-and-effect diagrams, histograms, Pareto analysis, affinity diagrams, quality function deployment (QFD), design of experiments, control charts, process capability analysis, analysis of variance, and regression analysis are used within the individual steps of DMAIC or DMADV. Simple tools for data selection and analysis are combined with sophisticated statistical tools in the toolset.

Importance

Six Sigma Training, Education, and Implementation

Leadership, together with instruction and training in the Six Sigma concepts, tools, and methodologies, are necessary for the successful implementation of Six Sigma. For those taking part in the implementation phase, distinct leadership responsibilities have been developed. For each position, as mentioned below, comprehensive educational and training programmes have been created.

1. **Executive management:** comprises the managing director and other senior management team members. These senior managers are in charge of establishing a clear vision for Six Sigma implementation and providing their staff with the tools they need to carry out improvement projects as well as get education and training.
2. **Winners:** are chosen by the top management team from the managers at the first level below the top management level and are in charge of implementing Six Sigma across the whole organisation.
3. **Black Belts Master:** Act as in-house coaches on Six Sigma concepts, tools, and techniques after being recognised by champions. Master Black Belts give Six Sigma their whole attention, supporting champions and mentoring Black Belts and Green Belts.
4. **Black belts:** work under Master Black Belts to apply Six Sigma methodology to particular projects, giving Six Sigma their full attention. Black Belts concentrate largely on the implementation of Six Sigma projects, whereas Champions and Master Black Belts concentrate on the identification of Six Sigma projects and functions.
5. **The Green Belt**: are the workers who, in addition to their other duties, execute Six Sigma, working under the direction of Black Belts.

Different organisations and consulting firms provide educational programmes to meet the requirements for the aforementioned professions. Education and training programmes differ from business to company. This is perhaps the most crucial element of Six Sigma programmes.

Impact of Six Sigma

In the majority of businesses who were successful in putting the technique into practise, Six Sigma success became a reality. Numerous books, media articles, and research studies on Six Sigma were written, educating readers on the various accomplishments and outcomes that successful businesses could demonstrate. Here, we concentrate on specific outcomes that Motorola and GE have published.According to Stephen George, Motorola saved as much as $1.5 billion in manufacturing between 1986 and 1990 by implementing the Six Steps to Six Sigma, and in 1990 they predicted that they might save an additional $1 billion annually in non-manufacturing. According to reports, Motorola was able to cut costs in non-manufacturing operations by $5.4 billion between 1990 and 1995. In their 2001 annual report, GE said that the completion of more than 6,000 Six Sigma projects had probably resulted in more than $3 billion in savings, based on conservative estimates. In 1999, GE reported savings of $2 billion attributed to Six Sigma.

The Importance and Limitations of Six Sigma

A new management methodology's significance may be assessed in a number of ways, but one of the best is to examine how and how widely it has been adopted in the management areas, both academically and by businesses worldwide. After Motorola, GE had a significant role, particularly in this. The approach quickly expanded around the globe after seeing its initial success within GE firms and from an expanding number of supplier companies. Due to GE's desire that businesses who wished to do business with GE follow the technique, the Six Sigma methodology was readily expanded to supplier firms. Due to statements made by senior academics in the area that the Six Sigma technique was founded on reliable scientific principles, the subject of Six Sigma also gained popularity in academia. It thus comes as no surprise that journals in disciplines including quality management, production management, operations management, process management, and service management began publishing an unusually high number of research publications showcasing case studies where the Six Sigma technique had been used.

The quality story, which was created in Japan in the 1960s as a standard for quality control circle presentations but later developed into an important quality improvement standard within the Japanese version of total quality control (TQC), which later evolved into the holistic management philosophy known as total quality management (TQM), may be viewed as a short version of the DMAIC (as well as the DMADV) process. Some specific and significant information from Motorola's initial road map to Six Sigma quality are missing. The key distinction is that "the customer" has not been mentioned directly. via GE's DMAIC procedure. If the consumers see DMAIC as one of numerous different TQM road maps for creating exceptional organisations, then this may not be an issue. (See the entries for Excellence Characteristics and Total Quality Management). Although many individuals (managers, consultants, and academics) seem to have a misunderstanding of what Six Sigma is, they may claim that it is the replacement for TQM or that it is a stand-alone management philosophy that competes with TQM and lean production (see the page for Lean Enterprise).

Lean production and Six Sigma quality, however, are management and manufacturing philosophies, concepts, and tools that have the same origin as the management philosophy known as TQM, namely, Japan's quality evolution. This conclusion can be reached through systematic analyses such as the comparisons between GE's DMAIC process and Motorola's original six-step methodology that were made above. The ideas, concepts, and techniques of Six Sigma quality (as well as lean manufacturing) should not be considered as alternatives to TQM, but rather as a set of concepts and tools that complement the general principles and objectives of TQM, it may also be inferred from such systematic comparisons.Therefore, it may not come as a surprise to learn that the most recent development of Six Sigma has been the fusion with lean production, which at the turn of the century led to the creation of a lean Six Sigma road map to excellence. There can never be just one road map towards greatness, which

is why we have created this integrated one. Sometimes businesses can benefit most from concentrating on enhancing quality through the reduction of variation (the Six Sigma approach), while other times it may be more important and beneficial to concentrate on reducing waste (the lean approach), and still other times it may be important to combine the two approaches under an overarching management tenet like TQM and business excellence[10].

III. CONCLUSION

A potent technique called Six Sigma has completely changed how businesses approach process improvement and quality control. Six Sigma helps businesses to find and remove flaws, reduce process variation, and improve overall performance by using a data-driven and methodical approach. Six Sigma's emphasis on customer attention, data analysis, and process optimisation is the key to its success. Organisations may improve their operations and make wise judgements by matching processes to client needs and using statistical tools and methodologies. Better efficiency, more customer happiness, and ultimately better company outcomes follow from this. The capacity of Six Sigma to promote continual improvement is one of its main advantages. Organisations may use the DMAIC technique to repeatedly identify and fix process problems, resulting in gradual improvements over time. With the help of this strategy, workers are given the freedom to actively participate in attempts to enhance processes.

Strong leadership commitment, an investment in training and resources, and a readiness to accept change are all necessary for the implementation of Six Sigma. Successfully implementing Six Sigma often results in considerable increases in customer loyalty, cost savings, and quality. Additionally, Six Sigma offers a well-organized framework for teamwork and problem-solving, allowing cross-functional teams to cooperate to achieve a single objective. But it's crucial to understand that Six Sigma is not a universally applicable answer. Its implementation must to be customised to fit the particular requirements and circumstances of every organisation. Additionally, wise project selection, transparent communication, and ongoing leadership support are necessary for Six Sigma success.Six Sigma provides a structured and exacting method for process improvement and quality control. It provides businesses with the tools and procedures they need to find and fix problems, improve client happiness, and boost overall productivity. Organisations may position themselves for long-term success in the competitive environment of today by adopting the ideas of Six Sigma and cultivating a culture of continuous improvement.

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