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# The Success Roadmap for Six Sigma Implementation in Organization

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## **Abstract**

*Six sigma is a well- liked and powerful statistical tools and techniques to drive out variability in the efficiency of processes within the organisation. First introduced by Motorola in 1986 as a quality performance measurement, six sigma now has been developed into a statistically guided technique used to improve procedure and product quality. Many organizations have informed momentous profits due to adaptation of six sigma project, though not all has success tales. Reports state that 60% six sigma projects either fails or profits doesn't last more than a year. Studies show that six sigma technique works under some conditions.*

*This paper reviews the literatures associated with the factors that lead to sustainable and successful six sigma in the organization.*

*Keywords: Six sigma, sustainable six sigma, success factors, quality management,*

## **Introduction**

Six sigma has become to be a popular approach in many organisations today to reduce variability and waste in processes using powerful statistical tools and techniques. Statistically speaking, six sigma means 3.4 defects per million opportunities (DPMO), where sigma is a term used to signify the variation about the average of a process. In business terms, six sigma is defined as a business improvement strategy used to improve business profitability, to drive out waste, to reduce costs of poor quality and to improve the effectiveness and efficiency of all operations so as to meet or even exceed customers' needs and expectations (Antony and Banuelas, 2001).. Six Sigma is a quality management methodology that focuses on reducing variation, measuring defects and improving the quality of products and processes (Furterer and Elshennawy, 2005). Six Sigma was first applied in manufacturing; however, its application rapidly expanded to other functional areas, such as marketing, engineering, administrative support and

supply chain operations (Kumar et al., 2006; Tang et al., 2007). Since Jack Welch, the former chief executive officer of GE, popularized Six Sigma in the late 1990s, the S business-management methodology has had a profound impact. Yet, amazingly, in the majority of all corporate Six Sigma initiatives-60 percent fail to yield the desired results, according to Praveen Gupta, a noted author who has been involved with the methodology since its origin in the 1980s. Amid rising concern regarding these failures, more corporations across multiple industry sectors are now pulling back on their Six Sigma initiatives, realizing that the methodology by itself is not the cure-all for corporate ills. 3M also struggled with Six Sigma,

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though it seemed promising when first implemented under CEO James McNerney, a former GE executive. Profits initially grew approximately 22 percent a year, but then languished. Experts questioned whether McNerney's-and Six Sigma's-unyielding emphasis on efficiency stifled 3M's creativity and innovation. According to David Fitzpatrick, worldwide leader of Deloitte Consultant's Lean Enterprise practice: fewer than 10 per cent of the companies are doing it to the point where it's going to significantly affect the balance sheet and the share price in any meaningful period of time.

These dissimilar results makes six sigma implementation a complex and central process. Rockart (1979) popularized the idea of critical success factors (CSFs). CSFs are those factors which are critical to the success of any organisation, in the sense that, if objectives associated with the factors are not achieved, the organisation will fail perhaps catastrophically. For six sigma project implementation, CSFs represent the essential ingredients on which a project stands chance of success. With the aim to determine the CSFs for six sigma, the first step was to carry out an exploratory study on the topic as similar studies were performed by authors such as Pande et al. (2000), Henderson and Evans (2000) and Eckes (2000). For instance, Henderson and Evans (2000) suggest upper management/involvement, organisation infrastructure, training and statistical tools as the major components for a successful six sigma implementation. The main objective of this research is to accumulate all the key ingredients from the existing literature on six sigma implementation by analysing the success and failure stories of a number of organisations.

### **Management Participation and Dedication**

Those who have implemented and practiced six sigma agree that the most important factor is continued top management support and enthusiasm (Henderson and Evans, 2000). Top Management of the organisation must impel six sigma. In six sigma success stories like Motorola, GE, and AlliedSignal, the CEOs are the ones who have made it achievable. All of them support, participate and are actively involved and dedicated in company-wide six sigma initiatives. When Lawrence Bossidy, CEO of Allied Signal, took over the firm made formidable financial targets easy to reach through

the introduction of six sigma initiative (Harry and Schroeder, 2000). Jack Welch, GE's CEO, has stoutly inclined and enabled the restructuring of the business organisation and changed the attitude of the employees towards six sigma (Henderson and Evans, 2000). Welch supports and participates in a very hands-on approach such as dropping in on weekly and monthly six sigma reviews, monitoring project progress weekly through summary reports, and making site visits at manufacturing operations to observe the degree to which six sigma is ingrained in the culture (Henderson and Evans, 2000). In addition, Welch reviews and presents to the shareholders the progress of six sigma in GE in every meeting, term or annual report.

### **Change Management**

Six sigma needs to be involved alterations to the firm's values and culture for its introduction. It also involves substantial change in the organisation structure and infrastructure. Usually when important change occurs, the people in the organisation are afraid of the unknown and they do not understand the need for change. Some organisation cultures are fear based. Mistakes are not allowed, and employees are used to hiding defects. Six sigma, superfluties in an open and safe environment where defects are seen as improvement in opportunities (Erwin, 2000). Eckes (2000) identifies four different factors of resistance, which are:

- (1) *Technical*: frequently people find difficulties in understanding statistics to reduce this information. Education and involvement is needed.
- (2) *Political*: it is based on seeking the solution to be implemented as a loss, real or imagined. The strategy to avoid this is creating the need for change and then showing how change can be beneficial for them.
- (3) *Individual*: it consists of employees who are highly stressed as a result of personal problems, and not associated with the company. The strategy could be to try to reduce stress with less workload.
- (4) *Organisational*: this occurs when an entire organisation is committed to certain beliefs, which are usually established and communicated by the management. Unwillingness to change can be

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weakened by communicating to the managers the benefits of the scheme. Some companies that have succeeded in managing change have recognized that the best way to undertake resistance to change is through increased and sustained communication, motivation and education. It is important as well to get as much practical feedback as possible from employees, plan the change through a detailed six sigma execution signpost, delegate responsibilities when possible and empower people to make their own decisions.

### **Communication**

A communication plan is significant in order to engage the personnel with the six sigma initiative by showing them how it works, how it is related to their jobs and the benefits from it (Henderson and Evans, 2000). When six sigma was launched in Sony Electronics, as a part of the internal communication plan, slogans such as "show me the data" were frequently seen on internal magazines. The idea was to communicate a new management style based on facts and data, as six sigma claims (Air Academy Associates, 1998). It is significant to set up a communication program that can explain what should be communicated by whom and how frequently. It would help organisations to spread their business strategy, customer requirements and work team. After implementation of six sigma projects, it is best to publish results both success stories as well as setbacks. It will help other projects in the pipeline to avoid the same mistakes and learn from mistakes.

### **Organisation Infrastructure**

In order to put into practice six sigma within any organisation, some organizational characteristics need to be already in place. It is highly desirable to have some degree of communication skills, long-term focus/strategy and teamwork. Moreover it should have enough resources and investment to get on six sigma. Companies that have determined to take on six sigma must know that to see benefits, they need to wait for long-term results (Dale, 2000). In order to catch employees interest in six sigma, small quick wins can be reached in the initial phases and then focus on more ambitious projects that require more time and resources to reach them. According to Mikel Harry, when an average company performance is at the level

of three sigma (66,807 DPMO) it would take more than a year to go from three to four sigma shift in business processes (i.e. 6,210 DPMO). It is not easy to have a shift in sigma capability level while getting closer to six sigma quality level. However, the first shift in sigma (until 4.8 sigma) could be done comparatively easily and without large investments. When a company has reached 4.8 sigma, the strategy is not defect removal anymore; instead, the six sigma strategy will shift to refining the systems. This is known as design for six sigma (DFSS). When implementing DFSS, process and services are re-designed from scratch to reach six sigma levels. Each shift has an exponential reduction of defects, consequently affecting the cost of poor quality and profit margin. It is best to focus first on short-quick wins to gain the appreciation of the power of six sigma within the organisation. Teamwork is a fundamental element within six sigma. The value of teamwork formed by cross-functional teams will launch a sense of ownership, better communication, team working value and overall view of the organisation. Many organisations, consultants and people involved in six sigma show the immense benefits of implementing this viewpoint. Indeed there are many success stories about these benefits. Those organisations that succeed made an important initial investment and allocated a special budget to launch six sigma. Some of the most vital budget items include direct payroll, indirect payroll, training and consultancy and improvement implanting costs. However the cost of not doing it is much bigger than the cost of doing it (Pande et al., 2000).

### **Training**

Training is a decisive factor in the successful implementation of six sigma projects. It is significant to provide the opportunity to people to improve their comfort level through training classes (Hendricks and Kelbaugh, 1998). The belt system must be applied throughout the company starting with top management (i.e. the champions) and should be cascaded down through the organisational hierarchy. It needs to be provided by identifying the key roles of the people directly involved in applying six sigma. They are agents of change who should spread the six sigma philosophy throughout the company. Operators who know their process better than anybody (Antony, 2000)

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should also be familiarised with it since they are the main provider of the quality in products and services. All through the time companies need to look outside the six sigma discipline for other methods and ideas that complement it (Pande et al., 2000), passing from a trained organisation to a learning organisation.

### **Six Sigma based business strategy**

Six Sigma cannot be treated another separate movement. It requires devotion to a whole philosophy rather than just the usage of a few tools and techniques of quality improvement (Dale, 2000). Six sigma projects must be targeted for process and product improvements that have a direct impact on both financial and operations goals. Even if the first efforts center on fairly fine problems, their impact on the whole business should be clear. It needs to be clear how projects and other activities link to customers, core processes and competitiveness (Pande et al., 2000). Many authors generally accept six sigma as a philosophy that provides a better product or service faster and with a lower cost than competitors (Harry and Schroeder, 2000; Eckes, 2000). It should be extended to other operations within a company. Since the goal of every company is to make profits now and in the future, six sigma makes processes gainful while attacking variability in business processes. Ford motor company has embraced six sigma methodology since 1999. By following the dictates of six sigma, engineers at Ford conducted a cost-benefit analysis to determine whether the benefit from the project was worth the effort. Ford found that six sigma is a lot more structured and profit-oriented method than total quality management. The expected process performance improvement (i.e. reduction of rework, scrap rate, reduction of warranty costs, reduction of process variability, etc.) is about 70 per cent per project and thereby cost savings are in the range of \$200,000-250,000. Individual six sigma projects are assigned black belts, who are committed to working on quality-improvement projects (Gabor, 2001).

### **Linking six sigma to customer**

It is necessary to set Six sigma project goals based on reducing the gap between the company's expected and actual performance, especially in terms of delivery time, reliability and customer satisfaction. The understanding of markets, operations, measures used

and creativity to maximize value and performance are the core elements of six sigma approach (Pande et al., 2000). Similar to the linkage with the business strategy, six sigma should also be linked to what is important to the customer. An important issue here is the identification of the critical-to-quality characteristics (CTQ). Six sigma is a performance target that applies to a single CTQ, not to the total product contrasting to other TQM initiatives. CTQs or customer's "wants" are identified quantitatively in the starting phase of the six sigma methodology. It is when several tools and techniques are applied in order to obtain data that describe customer expectations. In some cases this is not an easy task, especially when customer requirements are ambiguous, subjective and poorly defined. In service industries, this occurs more frequently than in manufacturing companies. For instance, Westin Hotels, a service chain identified characteristics such as customer attention or amiability as CTQs. Traditionally these are difficult to define and measure. However, through six sigma approach they found different ways to measure these characteristics.

### **Linking six sigma to human resources**

Equal attention must be paid to people, innovation, and customer relationships. We often note a behavior-change gap within companies that devote significant resources to the Six Sigma philosophies. The experts driving these initiatives tend to be extremely successful at developing technical changes that positively impact company performance. They typically excel in statistical analysis and in addressing specific parts of the process. Much less specific and robust, however, are their efforts regarding the workers upon whom the company depends. With any significant change in internal processes, just the initial talk of the intended change can be unsettling to a workforce comfortable in its current routine. The situation is exacerbated if management fails to communicate the reasons behind the change and fails to demonstrate strong, visible support for it. Process improvements may perfectly achieve their objectives, but the workforce may not be prepared to accept them as part of their daily routines. Some of the aspects may in fact reduce Six Sigma its overall effectiveness.

### **Linking Six Sigma to Suppliers**

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Under six sigma approach, one way to reduce variability is to have few suppliers with six sigma performance levels (Pande et al., 2000). In addition win-win behaviour should be considered in the buyer-supplier relationship.

### **Understanding tools and techniques within Six Sigma**

During the belt training, employees learn three main groups of tools and techniques which are divided into team tools, process tools and leadership tools. With the knowledge obtained, it is important that employees will be capable of adopting and developing the six sigma methodology. Since methodologies vary from organisation to organisation, there is no standard methodology and organisations must be capable of choosing the most appropriate tools and techniques applicable to them (Pande et al., 2000).

Within the arena of six sigma, there are two different methodologies, which are listed below:

(1) The problem solving methodology which can be either MAIC or DMAIC (where D stands for define, M stands for measure, A stands for analyse, I stands for improve and C stands for control); and

(2) Preventative methodology known as design for six sigma, which consists of four stages: identify, design, optimise and validate (IDOV). These two six sigma methodologies have strong bases in the use of statistics; however, in most cases, advanced statistical techniques are not needed. The well-known seven quality tools in combination with basic statistical process control (e.g. run charts, control charts, etc.) and other statistical methods (hypothesis testing, ANOVA, ANOM, etc.) are enough on many occasions (Halliday, 2001). It is important that people with experience in six sigma assist, follow up and track projects' progress.

### **Project Management Skills**

Another key element in the implementation of six sigma is that project leaders must have some basic project management skills. As it was mentioned earlier in the black belt training program, participants must be trained in team tools, where project management skills are included. Project managers, champions, black belts and green belts should consider the key elements

of project management, time, cost and quality. Defining them will provide the team with the scope, aim and resources needed to deliver an improvement in the short time, at the lowest cost and meeting the requirements needed. To obtain this, they need to work in cross-functional teams in which facilitative leadership guides the team to contribute in reaching the business strategy by identifying customer requirements.

### **Project Prioritization and Selection**

It is essential to prioritise projects on the basis of financial benefits to the organisation. The projects are selected in such a way that they are closely tied to the business goals or business objectives of the organisation (Ingle and Roe, 2001). Therefore every project should be selected so that it will help the company improve competitive advantage, business profitability, process cycle-time, throughput yield, etc. There are many criteria for project selection that look to measure the factors described; Harry and Schroeder (2000), for instance, suggest that project selection can top down or bottom up and propose occurrence of the following possible decision criteria for project selection:

- DPMO;
- net cost savings;
- cost of poor quality (COPQ);
- capacity;
- cycle time;
- customer satisfaction; and
- internal performance.

When projects are selected, it is important to define their scope, limitations etc. showing the team that will be working on it. Moreover, the project goals or objectives must reflect the critical quality requirements from customers.

### **Conclusion**

Six sigma has been considered as a ground-breaking approach to product and process quality improvement through the effective use of statistical methods. We exemplify the critical factors for the successful implementation of six sigma projects. These aspects were derivative from a methodical analysis of various journal papers, books and case studies. All these

factors should be taken into consideration for optimising the profit from six sigma projects in organisations. If any of these elements are omitted during the implementation of six sigma projects it would be then the difference between, results arising out of successful implementation and a complete waste of effort, time and money. Future research should try to identify CSF in service and manufacturing sectors comparing and contrasting them.

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