

Six Sigma (6σ) accomplishment by SMEs and Vital Success issues

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Abstract— To make sure quality of products and service 6σ is a statistical measure used. For improving the base line of the trade. 6σ is a methodology. The SMEs in present age also have initiated taking up the 6σ methods for enhancing their efficiency. 6σ is not only a quality program but a complete business enrichment plan. One method of obtaining 6σ accomplishment is by altering the attitude of the persons. The entire idea of 6σ is that everybody concerned try hard to attain excellence by eradicating as many imperfections as possible and by manufacturing their goods and services as efficient as possible. So, a organization-wide dedication is necessary for success of 6σ . The thought following a 6σ process is to eradicate imperfections.

A well-developed tactical scheduling system is necessary to make sure the achievement of 6σ projects. 6σ as a methodology helps companies to make out and get rid of imperfections in business growths fundamentally by concentrating on performance characteristics. An attempt is made in this article to make clear the noteworthy success factors for achievement of 6σ in manufacturing industries of small and medium capacity.

Key Words— 6σ methodology, small and medium scale industries (SME), vital success factors, business strategy, 6σ implementation

1. Introduction

6σ is a methodology that prepares firms to make better their earnings by optimizing their processes, enhancing quality and eradicating imperfections. It is an idea to attain, exploit and sustain business success by understanding needs of the customers. A lot of well known big organizations globally doing trade in diverse fields have done well by adopting 6σ approach. 6σ put particulars and information achieved from measurement of procedures within a form, not by evaluating with some outside

standards. Alternately, it specifically determines what is in fact occurring with in the production and service processes and decides how to develop them. Go on board on a 6σ program denotes bringing good quality goods and service while almost removing all inner insufficiency.

Despite lessening of imperfections in making, 6σ also builds bear processes to divest yourself of faults and ineffectiveness hence serving all the stake holders of a trade like administration, clients and workers to a large extent.

It is an opinion that 6σ is appropriate merely for big organizations having superior resources. Yet 6σ is consistently relevant for firms of any size if accomplishment is carried out with correct idea and the suitable deliberations. A thorough examination is necessary concerning what are the significant success factors for accepting 6σ in SMEs. Some of the significant concerns and features that show critical for 6σ work management approach in SME's is presented here.

2 The Need For 6σ Approach

Quality plans are precious because they can produce a quality viewpoint and customs. Rather than merely a quality system 6σ is an on the whole trade development plan. 6σ set right typical, persistent problems that openly influence base line of a company. The processes of 6σ are chosen to lessen waste, which renders into lesser costs, more contented clients and better base line. 6σ measures, identifies, analyses, get better and manage the essential a small amount of procedures connecting the enhancement of quality straight to the end result. 6σ is based on the technical process, using statistical idea. Statistical philosophy is an idea of action and learning dependent on the basic principles as follows:

- all job happens in a system of interrelated practices
- deviation occurs in every course of action and

- accepting and decreasing deviation are means to success

The major thoughts in 6σ contain finding imperfections and make efforts to get rid of them to fewer than 3.4 defects per million opportunities. 6σ came out as a structure focusing on business of management in the 1990s,. The focal point of 6σ slowly moved from goods quality to business quality.

It was achievable to manufacture defect-free goods using smallest cost of manufacture and earn elevated earnings. The world-class companies adopted 6σ and the results obtained tell for themselves. As a tool for improving quality, dropping cost, improving client constancy and obtaining base-line outcomes 6σ has emerged. Although the unique objective of 6σ was to spotlight on manufacturing methods, afterward selling, buying, billing and invoicing roles were as well involved.

Every organization big and small, contribute to a lot of common features and troubles. Big organizations, due to scale, may gather elevated monetary gains as a consequence of a set breakthrough, but it must not be taken to put forward that small organizations would not benefit greatly from its application. American Researches with a number of the foremost 6σ organizations illustrate that their monetary gains prevail over the expenses for accomplishment of 6σ .

3. 6σ FOR COMPONENT MANUFACTURING INDUSTRY SECTOR

Chief two parts of the SME ancillary sector are original equipment manufacturing and component manufacturing industries. Considering existing trends and prospect of worldwide financial growth all segments of the ancillary industry have major thrust. So, ancillary part manufacturing segment has turned out to be a thriving engineering segment.

The SME industries offer a broad range of goods and also continue replacing them further. Consequently the component suppliers to industries, to be efficient, should respond to the market-driven matters rapidly and efficiently. As the worldwide rivalry cost effectiveness is the essential need of this division. Since its beginning 6σ philosophy has been generally connected with big OME industries owing to their economic power

and manpower assets. Slowly midsize industries have also started accepting this course and gathering monetary profits. SME component manufacturing divisions also have to accept 6σ on priority basis to boost its efficiency.

Removal of a few of the false impressions about 6σ philosophy , by educating the component manufacturing

SMEs concerning the applicability of 6σ for them, is necessary. The majority general myths about 6σ philosophy are:

- 6σ is appropriate merely to big industries.
- 6σ is a difficult, arithmetical method which is hard to understand
- An outside consultant must be hired.
- Experts are required to make it work
- 6σ is same as TQM.
- 6σ does not produce real savings
- 6σ is just training the people
- 6σ is a “magic pill” to fix troubles with small Attempt.

The SMEs that have realized the worth of 6σ and accepted it are obtaining better increase and improved savings from the 6σ schemes.

4. ACCOMPLISHMENT OF 6σ BY SMES, CRITICAL SUCCESS FACTORS (CSF)

The achievement of a 6σ accomplishment effort cannot be always available to serve. Normally the collapse in 6σ implementation by industries are due to inappropriate and unreasonable approach with no correct foundation and arrangement. Few mainly general critical success factors (CSF) for 6σ implementation which the companies should give proper attention to are:

- Management dedication and contribution
- Infrastructure of company
- Cultural change
- Preparation
- Connecting 6σ to clients
- Linking 6σ to economic growth and trade policy
- Relating 6σ to employees
- Linking 6σ to suppliers
- Comprehending 6σ methodology
- Work management skill
- Work prioritization and selection
- Guidance for 6σ

4.1 MANAGEMENT DEDICATION AND CONTRIBUTION

The management ought to be completely dedicated and supportive of acceptance of 6σ by a company. Due to bad management and be deficient in of dedication from higher management, 6σ is sighted by a number of companies as just a passing management craze which merely put in to cost with no major monetary growth. Still if the leadership is actually concerned in 6σ accomplishment, top managers should first recognize the notions, benefits and accomplishment steps of 6σ by taking part in an outline training of 6σ .

When they are certain, they ought to support and instill confidence in further people previous to they venture down this new course. Prior to the education program for further employees, senior management representatives ought to talk to them taking it as a chance to give them a promise of support from leadership and converse how significant their partaking will be on the way to the success of the program and the trade.

The projects selection in the majority cases strongly supported or even determined by top leadership.

4.2 ORGANIZATIONAL INFRASTRUCTURE

Companies should be ordered by recruiting the right people for the 6σ implementation. Dedication of senior leadership to give the chosen workforce, finance and more things is crucial. Relieving the top talent inside the organization from additional duties to work on new 6σ schemes and supporting them to be eligible as 6σ experts is the main power of the 6σ environment. Many organization resources would be consumed by 6σ schemes and the considerable advantages could be obtained by companies of all sizes, normally simply big companies would survive with the 6σ actions gathering the affluent gains as an outcome

Small organizations are short of resources in the form of time and people. Such companies are likely to contain a lean organization and hence they find it hard to employ a person or coordinator for the accomplishment. Also, they contain insufficient things to proffer inside training. Be short of assets in such aspects directs to a want for a cautious examination of what approach to use when applying statistical methods for succeeding.

This situation is significantly changed by third generation 6σ by decreasing the training and infrastructure desirable to obtain practical

outcomes from a 6σ plan. The idea of the White Belt 6σ practitioner who makes easy use of 6σ in work groups or alike settings initiated by third generation 6σ . White Belts put 6σ to troubles that would not validate the necessity of a 6σ Black Belt hence putting down the cost of accomplishment.

Further requirements would be essential software support for using tools of quality and efficient use of information technology for use of 6σ . In this current day situation the cost of statistical software package and knowledge needed for usage of it are fairly convenient by SMEs.

4.3 CULTURAL TRANSFORM

A method of obtaining 6σ achievement is by shifting the mind-set of an organization. If a small organization feels scared by the thought of accepting the 6σ philosophy or it is not sure of its capability to be successful at it, it is not alone. The mass of the organizations sense alike way at the start.

Yet once they comprehend and distinguish what 6σ can attain for their business, it's easy to embrace it along with assurance and also interest. Company ought to construct a culture affable towards embarking upon on keep going 6σ growth projects within the organization by giving required knowledge and consciousness to the entire workforce.

Cultural advancement in the organizations in many fields will be supported by 6σ project management view and certainly there will be constructive result on doing of the business. Alteration in thought is due to introduction of systematic project controlling and conception of a knowledge management idea. That will alter the culture in a planned way by accepting methodical and realistic D-M-A-I-C view towards dealing the troubles in the organization. On the whole it will build your company goals "SMART".

- S= Simple
- M= Measurable
- A= Achievable
- R= Realistic
- T= Time bound.

The 6σ prospects depend on keeping it pertinent to current business needs and to carry on better and get bigger usual 6σ package. As the application of 6σ grows up, additional companies start to apply 6σ as an organizational transform medium and tool for management growth.

Administration of system get through which happens in a company, as an outcome of 6 σ projects, on a constant basis and imbibing it as enduring virtues across the whole sort of the organization is the most critical liability of the company.

4.4 TRAINING

For achieving the set objectives, a company has to educate its employees as 6 σ experts. Such people are given diverse title or certifications, as per the stage of knowledge attained and mastered by training. Few terms used are; Champion, Black Belt, Green Belt, Yellow Belt, Master Black Belt, and Sponsor amid others. Though, education of people which is the mainly significant feature of 6 σ accomplishment is one of the chief obstructions for SMEs owing to the cost factor. Yet, as stated previously, the thought of the White Belt 6 Sigma practitioner who can assist 6 σ projects in place of a 6 σ Black Belt would crack this problem to definite degree. Few key spots concerning training for 6 σ are:

- Top executives ought to partake in a education program intended to permit them to reasonably take part in project assessments.
- Create the training programs systematic, but don't devastate people by excessive training
- The count of people that go through the training practice ought to be optimum
- Duration of training duration ought to be good enough for the coach to cover the teaching volume in the offered time.
- The education programs should not be a mile wide and an inch deep.
- If the skill to apply the knowledge is not shown in the project reviews, modifications in the depth and pace of the training program ought to be done.

4.5 RELATING 6 σ TO CLIENTS

The firm ought to deliver to the consumer quality service or goods at a competitive cost. Basically it is imperative to recognize what the client wants also to utilize this data for directing research and development on current products or design of novel ones. Many firms across the world have attained it by accepting 6 σ philosophy.

All 6 σ projects begin with the clients. The center of the project would be finding features that are crucial for the clients. Clients are regularly consulted through the DMAIC phases of 6 σ projects since 6 σ procedure is very much involved in client satisfaction,. They can give input to the firm concerning their expectations from the services or goods or what they be ready for paying. Alternatively 6 σ concentrates on voice of client. Due to the extremely prepared process of 6 σ accomplishment, the client will be able to observe transforms. Few transforms eradicate wastes in the production process having utmost use of input objects. As soon as resources are completely used, the cost of manufacture will simply go down. Clientele of 6 σ organizations feel initial profits in its form of quality goods at excellent prices. An additional critical thing is that the 6 Sigma tactics tries to abolish wastage of time in all chains and stages of a trade. Whilst services and goods are delivered rapidly, it is a chance to manufacture more number within the same period used before. The client will feel this transform. Because of the fact that when the cost of production goes downward, profits can be passed on to the buyer, the connection amid a 6 σ organization and its client raises and becomes more stable. It enhances trade name and client trustworthiness.

4.6 CONNECTING 6 σ TO MONETARY GAINS AND TRADE POLICY

The need for attainment is integration of 6 σ with economic accountability and trade policy. 6 σ set a clear focus on base line economic results. 6 Sigma project can gets accepted except the base line influence has been recognized.

In SMEs as well base line would be the major focus for tough organization promise & support to 6 σ plans.

Seeing at the elementary conducts in which trades function for finding a better way 6 σ is very much concerned. All parts of this method is about enhancing the product or the service an organization recommends toward its clientele. Companies ought to take on right trade plans to come out of few troubles and the barriers on drive to 6 σ accomplishment.

Client focus is one of the goal of 6 σ projects as shown by some of the work. Some of the majority measures utilized to measure the accomplishment

of 6 σ missions are cost, efficiency and profit. Such factors for SMEs are very vital than other causes like being top-notch company, generating improved representation of manufactured goods/service, etc. Numerous executives may see to 6 σ as a rapid tool and therefore not adequately snatch the 'big picture'. Properly positioned, 6 σ can make superb outcomes. Organizations ought to concentrate on method & trust in improved awareness of disparity & an amplified use of numerical tools for quality enhancements. Firms ought to observe the advantages of stress on training and education. Yet, 6 σ must not be as a different idea; In its place it ought to get included with the actual courses.

4.7 EMPLOYEES AND SIX σ

Every part of idea of 6 σ is that everybody concerned endeavors to attain precision by removing as many imperfections as possible also by building their services & goods as competent as possible. Hence, a organization-wide dedication is necessary for achievement of 6 σ .

Build up a map to converse the 6 σ plan to your whole organization. The first nearly all basic and significant things to converse are:

- About the business goals
- About 6 σ is
- In which manner going on board on this drive helps the business
- In what manner the operation will be completed
- In what manner all people will be able to take part

As the program progresses, things to communicate are:

- Training plans for 6 σ
- 6 σ Sigma Projects being considered, in progress and completed
- Profit realized to the firm
- Influence on clients —sales quantity, response from clients and boost in number of clients

People must feel as a component of the 6 Sigma program. Sooner or later, the organization will require all the workers to participate in the program. People will maintain projects as group members and recommend ideas for projects. When the plan start makes the common worker feel left

out, it will be hard to get its support and contribution when the requirement occurs afterward .

Certified 6 σ people are known by belts. A green belt is a amateur member who is accountable for enhancing processes, while a black belt is a permanent project administrator. Black Belts will direct the projects, but they will require the help of persons with good information to facilitate plan and perform the projects. Any person must not be left behind.

Otherwise, we observe a threat that the belt-based system has a trend to adore a few people and, hence, not adequately bear the worth of all people commitment. A lot of money is saved by General Electric through 6 σ , Eckes [3] believes that this trend to elevate a few people may cause in lesser on the whole worker satisfaction. While, when setting up 6 σ , some companies try to take in every one in the improvement work also keep away from elevating a few [7].

Some organizations connect 6 σ projects for appreciation to workers. While this can inspire the workers to do extremely well in their effort there is as well a negative outcome of influencing the payback, in exacting monetary gains, of Six Sigma plans to the organization for the sake of appreciation. There ought to be cautiously designed enticement programs for the performers for the achievement of 6 σ .

4.8 CONNECTING 6 σ TO VENDORS

In present scenario of specialism, there is enlarged reliance on vendors to develop the products or services value. A vendor with bad quality turns out to be a weak link. The key suppliers must be involved in 6 σ accomplishment. If a firm doesn't help its vendors to improve, the quality of the goods or services it could be supplying inferior product or services to its clients. Vendors are in fact strategic associates in 6 σ accomplishment.

4.9 COMPREHENDING 6 σ METHODOLOGY

The thought at the back of a 6 σ process is to get rid of imperfections. An imperfection is something that harms the quality of a good or service. Comprehending the project-oriented definite necessities and performance potential of an organization is mainly necessary for 6 σ accomplishment [7].

Many conditions to explain quality approaches for enhancing the methods used by the firms for

delivering services and goods are used by 6σ techniques. A case of this is the DMAIC (Define, Measure, Analyze, Improve and Control). All these terms should be considered by a company when observing at how good their methods work on a daily basis. This assists to decide if the linked person or method is obtaining what is necessary for the business.

This excellence can be obtained by using quality tools. These facilitate people to watch how their trade works at statistical plane. Many tools can be used for 6σ . Few usually used methods are:

Scatter diagram, Histogram, Run charts, SPC control charts,

Measurement system analysis, Process capability analysis,

Taguchi methods, Hypothesis testing, ANOVA, , Regression analysis, Brainstorming, Cause and effect analysis, Process flowchart / mapping, Pareto analysis, Affinity diagrams, 5S, Quality function deployment, FMEA, Kaizen, Benchmarking, SIPOC PDCA, Poka-Yoke. All the quality tools listed above are not to be used for proficient 6σ accomplishment. The tools to be applied for a specific 6σ project may differ based on the specific problem and the probable result. So, SMEs should take on the nearly all suitable tools with care. 6σ method as a whole, is proposed to make people to experience regarding how their trade and goods work. It is about enhancing customer contentment and building better goods and services at a lesser price. It will help both the trade and the clients in the future.

4.10 ABILITY OF PROJECT MANAGEMENT

A strong tactical arrangement is necessary to make sure the accomplishment of 6σ projects. Company target is the initial point. The volume and intricacy of processes will decide the quantity of projects needed to finish every year to attain the preferred quality planes by the selected end date. The quality objectives like PPM lessening, attaining a sigma level, attaining a throughput yield, etc. beside the end date will impel the speed of 6σ efforts. Selection of team is the most vital aspect for achievement of 6σ projects. The amount of projects and the speed will direct the number of Black Belts necessary to establish and escort the projects.

A lot of plans die when the persons on the front line run into obstructions or stumbling blocks produced by technological matters they do not understand fully. Or else the group believes it does

comprehend the issue, but its working be unsuccessful to give the anticipated outcomes. The attempt will be purposeless and the project fades away. Ultimately the attempt is discarded. Project heads or Black Belts will require support from the higher executives or Champions to talk to organizational matters, but they will also necessitate support to talk to their technical matters. Authority and empowerment at all levels is vital for 6σ achievement. Effective communication on 6σ Sigma Program is highly essential for success of a 6σ project. Master Black Belts are guides and trainers for the Black Belts and Green Belts. The Master Black Belts gather with their Black Belts regularly to assess the status of the existing project, the method that the Black Belts and group are using and the results of the effort. The Master Black Belt is there to offer course rectification and help solve the unforeseen troubles the team may face. It is particularly significant during Black Belts or Green Belts premature projects, until they get confidence. Master Black Belts are the paramount in the company. Persons who have established sturdy management skills under

decisive situations and the aptitude to be a change agent ought to be selected. People who have effectively carried out the responsibilities of a key project and may have also engaged in to solve problems for others needing help are required.

Efficient follow up of missions and reviews is one more solution to achievement of 6σ projects. If evaluations are done on a normal basis, the process keeps the Black Belts and Green Belts on their toes to make the projects to a successful end and finishing.

Assessments are to provide the Black belts a technical solution. Assessments make sure that the Black Belts and Green Belts are properly following the 6σ policy and tactic and also utilizing correct 6σ tools. Queries and remarks during the assessments ought to be positive and inspire the workforce to do better.

The number of Master Black Belts, Black Belts and Green Belts may be very small due to the inadequate resource in case of SMEs. At times such roles could also overlies to some degree such that the person in charge playing a task equal to Black Belt may have to don the role of Master Black Belt and also Green Belt depending on the group size and the company limits. The projects are conducted by white belts to reduce the project cost in tiny companies

4.11 PROJECT PRIORITIZATION AND SELECTION

Right project selection recognizing the correct critical to quality characteristics (CTQs) is one of the main obstacles to the 6σ accomplishment program. Establishment of process control, DOE concepts and matters involving to product reliability can be effortlessly dealt by the bigger industries in which resources are on hand to prepare the people to apply these concepts. Accepting of the concept of variation, recognition of reasons of variation and managing of these causes are as well important factors for SMEs. These statistical notions have similarly main part to play in SMEs and the application of such ideology can be taken care by training and improvement of the workforce inside the organization. General criteria used by the organizations for the 6σ project selection are:

- Concentration on CTQ
- Economic benefits to the company
- Client requirements and hope
- Period of the projects
- Chance of success
- Measurement of response variable
- Easiness of data gathering
- Resources necessary for projects
- Cost of deprived Quality
- Knowledge and talents essential to do the projects
- Benchmarking
- Process map of operations
- Strategic alignment of work
- Threat involved in projects, etc.

4.12 6σ LEADERSHIP

No alternate is there for smart working and persistence. Problems are not mechanically solved by 6σ if some data gathered from methods are fed into a software. It needs imagination people with creativity and good analytical talents. Teams ought to be created by choosing persons who desire to be component of the attempt. The persons for 6σ plan are chosen by pull rather than push. Top managers should know the accomplishments and insights of Black Belts in the finished phase of a 6σ program. Admire them for their victory and for their innovative involvement. This course builds confidence in the people and endorses learning.

Top managers ought to use the project appraisal process to comprehend the hurdles for 6σ application. Let the people to suggest answers and find out how administration can offer the solutions such as monetary support, workforce and company issues.

5. SIGNIFICANCE OF 6σ FOR SMES

Worldwide changes are taking place in the industry. The

need is to make organizations consider about accepting

the 6σ method so that they can augment their competence in all the basically possible ways and to the utmost degree probable. Present industrial changes show that more SMEs are going serious towards 6σ approach for enhancing base-line of their business. It is very crucial for SMEs to use 6σ philosophy for imperfections free production and be worldwide cost effective.

6. CONCLUSION

The major understanding the organizations must to have is that 6σ is about statistical thinking. 6σ assist organizations to recognize and get rid of imperfections in work processes radically by concentrating on performance characteristics. Contrasting other quality management tools, 6σ puts economic element into the picture and if put into practice appropriately it helps the organizations to perk up their ROI considerably. If an organization is at 3σ stage the rejections are about 67000 per million and with the acceptance of 6σ the rejections would only 3.4 parts per million. It calls for a lot of knowledge on the part of practitioners to do projects efficiently and widespread training is essential to generate any remarkable results. As an outcome, though the considerable profits could be gained by companies of any size, only bigger companies could manage with 6 Sigma activities gathering the rich gains. An effort has been done here to talk about the vital success factors for accomplishment of 6σ by SMEs. The key idea is to modify the general misperception of the SMEs about 6σ and support them to take up it to get in good revenues.

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