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Classification criteria for selecting Six-sigma projects

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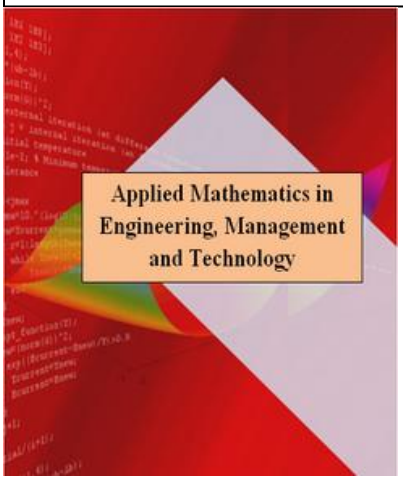

Abstract

The trend of evolution and progress in organizational quality and excellence has led to six-sigma philosophy, which is an effective way to improve and develop the organizational capabilities and capacities. One of the most important topics of six-sigma is choosing the right projects. A six-sigma project is about appropriate deciding to solve a problem systematically, which has a set of specific criteria. These criteria can be used either as the project's objectives, or as means to analyze the project progression. Choosing six-sigma projects is like setting the first row of bricks in a wall, that if it is done in a scientific and systematic manner, effectiveness in six-sigma project implementation phase is gained substantially which ultimately promotes the quality of organizational processes. This article outlines efficient approaches to selecting and defining six-sigma projects, and the most debated criteria in this field.

Keywords: Six-sigma, Project Selection, Quality, Organizational Excellence

1. Introduction

Nowadays, globalization and rapid access to information, products, and services, approaches and business practices, has changed the customers. The old business models are no longer viable, because today's competitive environment has left no room for errors. Organizations and firms must enjoy their customers and meet their needs and demands. Six-sigma and its six quality factors are considered as the new culture for customer satisfaction. To achieve six-sigma quality, a given level of production should not exceed more than 3 to 4 defects in a million at any period. This is approximately equivalent to the concept of being flawless. The Six-sigma is thus, the philosophy of being under the impression of constantly moving towards perfection.
Six concepts of six-sigma are as follows: the critical attributes for quality, defects, process capability, process variability, stable operation, and Design for six-sigma [1]. The remarkable thing is that customers feel variety, not the meanings. Our internal presumptions of business are often based on a moderate scale or the meanings of the past. However, the clients do not judge based on moderate scales; except, they consider the changes on every stage of production and trade. Six-sigma focuses first on reducing process variation, and then on improving process capabilities and compatibility of values. In management literature, there are three key elements to quality. These three key elements are customers, process, and personnel. To move towards an excellent production, the necessity to consider these three factors seems to be essential. In trading today, customers are becoming the key to globalization and they define quality. About the process, we should also keep in mind the fact that it should be viewed from the perspective of customers. Customer satisfaction is always first motto of six-sigma.

2. Six-sigma project

A six-sigma project is a purposeful planning targeted to solve a problem, which has a set of specific criteria. These criteria can be used either as the project's objectives, or as means to analyze the project progression [2]. Hence, the implementation of the six-sigma project can be from many directions helpful and effective for the organization. Technical and financial reports, operating status of the contractors, customers' feedback reports can all be motivation to select and run a Six-sigma project. The determination of a project with six-sigma value in an

organization is very important and can be a very important issue. If the selected six-sigma project is not in line with objectives and strategies of the Organization, their cost of implementation is more than their income, or technical problems make their implementation difficult, then their utility is under question. There are numerous other cases proving that selection and determination of a proper six-sigma project can be as much important - or even more important - as proper implementation of the project itself. Choosing a six-sigma project in an organization is not an easy task. Therefore, several items should be considered for this [10].

Three main steps of project selection are as follows:

- Selecting the Project Steering Committee
- Preparing the project selection matrix
- Planning meetings with clients and project evaluation

Customer feedback should have a high priority in six-sigma projects. Teams and major councils of project selection in an organization can select profitable and value-adding projects for the organization through determining project succession's main factors. In project selection phase, organizations usually focus only on process performances; whilst this is not enough, considering several other criteria factors can be important in project selection. Nevertheless, characteristics of an ideal Six-sigma project include:

- Be in congruent with annual strategic and operational plans.
- Being done in a time slope manner (for example, from three to six).
- Being under a legislation of management team and getting their support.

3. Six-sigma project selection criteria

3.1. Customer Feedback

Any six-sigma project does not only seek customer satisfaction but customer delighting. In fact, it is crucial to listen to customers' callings as the end-users, if willing to make them happy [3]. Now the question is how we can utilize feedbacks from our customers to brighten products' future. Most organizations dedicate more than 95 percent of their resources to handling case complaints, and just less than 5 percent to scrutinizing root problems as well as factors causing customer dissatisfaction. One approach that can potentially improve both customer and organization satisfaction is six-sigma methodology. Now we shall investigate how to employ six-sigma in improving customer satisfaction and how customer satisfaction can be used in selecting proper six-sigma projects. Organizations employing customer feedback reviewing systems as well as systems of data quality review are able to make a use out of these data to analyze organization's critical factors and to determine and select the projects.

Satisfied customers are as unbound sources to use in product improvement and development, which unfortunately are often overlooked. In most cases, the employees' awareness about customers' feedback among service personnel is quite different those of production personnel. Service employees gain a lot of information from customers' feedbacks and dissatisfactions, however information exchange between them and new products' processes, or even current products' improvement processes, does not usually take place accordingly. Previous studies highlighted that the issue of ignoring customers' feedbacks is not due to data collecting, but dealing with them and methods of using them. In fact, the exchange of collected information to product manufacturing process is not done appropriately. The reason behind this originates from lack of a facilitating system in transfer feedbacks toward design and manufacture processes. Therefore, organizations dreaming of having a proper project selecting system are undoubtedly to use a proper system for information transmission from customers to production processes. Among the tools for this purpose, QFD and affinity diagram are worth noticing; but unfortunately, a few organizations utilize this tool only after the project is selected [14].

3.2. Technical standards and improving processes

One of the main objectives of any six-sigma project is to improve performance of the organizational main processes. Now, the question is for which processes and main activities a six-sigma project should be assigned. In

fact, six-sigma projects selected without taking into account the technical criteria are destined to fail, leaving the organization with bounce costs. Selecting a six-sigma project must be justified properly. For example, if the product packaging process is not performing well, it is not a proper choice for a six-sigma project. However, if due to improper packaging of the product, delays in delivery are occurred, or a specific method of packing has caused a high return rate, this can be a good justification to define a Six-sigma project on the packaging process [12].

Another factor that can be used to define a six-sigma project is recognizing the actual and potential failures in process. Six-sigma focuses on removal of defects and failures in products and processes, so it is necessary to identify the failures in order to focus on them. One powerful tool that helps choosing the main processes to define a six-sigma project is the Failure & Mode Evaluation Analysis (FMEA) tool, which determines the main failures and the major and most important processes. Walter Shewhart refer to failures as the gold within a mine, this is when the costs in poor quality production can be reduced significantly by a low-cost investment and appropriate quality improvement program [4]. Now after determining the main processes, it shall be considered either if a project can be defined according to the process or whether the process could be improved in terms of technical.

Several reasons including lack of a suitable measuring system or its high expenses may cause the improvement of a process being impossible. In other words, when choosing a six-sigma project not only improving the processes with the most fundamental problems, but also improving the processes, which have the minimum capability to improve, are to be considered.

The Alstom Company defines Process Improvement Process (PIP) in order to use in its six-sigma projects, as shown in Figure 1 [2].

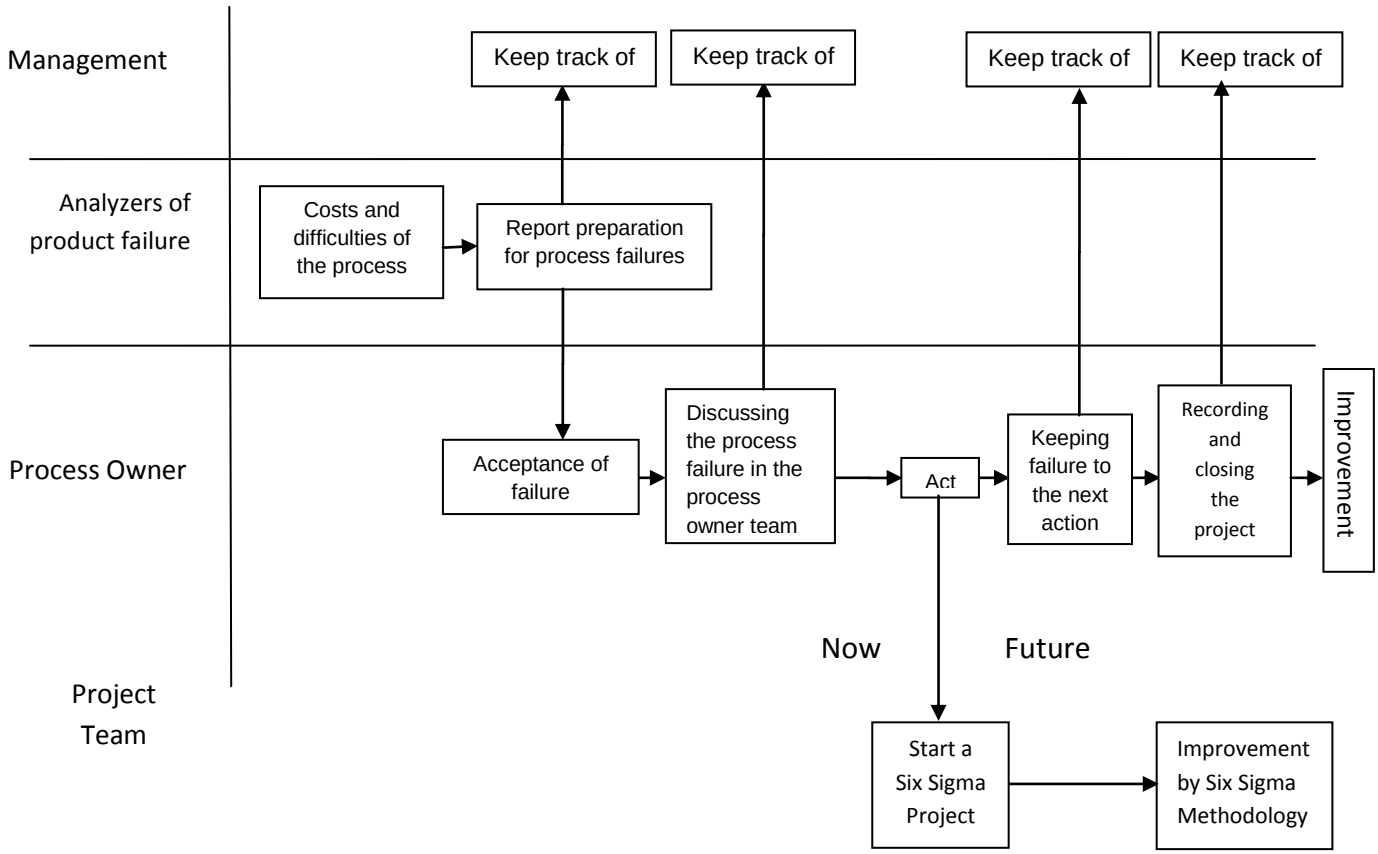

Figure 1: Process Improvement Process [2]

This means that any improvement in the process must be done using process failures. Another factor worth considering, in the process of improving the technical parameters, is availability of an effective measuring system. In fact, in case of unavailability, the improvement, even if an improvement actually does happen, it will not be

seen. Each of the afore-mentioned factors may cause the rejection of a six-sigma project. Thus, when choosing projects, all factors need to be considered carefully simultaneously.

3.3. Financial criteria

One of the main criteria for selecting projects in any organization is cost reduction. If a project is successful but increases the costs, then it might not be considered a good one. For example, if a six-sigma project is set to increase product quality, but the cost of establishing this quality is more than the money it saves, then this project is not cost-worthy. In other words, when selecting a six-sigma project, in addition to technological criteria and customer feedbacks, operating costs are also to be considered. One common costly factor is time. Short-term projects (4 to 6 months) are usually preferred to long-term ones, which their results are not available any time soon [8].

3.4. Management support

Six-sigma projects should be selected so that the management would support them. The top management should support the project and provide the team with the necessary resources for implementation. In addition, management should delegate enough authority to implementers so that they could be able to change the processes in any favor. Thus, the extent that corporate and senior managers care about six-sigma project plays an important role in selecting such a project. In fact, the project should be selected in a way that its importance to the Organization management is assured [11].

3.5. Clear defining of project elements.

An important question in the process of selecting six-sigma projects is whether the project includes clear definition of the process. In fact, we should know where they start and where they end and what work plans each activity comprise. Not having this might divert us towards doing things with no avail. Six-sigma focuses on products and processes' defects removal. Therefore, having exact definition of different defects seems crucial. Sometimes it is necessary to define defects in several levels or to focus on certain defects that have a direct impact on time factor. In any case, by using the most appropriate statistical tools, there should be no room for ambiguity in definition of the defects.

4. Using simulation to select Six-sigma projects

Among the solutions that have been recently suggested in selecting Six-sigma projects is project simulation. Simulation of six-sigma projects helps analyzing the possible results [5]. If the simulation models are adjusted appropriately, it can reach a conclusion in short time and low costs with a good approximation for exact anticipated results

In simulating the projects, determination of the following are considered important:

- The bottlenecks of the process
- The capacity to improve
- The chances of improvement in the project
- The necessary funds and resources

Nowadays, most companies do not own a convenient and effective system to allocate funds and resources to six-sigma projects. Such simulations can help evaluating assets and resources in order to select the projects better.

5. Using theory of constraints in selecting Six-sigma projects

If a project is chosen by mistake, it might make some improvements in quality and productivity, but have absolutely no effect on the net profit. An efficient way to detect the best project is using the theory of constraints [6]. Every organization has some restrictions and limitations in the process of production and services. How and in what priority the projects are selected, depends on a series of specific regulations, which are described as the Theory of Constraints (TOC). According to Goldratt, these regulations include the following in form of a circular-defined algorithm.

5.1. Setting system restrictions

First, it is required to determine how each limitation behaves. At this stage, six-sigma project goals are determined. For instance, if the effective limit of the system is market demand, a six-sigma project based entirly on minimizing delivery times is in effect and if the limit originates from machinery, the six-sigma project should focus on reducing setup time and eliminating wastes. Then, all factors get in line with main decisions; setting six-sigma project to maximize limits output. At this stage, company should focus on downstream resources, and consider issues that make sure of having adequate non-defective resources. On next stage, upstream resources are to be considered, since they bring slack.

5.2. Promoting system restrictions

Here, promoting refers to raising the level of restriction each limit makes. During the above levels, restrictions are usually eliminated. However, if not, six-sigma projects should be chosen which provide the organization with extra resources, like buying new equipment or hiring workers with specific skills. If a limit was broken on the final stage, return to the first limitation.

6. Dickman and Doran's guidelines for selecting Six-sigma projects

Dickman and Doran proposed an approach [7] in choosing six-sigma project, which includes considering the following points.

6.1. Linking projects with organizational goals

Make sure that responsibility is assigned to a Black Belt person, who has not started training yet. Do not let the team know about your expectations. The team should be formed of people who are working in the same organization, but have not met in person. Thus, make sure that at least three other groups are working on similar task, but on different verges of time.

6.2. Using the project Chart

Determining the project's chart as well as the project leader is essential. There are guidelines for selecting the project's team. For example, it is not necessary to select the process owners, or people's actual presence. Therefore, in six-sigma project selection phase we should deliberate about forming the team and presence of proper people for the chart, simultaneously.

6.3. Importing key factors

Key factors of a good six-sigma project include defining the project scopes clearly, availability of resources, being in congruent with organizational objectives, high priority and proper access to information.

6.4. Clearing the project scope

Although determining the project's scope appears to be hard, but fortunately, this is a choice. Clearing the project scope will make meaningful requirements, practices, and operations. The project scope should not be insignificant and inaccessible.

6.5. Linking with training projects

In case of doubt, you can be assured that you do not need an academic training, because academics understand six-sigma tools very easily. Utilize educations only when you are assured that the project is not lead-able, poor, and unfortunate.

6.6. Accuracy in project guidelines implementation

Projects should ideally take more than six months, and should never take less than four months. If you think the project will take more than six months, watch out for falling into trap of breaking into sub-projects. If the Black Belts and Green Belts are not satisfied, do not go to the master black belt, because you will not need him.

6.7. Finding the right resources for the project

There are four main sources for six-sigma. First is the quality of the process. Do not reach out for processes critical to the customer or process with high level of deficiencies. Instead, focus on a second source, cost saving. The third source is focusing on the product, which brings customers with satisfaction. The fourth source is focusing on problems. Remember to consider projects with potential problems or further exaggeration.

6.8. Creating idea for the project

There are three basic methods for generating ideas. First, focus on product tree or process tree, which is not useful in selecting six-sigma projects. The second method, which is upon the first, is discussed within the executive team. The third method is beneath the first, which is a normal method in six-sigma.

7. Discussion and Conclusion

In this study, we discussed about six-sigma project selection criteria. In brief, and by importance, the followings are the major factors in selecting six-sigma projects:

1. The project should consider the customer's satisfaction as its primary priority.
2. 2 – Project objectives should be in congruent with organizational goals to the possible extent.
3. 3 - Project progression trend should be gentle and non-impulsive.
4. 4 - The project should not conflict with the organization constraints, particularly financial capabilities.
5. 5 - Progress indicators should be identified clearly at the beginning.
6. 6 – Making efficient use of quality measures plays an important role in building up the project.

7. 7 - Integrity and expertise of the project team has significant impact on the results.
8. 8 - Implementation direction is related to management support and investment.
9. 9 - Duration of the project must be aligned with the organization's requirements.
10. 10 - The role of efficient human power as a significant resource in the project should not be overlooked.

Reference

1. Brunson David, Hallam Brett, Mistry Sunjay, Felician Campean, Designing for Six-sigma Reliability Conference of Statistics and Analytical Methods in Automotive Engineering, 2002.
2. Anders P.Fundin, Peter Gronemyr, Alstom Power, Use Customer Feedback To Choose Six-sigma Projects, SIX-SIGMA FORUM, November 2003, http://www.asq.org/pub/sixsigma/past/vol3_issue1.
3. Sutton Finan Jill, Choosing a six-sigma project, online articles, January 17, 2002, http://www.stcrochester.org/news2.
4. Linderman Kevin, Roger G. Schroeder, Srilata Zaheer and Adrian S. Choo, Six-sigma: a goal-theoretic perspective, Journal of Operations management, Vol 21, Issue2, March 2003, pp: 193-203.
5. Yuceasan, E. Chen H., Snowdon J.L. And Charnes J.M., eds. Six-sigma and simulation, so what's the correlation? ,Proceeding of the Winter Simulation Conference, 2002.
6. Pyzdek Thomas, Considering Constrains, Quality Design, june 2000.
7. Dickman Daryl & Doran Colm, Selecting six-sigma projects – A new approach, 2003. http://www.onesixsigma.com/lit/white_paper.
8. Blakeslee. J. A., Implementing Six-sigma Solution, Quality Progress, July 1999, pp: 77-85
9. Breyfogle, F.W., Implementing Six-sigma, Smarter SolutionUsing Statistical Methods, Wiley-Interscience, 1999.
10. Hahn, Gerald J., Necip Doganaksoy, and Roger Hoerl, GE Corporate, The Evolution os Six-sigma Quality Engineering, Vol 12, No 3.
11. Hammer, M. and Goding, J, Putting Six-sigma in Perspective. Quality Magazine, Business New Publishing, October 2001, pp: 58-62.
12. Linderman, K., Schroeder, R. G., Zaheer, S., and Choo, A. S., Six-sigma: a goal theoretic perspective. Journal of Operation Management, Elsevier Science, 2003, Vol 21, pp: 193-2003.
13. Paige Leavitt, Lessons Learnes in six-sigma implantation, Academic Productivity & Quality Center (APQC), 2002.
14. Pande, P. S., Neuman, R. P., and Cavanagh, R. R., The Six-sigma Way: How GE, Motorola, and Other Top Companies Are Honing Their Performamce, McGraw-Hill, New York, NY, 2000.
15. Academic Quality Improvement Project (AQIP), Identifying Projects, 2002, http://www.goalqpc.com.