

THE IMPROVEMENT OF PROCESSES' QUALITY IN ORGANISATIONS USING THE SIX SIGMA CONCEPT

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ABSTRACT: *Six Sigma is a problem-solving methodology. In fact, it's the most effective problem-solving methodology available for improving business and organizational performance. Bill Smith from Motorola first developed in 1986 the specific elements of Six Sigma. At the beginning, it was a set of practices which have been used in the manufacturing processes in order to eliminate the defects but, as time passed, the concept has been extended so as to be used in other types of businesses, too. The 6th Sigma level corresponds to a 99,9997% performance, respectively 3,4 defects per a million of occasions. A Six Sigma process is a re-designed business process and has three basic elements: Process Improvement; Designing/re-designing the process; The Process Management.*

KEY WORDS: *Six Sigma, 3,4 defects per a million of occasions, DMAIC, DMADV, DPMO*

JEL CLASSIFICATION: *M1, M2*

1. INTRODUCTION

Six Sigma is not a theory, it's an action!!! Six Sigma is not a business caprice connected with a single method or strategy, it is rather a flexible system for improving the company management and performance. Six Sigma starts from the most important ideas and practices in management and succeeds in creating a new philosophy for the companies' success in the 21st century (Pande et al., 2009, p.25).

Six Sigma is a strategic management process which has been developed by Motorola; a sort of more detailed quality control. It is used in the entire world, the name being derived from the Greek letter sigma (a symbol used in the statistics in order to express the „standard deviation”- an indicator of the variation or unsteadiness in a group of articles or in a process).

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Six Sigma has as the main target reaching a high performance while maintaining a low number of defects and a low cost (<http://www.askdeb.com/six-sigma/>). Bill Smith from Motorola first developed in 1986 the specific elements of Six Sigma. At the beginning, it was a set of practices which have been used in the manufacturing processes in order to eliminate the defects but, as time passed, the concept has been extended so as to be used in other types of businesses, too.

2. DEFINING SIX SIGMA

In the book *Six Sigma for Dummies* the authors define in a simple manner the Six Sigma concept: “Six Sigma is a problem-solving methodology. In fact, it’s the most effective problem-solving methodology available for improving business and organizational performance” (Gygi et al. 2005, pp.9). Another interesting definition is: “A comprehensive and flexible system for reaching, maintaining and maximizing the success in business. Six Sigma is only guided by the close understanding of all the clients’ needs, by the proper use of facts, information and statistic analyzes as well as by the special attention paid to administration, to the business process reshaping and improvement” (Pande et al., 2009, p.11). The Sigma performance levels can be expressed through DPMO- “defects per a million of occasions” as shown in table 1.

Table 1. The Sigma conversion table

If performance is...	DPMO is...	The Sigma level is...
30,9%	690.000	1,0
69,2%	308.000	2,0
93,3%	66.800	3,0
99,4%	6.210	4,0
99,98%	320	5,0
99,9997%	3,4	6,0

So, the 6th Sigma level corresponds to a 99,9997% performance, respectively 3,4 defects per a million of occasions. *Things can also go further to the 7th Sigma level which would correspond to a 99,9999981% performance, respectively 0,019 defects per a million of occasions, but this is however too much* The main benefits of Six Sigma are shown in Figure 1.

Besides all these, we can also add (<http://www.siliconbeachtraining.co.uk/free-resources/six-sigma-benefits/>): defects are reduced; communication is Improved as the whole organisation works towards common goals; employee satisfaction improved; productivity is increased; capacity and output are improved; quality is improved; reliability of products and processes are improved; unit costs decreased; designs improved; better delivery time.

2. THE SIX SIGMA PROCESS

A Six Sigma process is a re-designed business process. Any business process which does not fulfils the established goals has flaws either in design, either in

application or, in the worst case, in both stages. Through the used methodologies, Six Sigma is able to re-shape the flawed process with the purpose of reducing the resulting variations to a minimum level. The type of methodology is different according to the business process that the company intends to re-shape.

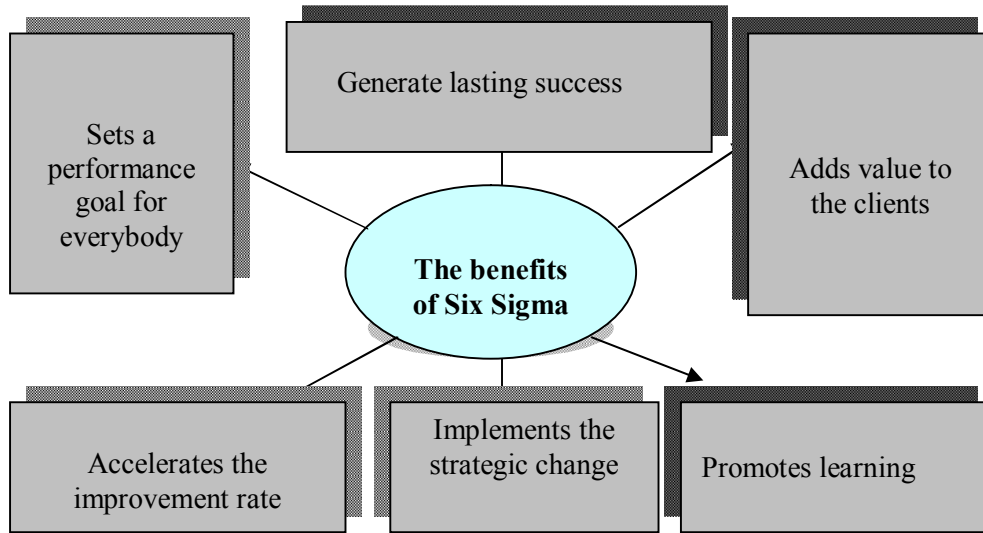


Figure 1. Benefits of Six Sigma

There are three main elements focused on the organization progresses shown in figure 2 and detailed in table 2.

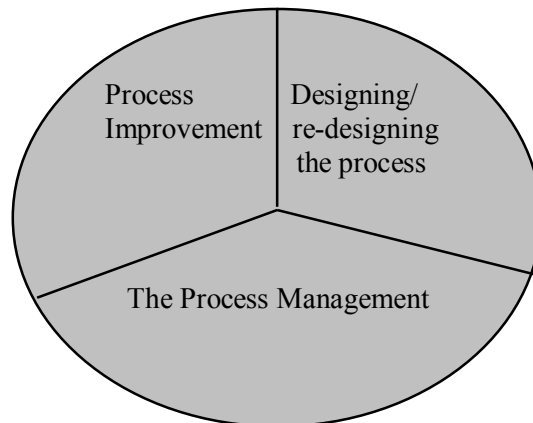


Figure 2. Six Sigma main elements

Six Sigma uses two main improvement methodologies: DMAIC* and DMADV** (figure 3).

* The acronym of *Define, Measure, Analyze, Improve, and Control*.

Table 2. Description of the Six Sigma main elements

Main elements	Their description
<i>Process Improvement</i>	Consists in finding directed solutions meant to induce the removal of the main causes of the problems that affect the company performance. The majority of the Six Sigma projects are efforts to improve the personnel structure
<i>Designing/re-designing the process</i>	The Six Sigma objective is not to fix the process but rather to replace the process with a new one (or to replace a part of the process). The business world is continuously changing nowadays and this thing makes impossible maintaining a company in a top position without re-designing the process.
<i>The Process Management</i>	In this case the Six Sigma themes and methods become an integrant part of the business management: <ul style="list-style-type: none"> -The processes are analyzed and managed and the responsibilities are assigned in order to ensure the crossed management of the main processes; -The client's requirements are clearly defined; -Profound evaluations of process results, activities and resources are carried out; -The leaders can evaluate performance in real time; -The process improvement, design and re-design in order to to increase the company levels of performance, competitiveness and profitability.

Source: adaptation based on Pande et al., 2009, pp.50-55

**Figure 3. DMAIC versus DMADV**

DMAIC is used for an existing process and uses the following steps: 1st step: Defining the process improvement objectives; 2nd step: Measuring the current performance level; 3rd step: The data analysis so as to notice the cause-effect relation within the process (the importance of this relation derives from the need for keeping the company strategy according to the client's needs); 4th steps: The process improvement based on data. It is important that the process be constantly improved or that the process be modified so as to correspond to the current situations; The 5th step: Control is vital since we need to check and correct any variation in order to prevent losing quality.

DMADV is used for creating a new product or process and involves 5 steps, too: 1st step: Defining the objectives; 2nd step: Measuring and identifying the

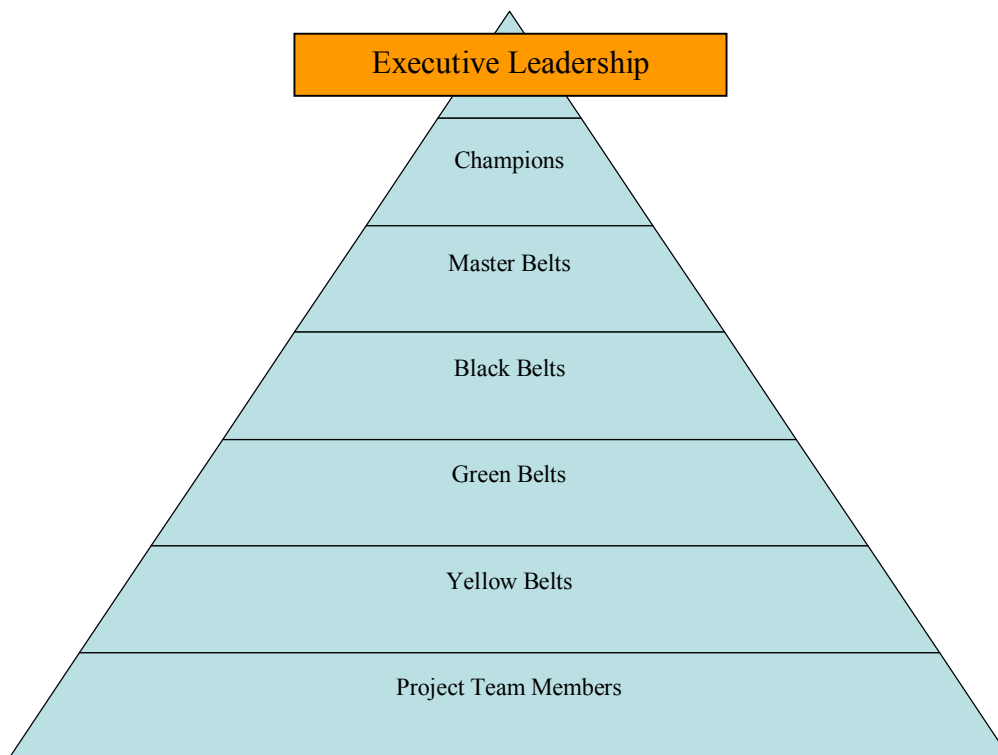
** The acronym of *Define, Measure, Analyze, Design, and Verify*.

characteristics for CTQ (Critical-To-Quality); 3rd step: Analysis and evaluation with the purpose of developing alternative models, choosing the best design for the general process; 4th step: Optimizing the design characteristics; 5th step: Checking the process

3. THE MANAGEMENT ROLES IN SIX SIGMA

Six Sigma uses a management hierarchy based on the classification levels of the martial arts. This classification excludes a series of unnecessary functions and develops a direct communication mean to the higher levels. Here it is (adapted after Stamatis, 2003):

- Executive Leadership includes the CEO of a company as well as other members of top management. This level is responsible for setting up the Six Sigma process within the company and for giving power and freedom to the other hierarchy roles to oversee Six Sigma implementation and to explore new ideas and designs;
- Champions are beneath the Executive Leadership and are responsible for implementing Six Sigma across the entire business or organization. Champion positions are filled from upper management levels and act as mentors to Black Belts;



Source: Gygi et al. 2005, p.52

Figure 4. Six Sigma hierarchic levels

- Master Black Belts are the coaches and motivators on Six Sigma. They are chosen by and assist Champions as well as guide Black Belts and Green Belts. Their duties involve making sure that Six Sigma is consistent throughout various functions and departments;
- Black Belts are directly under Master Black Belts. Their task is to apply Six Sigma methodology to specific projects within the business or organization. While Champions and Master Black Belts focus on identifying Six Sigma projects and general overseeing them, Black Belts focus on the actual execution of the projects;
- Green Belts are guided by Black Belts. These are employees of the company that are given specific tasks to do along with their regular job responsibilities;
- The team members are individuals who support certain projects in their fields;
- Other authors (Gygi et al. 2005, p.52) suggest a hierarchy made up of 7 hierarchic levels for Six Sigma, as we can notice in the figure 4.

The element of novelty consists in the “Yellow Belts” represented by “all the others” in the organization who apply elements in the Six Sigma methodology and through this they improve their work. They can be leaders, managers, project members or anyone else.

4. CONCLUSIONS

In a certain way, Six Sigma represents the evolution of the TQM projects (Total Quality Management) and it is influenced by important authors in the quality field as W. Edwards Deming and Joseph Juran. But Six Sigma is much more than this ... a real, practical mechanism for increasing the company competitiveness.

The great majority of organizations have reached the Sigma 6th level only in certain processes, but this thing is not supposed to scare them as it means a lot, however. This level provides a wide range of benefits, such as: generating a long-lasting success, setting a performance objective for everybody, an added value for the clients ... and the most important thing ... increases their competitiveness! ...

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