SIX SIGMA SPECIFICATIONS IN PRIVATE BUSINESS. CONCEPTUAL APPROACH

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ABSTRACT
The streamlining of management processes is a growing concern for private management. Considering the significant financial implications, the private companies, especially those with internationalized activity, developed internal systems to monitor and control all the processes. A lot of these systems are based on the Lean Six Sigma concept through DMADV model, customized according to the specific industry. The Six Sigma in private management is part of New Management stage and promote the institutional flexibility by reducing the related costs.
This paper goes through a series of conceptual notions related to Six Sigma and submit recommendations on its correct application in private administration. It also proposes a set of good examples of private companies that have implemented this concept.

KEYWORDS
six sigma, management, continous improvement

JEL CLASSIFICATION: *M11, M12, G32*

1. INTRODUCTION

If we look from certain angles Six Sigma, the most important are: as methodology, as a philosophy, as a symbol, as a value, a vision(Tennant, 2001). Six Sigma concept beginnings are recaptured in the production process and especially in its statistical modeling.

2. ABOUT SIX SIGMA

In a Six Sigma process can be identified only 3.4 defects per each million opportunities, 99.99966% of the results of such a process being with no defects (Allen, 2006). According to Six Sigma, with decreasing variation of elements that make up the process, the results will be increasingly better (Nave, 2002). The overall goal of Six Sigma is to describe the efforts to improve the entire process. Six Sigma involves good knowledge of the needs that the customer has, and reducing (or eliminating) causes crash (Schofield, 2004). For the success of the implementation it will require a thorough preparation and planning. The aim of the improving processes is to increase the product quality which would subsequently lead to a reduction of costs (Card, 2006).

3. SIX SIGMA: IMPLEMENTATION

In the second half of the past decade there was an increase of attention for Six Sigma, most articles being published by practitioners, not researchers caregivers academics (Brandy, 2006)

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Motorola company's employee, Bill Smith, in 1986, based on concepts known at that time (production quality control, TQM, zero defects) for improving the products quality, he managed to formulate Six Sigma methodology (Aboelmaged, 2009). The difference between Six Sigma and other quality management approaches is more rigorous control in order to improve the processes through innovative organizational structure (Schroeder, 2008).
Although founded in 1929 and passing through various transformations, the company Motorola only in 1970 identify the danger presented by Japanese manufacturers in product quality. 11 years later, Motorola establishes that the fundamental objective is customer satisfaction.
In 1987 a campaign "Six Sigma Quality" was launched, campaign that started educating employees about the process variation. Between 1987 - 1997, after implementing Six Sigma, Motorola enjoyed improvements worth of 14 billion dollars (Bhuiyan, 2005)
Although Motorola is the company that spawned Six Sigma, it was followed by implementations in Allied Signal (1994), in General Electric (1995) and in Ford.
Although Motorola is recognized as the developer of Six Sigma, in 2002 they called for the help from General Electric to revive the Six Sigma concept (Edgeman, 2004).
If the traditional approach to increasing profitability of a company involves reducing costs, Six Sigma relies on improving quality (Harry, 2006).

4. THE CHARACTERISTICS OF SIX SIGMA OF IMPROVEMENT APPROACH

Six Sigma is considered as a flexible and comprehensive system for achieving, sustaining and maximizing business success. Six Sigma is based on customer proximity, understanding their needs, disciplined use of data, information and statistical analysis, paying particular attention to management, improvement and remodeling business processes (Pande, 2000).
The Six Sigma method contributes greatly to improving the competitive position of organizations. The Six Sigma approach of process improvement is based on empirical study (De Koning, 2006) regarding the proposed method (modeling the structure of causality which reveals a problem), its approach (empirical study of assumptions) and in terms of instruments (statistical tools for empirical research).

5. ACCURACY AND OPERATIONAL PERFORMANCE IMPROVEMENT THROUGH SIX SIGMA

The study was conducted in an outsourced customer service center, which facing difficulties in terms of performance and operational accuracy and a constant pressure on productivity improvements.

6. DEFINITION

The Customer Service Center offers post-sale support for a series of equipments that are under warranty while managing certain questions coming from the clients (requests for repairs, replacements).
Any incorrect replacement leads to another replacement, fact which incurs additional costs (additional replacements, delays) and which also attracts the dissatisfaction of the clients regarding the product and the brand.
The rate of incorrect replacement was 15% and the objectives of the project were to reduce this rate to less than 7% (a 50% improvement of the defects). All of the replacements which were not necessary have been considered incorrect replacements including the dispatch of incorrect products or the replacements which were made without billing the clients in the cases where the products were out of their warranty.

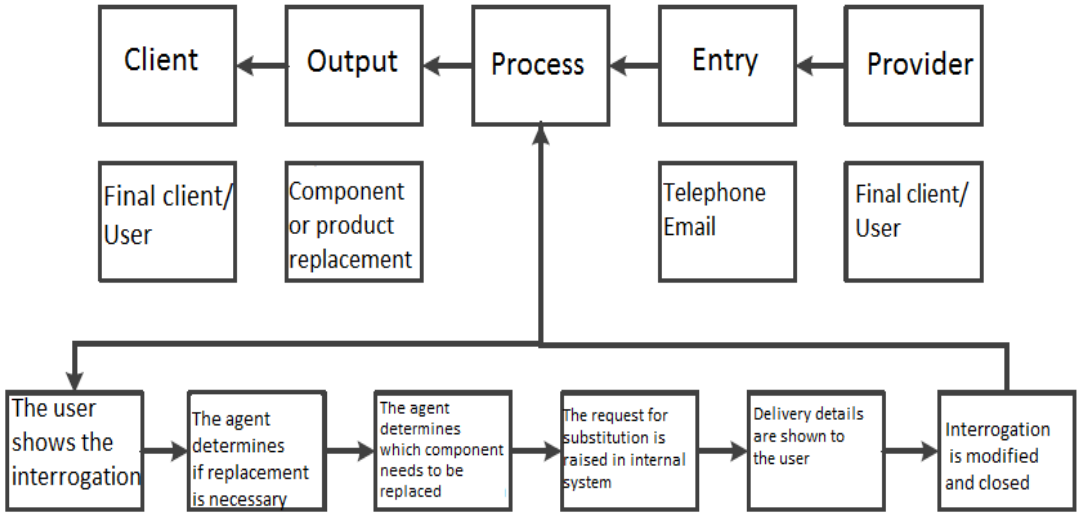

Figura 1. SIPOS DIAGRAM

A charter of the project was developed in order to define: the project, the purpose and the objectives, the sphere of application of the project, the project team and the deadlines for the defining steps, measurement, analysis, improvement and control.

7. MEASUREMENT

As the objectives of the project were clearly indicated, the defects, the units and the defect opportunities were established which implied that an Ishikawa analysis of the causes was made in order to facilitate a better understanding of the levers which affect the objectives of the project.

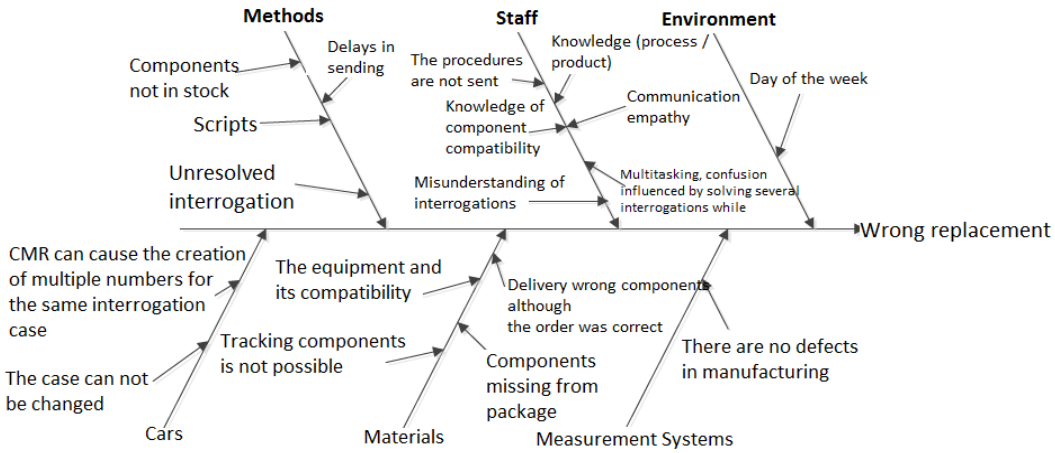

Figura 2. Ishikawa Analyze

The data was collected in order to permit a better understanding of the current performance and the measurement system. The precision, repeatability and reproducibility of the measurements were also analyzed.

8. ANALYSIS

Taking into consideration the measurements made in the previous step and the objectives of the project, the performance of the product has been established and the performance objectives were defined.

Product Performance

Component	Obs Defs	Obs Units	Opps per Unit	Cmplx	Adj Defs	Adj Units	Adj Total Opps	DPU	DPMO	Z.Shift	Z.ST	YTP
1	252	1581	1	*	252	1581	1581	0.159393	159392.8	1.500	2.497	0.840607
Total					252		1581		159392.8	1.500	2.497	

Figura 3. The product performance

Table 1. Initial Performance vs. Objective

	Opportunities	Defects	Dpmo	Sigma
Initial	252	1581	159393	2.50
Objective	?	?	70000	2.976

The project team organized a *Brainstorming session* to generate ideas regarding possible causes which affect the productivity (number of interrogations/hour). The identified causes were evaluated along with those previously identified causes, which resulted in the testing of the hypotheses in accordance with the type of data that applies to this case.

Table 2. Identified Causes

X	P – Value	Significant	Use text
The day of the week	0.000	Y	CHI - SQUARE
Equipment model	0.000	Y	CHI - SQUARE
The type of the interrogations	0.039	Y	CHI - SQUARE
The subtype of the interrogations	0.023	Y	CHI - SQUARE
Responsible person	0.000	Y	CHI - SQUARE

9. IMPROVEMENT

Once the variation causes have been identified and tested, a series of solutions for improvement were proposed in order to generate the desired effects.

Table 3. The Presentation of the Solutions

X	Analysis of causes	The proposed solution
The day of the week	Higher volume of queries Each Wednesday / Thursday	Ensuring relevant staff throughout the week

The equipment model	The technical solution used for processing the replacement does not show compatibility with relevant products	Updating technical solution to show the compatibility of equipment
The type of the interrogations	Procedures for treatment of certain types of interrogations are not current	Updating procedures
The subtype of the interrogations	Procedures for treatment of certain types of interrogations are not current	Updating procedures
The responsible person	Lack of communication skills /treatment interrogations; knowledge of components and compatibilities	Pregătire/ Formare privind comunicarea eficace, dezvoltarea cunoaşterii privind procesul şi echipamentele.
The approval process	There is not an approval process regarding replacements	Implementing an approval process validation / replacement
The lack of communication of process change	Changes and updates are centralized process and communicated	Comunicarea schimbărilor de proces prin email/SMS.

10. CONTROL

After the proposed solutions were put into application, the performance of the product was measured with the purpose of evaluating the impact and verifying the effectiveness of the improvements. Thus, an improvement can be observed: ~95% in DPMO along with a ZST movement from 2.5 to 3.89.

Product Performance

Component	Obs Defs	Obs Units	Opps per Unit	Cmplx	Adj Defs	Adj Units	Adj Total Opps	DPU	DPMO	Z.Shift	Z.ST	YTP
1	42	4976	1	*	42	4976	4976	0.0084405	8440.5	1.500	3.889	0.991559
Total					42		4976		8440.5	1.500	3.889	

Figure 4. Product Performance – After Implementation.

Comparing the initial data with those collected after the application of the improvements, it is evident that the rate of defects has decreased dramatically.

To ensure the lasting of these improvements, a control plan is implemented which consists of daily reports regarding incorrect replacements as well as weekly or daily information meetings

Table 4. Initial Performance vs. Objective vs. After Implementation

	Opportunities	Defects	Dpmo	Sigma
Initially	252	1581	159393	2.50
Objective	?	?	70000	2.976
Post deployment	4976	42	8440	3.89

Taking into consideration this case study, we can conclude that the application of the Six Sigma in a Customer Service Center is adequate and the DMAIC improvement methodology represents a defining factor for improvements within Processes Management of Business Management.

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