

# Challenges in Implementing the Six Sigma Methodology in a Public Sector

## A Case Study

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### Abstract

The six sigma methodology is currently used as a significant problem solving tool in order to improve processes of any organization. The main purpose of this paper is to identify challenges facing in implementing the six sigma methodology. We consider a real case study, namely Pipeline and Telecommunication Company in Iran. Then, we propose a conceptual model considering technical and fundamental challenges. The required data are obtained by the experts from a designed questionnaire based on eight hypotheses. Furthermore within each hypothesis, eight factors are considered and ranked by the use of the Categories Friedman test and SPSS software. Finally, the conclusion is presented.

**Keywords:** Six sigma, Conceptual model, Technical challenge, Fundamental challenge.

### Introduction

According to Item 5 of the Fourth Development in Iran has been appointed the country's 8 percent economic growth during the Fourth Development 2.5 percent of the locations should be better utilization of available resources and use 5.5 percent of new capacity through the attached. But facts and figures from international organizations and especially the Asian Productivity Organization (APO) been published, indicating that this topic is, unfortunately, our country productivity indices in three areas of energy, capital and human resources, the undesirable situation of Asian countries is a serious decision that requires in this area is. For this purpose, this research effort is the dissection table and applying the methods call on the challenges to identify the successful implementation of favor with the challenges and their adjustment, guarantee. More articles will be expressed is that Six Sigma, services and status is Six Sigma and service organizations is the challenge and learn on the implementation of this methodology in the case study due to pray for Iran analyze.

### Literature research

#### What is Six Sigma?

Quality management during several decades (half the twentieth century to today) by providing improved thinking based movement toward zero defects, the business has evolved. 50 decades of quality control concepts and models introduced in companies and in 1960's comprehensive quality control emerged. About 70 to 90 decades important changes in the quality of comprehensive changes that occurred with the needs and requirements, business was with.

Name and idea Intro to Six Sigma is attributed to Bill Smith. His decades of 70 and 80 AD, as a senior engineer in the quality and reliability of Motorola Company was engaged in activity, called the father of Six Sigma. Bill Smith with a view to increase the error rate results in increased complexity of products and add them with the number of parts being unfit was three sigma quality level foundation range and reliability with integrated concepts and techniques of quality engineering.

Six Sigma is one of the letters in the Greek alphabet for the mathematical definition of standard deviation used to. Sigma is a scale for measuring deviation of a process and shows how the optimum Six Sigma process is to divert. Six Sigma, a very regular way that helps the organization to constantly develop and produce the excellent products and services almost to satisfy the needs of customers. Six Sigma, so that specific initiative and is a regular activity that causes for any defects and errors estimates that management occurs as part of any statistical measure will, provided analysis of the causes and ultimately will remove them. Defined defects, Six Sigma all factors that prevent the production process or services are included. Table of an Innovation Center that focus on minimizing the defects in the industrial or service environments and problem solving in the field of Six Sigma, defect in any issue before the all parts of the company that defined by management or by customer understanding has been established. Thus, a Six Sigma methodology to identify such defects and because they are deleted (Kim, 2006).

Six Sigma programs, the thing with any customer satisfaction and desirability is considered the union, called lesions (Adams et al., 2003). Strategy includes Six Sigma statistical tools in the form of a structured approach with the knowledge necessary to achieve competitive world today, producing products and services better, faster and cost less to do with looks.

### **Six Sigma in Service Position**

Service, activity or set of activities more or less often and not necessarily Intangible interaction between customer and service staff or physical resources or goods or services offered as put systems and solutions to customer problems are presented. Six Sigma manufacturing services acting well, but customer service focus is relationships. Negotiations can focus on completing the main goals of the negotiations Cancel will. Integrating Six Sigma and Behavior-oriented management components can lead to a system fault is in service organizations (Patton, 2005). Peter Drucker believes that «all the Company's products are of course also have some production».

Most people in organizations improve service categories and methods to do with looking to see very different. These people believe that the methods used to improve production in place in organizations, service organizations and with no justification of this approach to utilizing Six Sigma in your organization do not welcome (Patton, 2005).

However, Six Sigma because they systematic and logical approach and problem solving is improving, this approach not only in manufacturing organizations, service organizations, but will also be used but on the other hand, the nature of that production and service processes is different for each process must be proportionate and compatible with the tools used to process.

### **Face challenges facing Six Sigma**

In general, challenges to the existing application table service processes based on different manufacturing processes is formed by the two can be divided into different categories to. Fundamental challenge or thought, usually the executive level and incidence acquire technical challenges, application tools and methods that are obvious. The main challenges are as follows:

## **I) Fundamental challenges:**

- **Intangible being output processes:**

Output of many service process are impalpable (Pathon, 2005) the first and most visible problem, the lack of a physical product that causes or is visible ignored process is suppose to provide services that are running. Reasons, this is often the performance of services or experiences are offered to customers.

- **Lack of process-oriented perspective:**

Next problem the lack of process-oriented perspective is with the staff. Six Sigma can improve the process if the employees, an understanding of the process that performs work on it, have. However, application chart (diagram) during the process of service operations is important.

- **Lack of improvement thinking:**

Lack of thought and culture to improve service in other ways over the fundamental challenges in applying this methodology is the lack of thought process in many organizations, services, should not be expected to improve the work flow had.

## **II) Technical challenges:**

- **Lack of appropriate measurement system:**

The first case the lack of suitable measurement system for collecting data or lack of data. Manufacturing organizations usually require Detection flow due to materials and products produced and presented various reports to calculate the rate of delivery time and customer costs, the measurement system have efficient (Esimai, 2005).

- **Share much the process of implementation of human resource services:**

As mentioned before this means that human resources was the share of services in the implementation process is more than production operations. Processes, feelings and behaviors in human services component inputs key process variables that are hard to control the machinery but is rarely provided resistance against the changes.

- **Lack of staff conversant in statistical methods:**

When speaking of the implementation of approaches to the improvement such as Six Sigma is, you people are the first component engineers to join the team as a Six Sigma black belt, black belt, and other senior technical role are candidate. Statistical skills, technical knowledge and process oriented view will cause them to engineering and statistical methods required, correctly selected and Six Sigma projects to be implemented more easily. Due to the features, as engineers develop Six Sigma in the main pillar of the industrial units are.

- **Team role in the process of implementing Six Sigma:**

Team role in the process of implementing Six Sigma is important (Eckes, 2003; Windsor, 2006). Beyond being a function of team performance its constituent individuals and their total yield is the fact that today is the need to prove it. Now, the teams actually as the main and important part of human experience and human resources are considered.

- **Lack of proper identification of waste:**

Services in the most difficult stage of analysis and the cradle can be said during the implementation of Six Sigma improvement projects, lack of waste is properly identified.

Unfortunately, many waste services operations as part of their work accepted and attempting to remove them not come on (Esimai, 2005).

### **Method and Statistical research**

The main purpose of doing this research, identify challenges facing processing projects Six Sigma companies is Pray. Study in terms of purpose, considering that for practical and tangible results is an applied research and collect data from the perspective of a descriptive study is also because it is the intention of some variables, the status quo, the same species that are reported can. The comment of the study, a research survey is a cross-sectional. The most important tool in survey research, using interviews and questionnaires in this study is also of these two tools have been used.

In this study, the statistical community, a senior black belt, green belt and black belt Six Sigma company Pray of Iran. Considering that all the respondents directly to the statistical community to do a project to improve participation and experiences with the role they are to identify key challenges facing implementation table face is important.

### **Research hypothesis**

- Intangible being in service sector output processes important challenges in the process of implementing Six Sigma methodology.
- Lack of process-oriented view among service employees in the important challenges in the process of implementing Six Sigma methodology.
- Lack of improvement with the thinking of employees in the service of important challenges in the process of implementing Six Sigma methodology.
- Lack of skilled staff in statistical methods of the important challenges in the process of implementing Six Sigma methodology.
- Large share of human resources in implementing due process and outcome of processes in the service of important challenges in the process of implementing Six Sigma methodology.
- Lack of an efficient system for measuring data in the service of important challenges in the process of implementing Six Sigma methodology.
- Weakness in the Six Sigma team dynamics in the service of important challenges in the process of implementing Six Sigma methodology.
- Lack of proper waste identification stage of analysis in the service of important challenges in the process of implementing Six Sigma methodology.

### **Method of collection, data analysis and data conversion**

In this study, 23 questions related to generally list eight factors that were developed after the validity of measurement validity and reliability through the expert teachers, as statistical samples of face among members of the society mentioned in Unit 4 was the result of this statistical distribution studies using the median test and the Friedman test was analyzed.

### **Results**

The results of research studies are as follows:

- Intangible be output from the challenges that face the process of implementing Six Sigma methodology is. Based on analysis of data and the output of statistical software SPSS (described in Table 1), 79 percent of respondents rated equal to or lower than the median number is assigned. Thus, hypothesis number one is confirmed to justify. In other words, the sig where less than 5 percent are Intangible output process of being face challenges table of implementing the company is Pray.

Table 1 . Output of variable 1 from the SPSS statistical software

Variable	Category	N	Observed prod	Test Prop.	Asymp. Sig. (2-tailed)
Intangible being Output processes	9 ≤Me	41	/79	.50	.000 <sup>a</sup>
	Me>9	11	/21		
		52	1/00		

Based on Z Approximation<sup>a</sup>.

- Lack of process-oriented perspective with staff challenges on the implementation methodology called Six Sigma is. Based on analysis of data and the output statistical software SPSS (described in Table 2), 77 percent of respondents rated lower than or equal to the number assigned to the median indicates that confirmed the hypothesis of being number two is be. In other words, the sig where less than 5 percent is the lack of process-oriented view of the challenges with staff on call are Six Sigma methodology.

Table 2. Output of variable 2 from the SPSS statistical software

Variable	Category	N	Observed prod	Test Prop.	Asymp. Sig. (2-tailed)
Lack of staff with the Process perspective	9 ≤Me	40	/77	.50	.000 <sup>a</sup>
	Me>9	12	/23		
		52	1/00		

Based on Z Approximation<sup>a</sup>.

- Lack of improvement in the organization of thinking challenges call on company performance table is Pray. Based on analysis of data and the output of statistical software SPSS (described in Table 3), 88 percent of respondents rated equal to or lower than the median number assigned to indicate that the hypothesis number three confirmed is. In other words, the sig where less than 5 percent are thought to improve the lack of organization learn from the challenges in the implementation table of pipelines and telecommunications companies are.

Table 3. Output of variable 3 from the SPSS statistical software

Variable	Category	N	Observed prod	Test Prop.	Asymp. Sig. (2-tailed)
Lack of improvement in the organization thought	9 ≤Me	46	/88	.50	.000 <sup>a</sup>
	Me>9	6	/12		
		52	1/00		

Based on Z Approximation<sup>a</sup>.

- Lack of the skilled staff in statistical methods learn from the challenges of implementing Six Sigma methodology is. Based on analysis of data and the output of statistical software SPSS (described in Table 4), 92 percent of respondents rated equal to or lower than average number have chosen to show that the hypothesis number four confirmed is. In other words, the sig where less than 5 percent are conversant Staff statistical methods to escape the challenges of the implementation table is.

Table 4. Output of variable 4 from the SPSS statistical software

Variable	Category	N	Observed prod	Test Prop.	Asymp. Sig. (2-tailed)
Lack of skilled staff in statistical methods	6 ≤Me	48	/92	.50	.000 <sup>a</sup>
	Me>6	4	/08		
		52	1/00		

Based on Z Approximation<sup>a</sup>.

- Large share of human resources challenges in the process of service call is on Six Sigma. Based on analysis of data and the output statistical software SPSS (described in table 5), 88 percent of respondents rated higher than the median number assigned to the positive attention being developed by Related Questions hypothesis number five can be identified as a challenge to. Other words, the sig where less than 5 percent is the high share of human resources services to process the call on the challenges facing implementation of Six Sigma methodology is.

Table 5. Output of variable 5 from the SPSS statistical software

Variable	Category	N	Observed prod	Test Prop.	Asymp. Sig. (2-tailed)
Large share of human resources in the process of service	9 ≤Me	6	/12	.50	.000 <sup>a</sup>
	Me>9	46	/88		
		52	1/00		

Based on Z Approximation<sup>a</sup>.

- Lack of efficient system of measuring the challenges of implementing Six Sigma methodology. Based on analysis of data and the output of statistical software SPSS (described in Table 6), 90 percent of respondents rated equal to or lower than average number have chosen to show that the hypothesis is confirmed six . In other words, the sig where less than 5 percent is the lack of an efficient system for measuring data on the implementation challenges call table is.

Table 6. Output of variable 6 from the SPSS statistical software

Variable	Category	N	Observed prod	Test Prop.	Asymp. Sig. (2-tailed)
Lack of efficient system of measuring	9 ≤Me	47	/90	.50	.000 <sup>a</sup>
	Me>9	5	/10		
		52	1/00		

Based on Z Approximation<sup>a</sup>.

- Weakness in the dynamic team of Six Sigma implementation challenges call the table is. Based on analysis of data and the output statistical software SPSS (described in table 7), 98 percent of respondents rated equal to or lower than the median number selected indicates that the hypothesis to be confirmed number is seven. Other words, the sig where less than 5 percent is the weakness of the dynamics of Six Sigma team challenges on the implementation methodology called Six Sigma is.
- Lack of proper identification of waste and re-learn the challenges of working on the implementation of Six Sigma is a methodology. Based on analysis of data and the output of statistical software SPSS (described in Table 8), 100 percent of respondents rated lower or equal number have chosen the middle shows the hypothesis is confirmed number eight. In other words, the sig where less than 5 percent is not correct to identify waste and re-learn the challenges of working on the implementation of Six Sigma is a methodology.

Table 7. Output of variable 1 from the SPSS statistical software

Variable	Category	N	Observed prod	Test Prop.	Asymp. Sig. (2-tailed)
Weakness in the dynamic team	9 ≤Me	51	/98	.50	.000 <sup>a</sup>
	Me>9	1	/20		
		52	1/00		

Based on Z Approximation<sup>a</sup>.

Table 8. Output of variable 8 from the SPSS statistical software

Variable	Category	N	Observed prod	Test Prop.	Asymp. Sig. (2-tailed)
Lack of proper identification of waste	9 ≤Me	52	/100	.50	.000 <sup>a</sup>
	Me>9	0	/00		
		52	1/00		

Based on Z Approximation<sup>a</sup>.

Table 9. Final result and mean raking of 8 variables

Mean rank	Variables
3.14	Weakness in the dynamic team
3.27	Lack of skilled staff in statistical methods
3.71	Lack of proper identification of waste
3.96	Lack of efficient system of measuring
4.31	Lack of improvement in the organization thought
4.86	Intangible being in service sector output processes
4.97	Lack of process-oriented view
7.78	Large share of human resources in the process of service
52	N

144.204	Chi-Square
7	df
.000	Asymp. Sig.

### Conclusion

Based on goals developed for this study, the eight-factor model has been presented in two sections of this study. Two main challenges, namely fundamental and technical, were identified and ranked the eight factors. The related results were extracted from the statistical SPSS software and Categories Friedman test. These eight factors respectively are described below. Because the significant value is less than 5 percent, assume that  $H_0$  is rejected, and claims to be the same rank (or priority) of these factors are not accepted). Based on the same test, the dynamics of weak teams Six Sigma as a 3.14 grade challenge and priority were other factors, lack of skilled staff in statistical methods with 3.27, 3.71 with the loss of proper identification, the lack of an efficient system for measuring data with 3.96, lack of perspective improvement 4.31, 4.86 intangible be a process with output, not process-oriented perspective with 4.86, 7.78 shares much with human resources, the priority to low priority has been classified in this regard special attention management challenges to the order and the correct allocation of resources, successful implementation of Six Sigma projects guarantees.

General challenges related to the proposed solutions thinking (being Intangible output processes, lack of perspective improvement, and lack of process-oriented perspective) can be presented as follows. (1) Mapping process to identify current value of output processes; and (2) Staff familiar with the concept stages of the process of implementation to create process-oriented perspective. Proposed solutions related to technical challenges (lack of an efficient system to measure data, lack of proper identification of waste, lack of skilled staff in statistical methods, weakness in the dynamics of Six Sigma teams share many human resources) can be presented as follows. (1) Determination of the executive process and each process to define specific instructions for performing them, how building performance standards for staff; (2) Using knowledge resources outside the organization to provide the required force expert; (3) Improved transfer process of the correct team and its main project owners provide instruction appropriate preventive and control to project sustainability achievements; and (4) Select the best projects to consider the interaction and correlation between organizational goals and project.

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