

SIX SIGMA IMPLEMENTATION AS PREPROCESSOR TO IMPROVE SERVICE QUALITY IN UNIVERSITIES

Fajar Kurniawan

Department of Business Management
Saint Mary's University of Hong Kong

ABSTRACT

Six Sigma is a methodology in improving the quality of products and services in order to reduce variation, develop profit and increase customer satisfaction. ISO certification is the first from the 3 pillars of Six Sigma methodology, and many Universities have obtained ISO certification. ISO certification is obtained following the Quality Management System implementation, meanwhile the other pillars : Process Improvement and Process Design are not yet fully implemented. Process improvement known as DMAIC method requires detail stage, as the initial step in Six Sigma implementation. The initial phase consists of four steps namely: Background, Problem Statement, Project Objective and Project Scope. This stage is very important to implement before getting on the DMAIC implementation, as the framework of Six Sigma implementation planning process.

Keywords : *Six Sigma, Process Improvement, University Service Quality.*

1. INTRODUCTION

Nowadays consumer satisfaction is the main focus in supporting the continuity of an enterprise, both the manufacturing and service industries. Universities are the enterprises which provide services to students as the core specific components in improving the service quality for the students, and in general in increasing the university performance. Until now there is no university especially in Indonesia who has implemented *Six Sigma assessment*. Using Six Sigma assessment we can measure the six sigma level of the university.

Sigma (σ) is a Greek letter which represent the standard statistical measurement to indicate the standard deviation of a certain population, measuring the variation of data dissemination (*Six Sigma Institute, 2012*). Sigma may be interpreted as the standard deviation which belongs to the limit specification and the average of a process (*El Cano, 2012*). In its implementation sigma (σ) indicates how much a data is in the reach of a consumer. The higher the sigma level of a data, the higher the output, and the product and the service level to the consumer. In other words, the higher the sigma level, the lesser the defect. The methodology in six sigma may become a

giant leap in trying to improve consumer satisfaction, and therefore to the profitability of the firm. Six sigma becomes the way to study an improvement in universities.

Six Sigma is a business strategy using some tools to improve process capability, wherein a process is the base of an environment (*Kai Yang, 2005*). A process could be product or a service provided to consumer. Six sigma has proven to be an effective measuring tool. From 1987 to 2005, due to six sigma methods implementation, income for enterprises has increased from 1,9 trillion dollars to 9,1 trillion dollars (*Six Sigma Institute, 2012*). Michael Marx (2007) stated that six sigma method may change an enterprise in its income as reported by Fortune 500.

Basically six sigma method comprises 3 pillars as follows :

a. Process Management

This process is the quality improvement based on procedures management. This process is more familiar as the Quality Management System (QMS). Most big corporations in Indonesia including the educational institutions has implemented this concept. Many universities have obtained ISO certifications.

b. Process Improvement

This method is aimed at process improvement, which is the continuation

of process (procedures) management. It seems that not many of Indonesian companies have implemented this method completely. Process Improvement is frequently termed DMAIC, an abbreviation from Define, Measure, Analyze, and Improve Control. Basically process improvement attempt to evaluate the quality improvement system, and provides the sigma values nilai for the current performance.

- c. Process Design/Redesign. This process is the continuation of the improvement process. This method is frequently called Design for Six Sigma (DFSS), aimed at maintaining continuous system implementation. In general, this process attempt at redesigning existing system in the company as the result of DMAIC.

Six Sigma Methodology is illustrated by Figure 1.

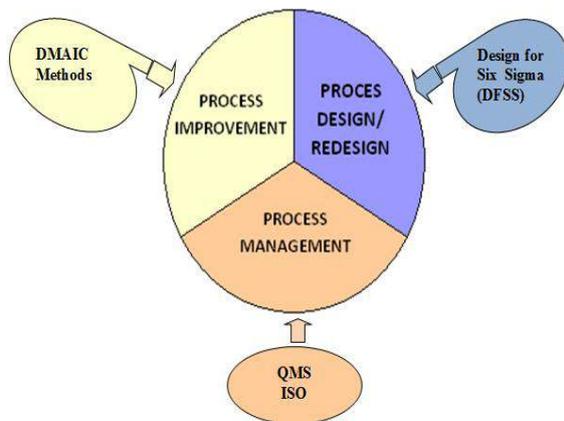


Figure 1. Six Sigma Methodology

This study implemented six sigma method in the Bachelor of Science in Entrepreneurial Management (BSEM), part of a local Hong Kong University. Improvement using six sigma, frequently called Project, in this case is applied to the BSEM student service system.

2. THE INITIAL STEP TO IMPLEMENT SIX SIGMA (6 σ)

Implementation of Six sigma more generally known as DMAIC methods, comprises:

- a. Define Phase

- b. Measure Phase
- c. Analyze Phase
- d. Improve Phase
- e. Control Phase

Prior to entering the five steps, there are initial steps as a framework to plan the implementation of Six Sigma as a whole, as shown in Figure 2.

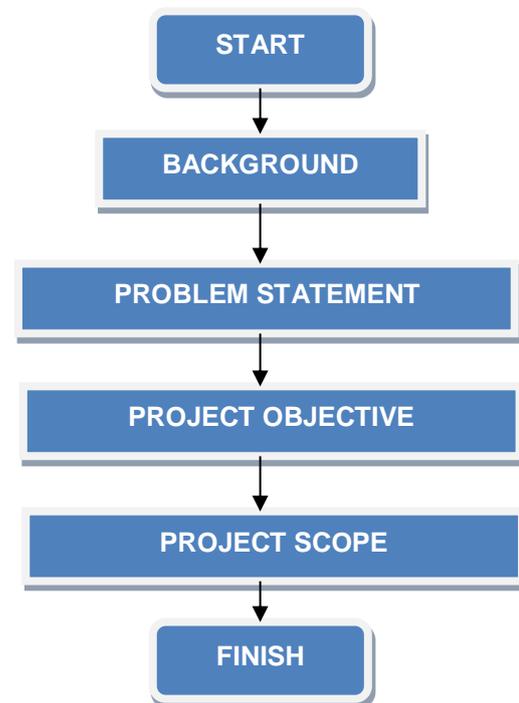


Figure 2. Six Sigma initial implementation stage

This step will serve as the basis in defining the improvement for the student service system for BSEM program. This steps must be completed so that it is much easier to proceed to the *Define Phase*.

3.1. Background

The background of this BSEM project is the decrease of student entering BSEM in the last 8 years. Table 1 shows the progression of number of BSEM program students from 2006 to 2013. The numbers are decreasing. There is a complaint from the top university executive that the program's service level has been low, and that this has been the reason for the decline in the number of student intake.

3.2. Problem Statement

Problem statement is the statement issued by the management on important

problems faced by the department, which should be better if supported with the revenue of the department. In this BSEM case, the problem statement may be defined as follows:

“In the years of 2007 - 2013, the number of BSEM students has been decreasing, which lead to the decrease of income. In 2007 the income was HK\$ 549.900 per semester and in 2013 the income was reduced to HK\$ 351.000, which is equivalent to 36,1%”.

Problem statement is absolutely important to be defined so as the management knows exactly what the real problem is at hand. While there are many managers do not know the real problems, this study report will help to remind them about the problems.

3.3. Project Objective

Project Objective is the definition of the ultimate goal of executing this Six Sigma Project to improve the performance of the institution. This BSEM case project objective is stated as follows:

“The Project aimed at increasing the number of student intake to 120 per year, through increasing the service quality to the BSEM students”.

The overall Six Sigma goal is to reduce the product variations and move the product and service criteria into the ones acceptable to the customers. This critical criteria in Six Sigma is known as the Critical Customer Requirement (CCR). Visual representation of this criteria is shown in Figure 3.

Project Objective may help the Six Sigma Project executives and all the elements in the department to know what exactly is the ultimate goal of the Six sigma Project.

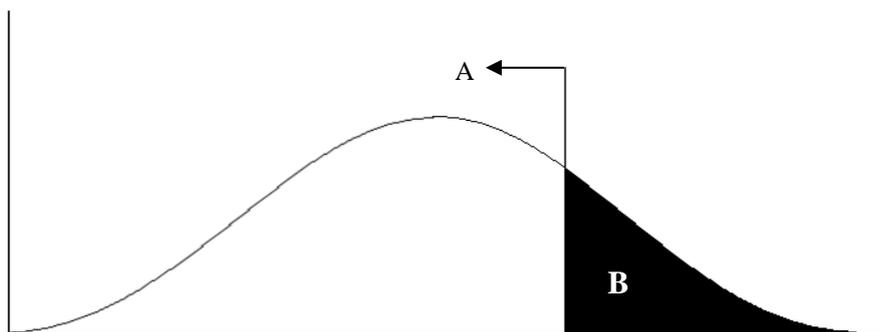
a. Project Scope

Project Scope describes the scope of the Six Sigma Project. The steps to be done must be based on the complete Six Sigma Concept. The Project scope for BSEM program is shown in Figure 4.

Table 1. Number of BSEM program students

Tahun	2006	2007	2008	2009	2010	2011	2012	2013
Jml Mahasiswa	130	141	131	138	110	100	114	90

Source : BSEM new student intake (2013)



Product and service output
 A = Critical Customer Requirement (CCR)
 B = Product and service defect which is unacceptable by the consumer.

Figure 3. Product/service variation curve



Figure 4. Project Scope

The steps may be described as follows:

a. Define Phase

Define phase is the definition of all planning preparation of improving the service quality of BSEM program, which includes :

1. Project Charter : identification of the project that will be executed by BSEM program. This describes the project name, case, goal, and which part of the Department is responsible for the execution of the project.
2. Project Plan : illustration of the steps of executing the project in terms of time schedule.
3. SIPOC : Detail explanation concerning the Supplier, Input, Process, Output and Customer of the project [abbreviated as SIPOC]. Here the supplier is the Institution or the Community where the students of BSEM came from. The Customer is the top executives of the university, who will evaluate the performance of BSEM program.
4. Voice of Customer (VOC) : illustration of criticisms and complaints from the *customer*, i.e. the Rectorat concerning the performance of BSEM program. This step will bring up critical customer needs which will become the key for the solution to answer customers' needs.
5. Critical to Quality (CTQ) : depicts customer's needs in numbers to enable number manipulation. In this case, the customer's requirement is the total number of students entering BSEM.

b. Measure Phase

Calculation in Six Sigma method is the tool to identify the defects in the system, and also to evaluate the service quality requirements that has been fulfilled (Mark O. George, 2010). Implementation of this Measure Phase, in case of BSEM program, includes among others:

1. Project Y : Determining variable Y which will be the basis to measure customer requirement satisfaction,

based on the priority and the supporting variables.

2. Performance Standard for the Y(s) : Determining the achievement standard based on the measurement of variable Y with reference to the target and the field realization.
3. Data Collection Plan : The plan to collect data considering the variables defect type, location, sample size, person to collect data, method, and the time of execution.
4. Data Collection : The proses to collect the data and the structured data recording methodology.
5. Y – X Relation : The activity to detect the relationship between variables X and Y using statistical tools.
6. Y – X tree : Determining the hierarchical structure of the causes for the key issues. In this case is the declining quantity of students, with reference to the results of data processing.
7. Y Distribution: Rechecking the data distribution statistics, based on the most influential variable for the decline of customer satisfaction.
8. Process Stability : Checking the stability of the process, as the continuation of process 7.
9. Capability Check : Determining the results of processing the statistical data, bringing up the average and the deviation standard with reference to the target fulfillment based on the chosen variables.
10. Sigma Calculation : Calculating the Sigma position of BSEM program, to measure the performance of the department.

c. Analysis Phase

The analisis conducted to test the identified CTQs. This to test if the CTQ is the dominant factor to the quality. In this case all variables to cause the decline of the number of BSEM program students. The factors are considered from perspectives of variables: personal, method, tools and the environment. The test is conducted by varying the tested variables while keeping the other constant. The results are tested using

statistical tools. The statistical method is to test whether or not the factors have some influence.

d. Improve Phase

This phase is the corrective action such that the corrected process can reduce the variation and the cycle time. These will reduce the variation and the cycle time which will have good impacts on the effectivity, efficiency and produktivity (D.H Stamatis, 2003). Proses improvement is focused on the solution for minimising defects, costs and cycle time. In BSEM program case, we will bring up the system improvement which will improve the system (the results of the analysis phase). Output from this step is the strategy to increase the number of students to BSEM program.

e. Control Phase

This phase evaluate the solution and the development of proposed control in achieving the results, and avoid the occurrence of product or service defects, and the happening of unexpected problems and costs (Bill Carreira and Bill Trudell, 2006). The last step in the process improvement is the effort to plan the implementation of the improvement to the revised or corrected system.

Detail description of the Six Sigma Project phases is shown in Figure 5.

CONCLUSION

1. Process Improvement while implementing Six Sigma will be easier if started with the initial phase of DMAIC, namely: Background, Project Statement, Project Objective and Project Scope.

2. The background in BSEM project improvement is to reduce the intake of students for the last 8 years.
3. The Project Statement is: "In years 2007 - 2013, the number of BSEM students has been decreasing, which lead to the decrease of income. In 2007 the income was HK\$ 549.900 per semester and in 2013 the income was reduced to HK\$ 351.000, which is equivalent to 36,1%".
4. The Project objective for improving BSEM program : "the Project is aimed at increasing the number of students to 120 per year, through the improvement of service quality in BSEM program".
5. The Project Scope consists of: Define Phase, Measure Phase, Analyze Phase, Improve Phase and Control Phase.

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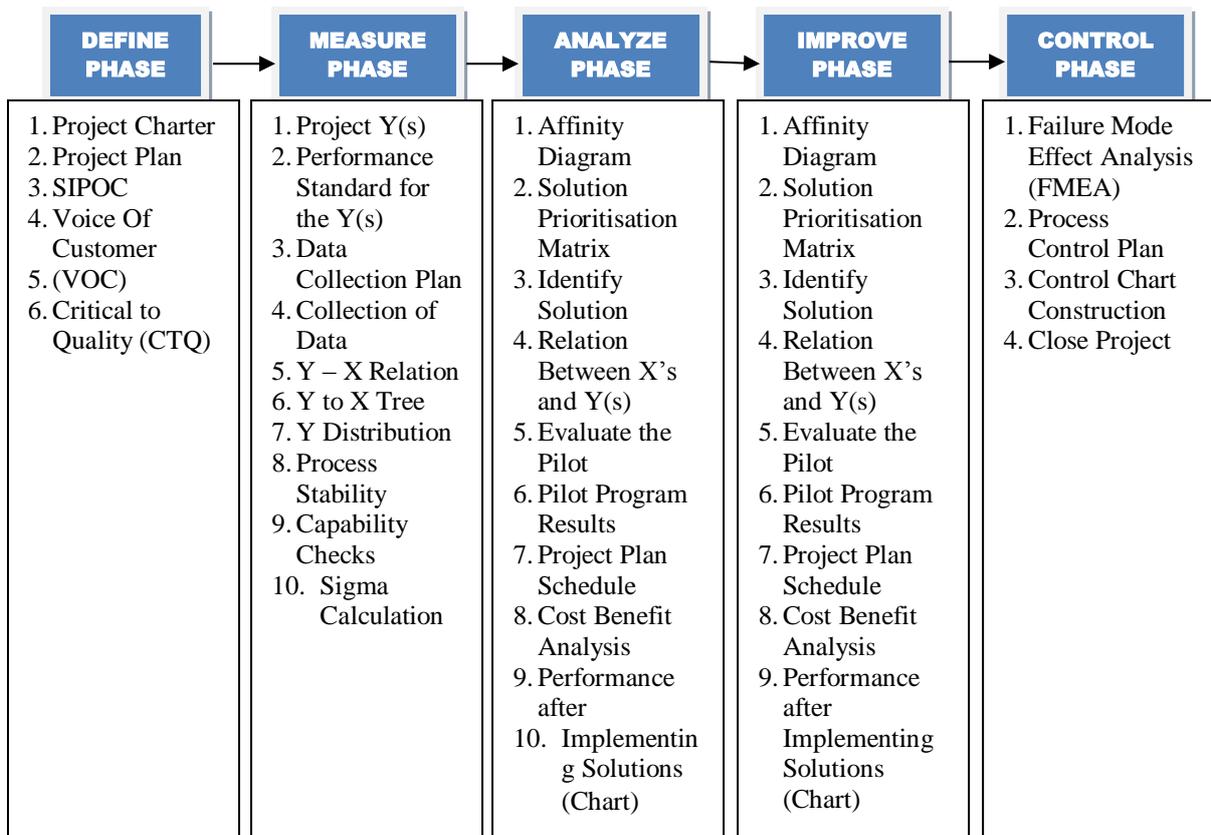


Figure 5. Detail Project Scope