

Comprehensive Concurrent Evaluation**MBA II/SEM III/317OSCM- Six Sigma for Operations****Faculty Name: - Prof.Nilambari Moholkar****Important Instructions:**

1. The subject is evaluated on the basis of three components

Group	Components	Total Marks	Date of Submission
1	Written Home Assignment	50	10 th Feb 2023
2	Case Study	50	13 th Feb 2023

2. Assignments to be mailed to be submitted in person.
3. Student Name, Contact number, email-id, Specialization, Component must be clearly mentioned.

Component A
Written Home Assignment

1. Which is the important Face of History of Continuous Improvement?
2. Explain two principle of six sigma for Operations?
3. Describe about DMAIC Process.
4. What are the Six Sigma Project Identification in manufacturing unit?
5. Define Two-Way ANOVA improve phase.
6. Give with example Curve for Attribute Control charts.
7. How would you recognize importance of Control Charts for Attributes?
8. Enumerate Taguchi Method and its key Concepts.
9. Summarize the use of design of acceptance Sampling Plans for Variables.
10. Define Measurement systems in six sigma process.

Group B Case Study

Business Process Reengineering at Escorts

Escorts Construction Equipment Limited (ECEL) set up at Faridabad has around 500 employees of which 300 are members of labour unions of the company. ECEL belongs to Escorts group which has 12 plants employing around 15,000 people. Escorts Tractor Plant which employs around 200 employees is located in the same premises along with ECEL.

ECEL had a need to acquire and adopt new technologies which necessitated ECEL to take up business process and performance reengineering. Reengineering was defined as a process need for a quantum improvement in the level, methods and quality of the operations at ECEL. ECEL hired the services of a UK based consulting firm for reengineering its manufacturing processes. ECEL realized that changing the attitudes, work practices and making the employees accept change in role-set were the most difficult part of the entire process of BPRE. This difficulty was augmented by the fact that ECEL belongs to a big group with various plants located in the same locality and sharing almost same values, ethos, work culture and work practices.

The environment of ECEL consists of technology, customer base, government, information technology, media association - all in a state of flux and demanding changes. Hence there was a need for transition from a functional organization to a process-oriented organization, For this, the employees have to accept multi-skill mode of function including some menial jobs such as carrying materials, tools, filling oil, water etc.

Since the workers were not developed and business information was not being shared with them by managers, the workers had developed attitudes against the management, with perceptions that management has interests which are detrimental to interest of employees and workers must fight against the management for their rights. This kind of situation was discouraging for BPRE because worker's involvement is very crucial for its success. Hence this management had to deal with issues like trust, commitment, skill, attitude and values concerning employees. To do this, the following actions were taken.

- (i) Introduction of extensive communication exercises. This included extensive sharing of ideas, information and facilities between management and employees.
- (ii) Focusing on a set of commonly shared values through communication sessions and at individual levels.
- (iii) Transparency in all the processes of implementation.
- (iv) Mindset change programmes carried out for every employee.
- (v) Multi skill approach training was provided for 8 to 45 days' durations.

(vi) Skill inventory analysis was carried out and training was provided to develop additional skills. These processes motivated workmen to such an extent that they started demanding for multi skill training to be imparted to them.

Questions

1. Give reasons for ECEL to take up BPRE.
2. Discuss the issues that ECEL identified as those needed attention.
3. Describe the planning done by ECEL for introducing BPRE. What results did it achieve?

Case Study

"Six-Sigma" at General Electric Company

The case examines the initiatives taken by General Electric (GE), one of the world's largest diversified companies to implement the Six-Sigma quality tool in the 1990s. The case discusses in detail the concept of Six-Sigma, its implementation procedure and its benefits. It also explores the implementation procedure at GE and the benefits reaped by the company on account of adopting Six-Sigma.

By 2001, with revenues of \$125.91 billion and net earnings of \$ 13.68 billion, the US-based General Electric Company was easily the largest diversified company in the world. Out of the company's 24 different businesses, some were so large that could independently feature in the Fortune 500 list of Companies.

GE operated in more than 100 countries and had over 250 manufacturing plants in 26 countries. The company was one of the largest employers in the world with strength of around 2,75,000 employees. GE remained the only company listed in the Dow Jones Industrial Index that had been included in the original index in 1896.

GE's products ranged from plastic for small compact discs to powerful locomotives. The company was the world leader in light bulbs and power generation equipment. Its diagnostic medical imaging equipment were well known all over the world. In addition, GE had a strong presence in the financial services, consumer durable goods and entertainment businesses. In the late 1990s, GE initiated various measures to transform itself into a services and solutions-oriented company.

GE was well known for its strong focus on R & D and quality since its inception. The GE Research and Development Centre was one of the world's largest and most diversified industrial laboratories- It employed 1,600 people that included around 1,100 scientists, engineers and technicians. The centre provided GE's businesses and strategic partners with cost effective technical innovations for various products, processes and services. During the 1990s, quality became a major issue of concern to the company.

This made GE's CEO Jack Welch to consider the benefits being derived due to a quality initiative called Six-Sigma by companies such as Motorola. Though Welch felt that quality programs were only theoretical and did not show any substantial results, he was impressed by the Six-Sigma concept and decided to implement it at GE in 1995.

About Six-Sigma: Six-Sigma is a well-structured, data-driven methodology for eliminating defects, waste or quality control problems in all kinds of business activities. It is based on a combination of well-established statistical quality control techniques, simple and advanced data analysis methods and the systematic training of all personnel at every level in the organization involved in the targeted activity or process.

Theoretically, any process would have a natural spread of 3 sigma (standard deviation) from the normal distribution mean on either side of the centre. This spread contains 99.999998% of the process output. Thus only 0.002 parts per million are out of the design specifications. However in practice, it is difficult to control the processes and any typical physical process would deviate from the natural centre by up to 1.5 standard deviation. Thus, Six-Sigma in real life denotes a defect rate of 3.4 parts per million.

Six-Sigma is a sophisticated quality program that is designed to reduce defects to 3.4 per million opportunities. This concept was pioneered by Motorola in the early 1980s. Six-Sigma enabled Motorola to achieve defect-free performance in its performance in its manufacturing, designing, engineering and business processes. Six-Sigma was originally developed to be used for physical processes-those performed in manufacturing and easy to observe, record, analyze and measure.

However its application was extended to processes other than physical processes such as bid and proposal, procure- at and contract management areas. While Six-Sigma comprised strict measurements for physical processes, it involved identifying waste in the form of delays for other processes. The primary objective of Six-Sigma was to increase customer satisfaction through continuous improvement in quality.

GE's Six-Sigma Experience: Before implementing Six-Sigma, studies revealed that GE's operations were carried out between 3 to 4 sigma, i.e. about 5 000 defects per million opportunities (DPMO). According to company estimates, avoidable expenditure of \$7 to 10 billion as being incurred in the form of scrap, reworking of parts, correction of transactional, errors inefficiencies and lost productivity.

The ground work for the implementation of Six-Sigma at GE had began in 1988 in the form of an initiative known as the "Work Out" program. The company realized that employees were an important source of intellectual power for new and creative ideas. The "Work Out" program gave each employee an opportunity to influence and improve GE's operations. The program had set some major goals that later helped to lay the ground-work for Six- Sigma.

The goals were as follows:

1. **Build Trust:** Employees were encouraged to criticize GE and the way they performed their jobs without negative consequences to their careers.
2. **Empower employees:** As employees who performed a particular task knew how to do it perfectly, GE granted them more power to encourage them to take more responsibility for their jobs and improve the way of doing their jobs.

Reaping the Benefits: Implementation of Six-Sigma at GE enabled the CEO, Jack Welch to transform an old-economy industrial giant into a competitive and growing company. No other Corporation seemed to have integrated Six-Sigma to its operations as widely as GE. Within five years of its implementation, Six-Sigma at GE produced annual benefits of more than \$2.5 billion for GE worldwide. Six-Sigma was a indisputable success at GE whether in terms of customer satisfaction, improvement in internal performance or in the improvement of shareholder value.

Questions: 1. Discuss the Six-Sigma concept and its relevance to a company such as General Electric in improving its performance.
2. Explore the benefits reaped by GE from Six-Sigma initiative and its contribution to the company's sustained superior financial performance and competitive advantage.

