CHAPTER 8

IMPLEMENTATION OF SIX SIGMA FOR IMPROVING EMPLOYABILITY

8.1 INTRODUCTION

Six sigma DMAIC methodology is a rigorous and proven problem solving approach as stated by Antony et al 2007a. It is a data driven approach for improving processes in a logical manner with its five phases viz., Define, Measure, Analyze, Improve and control (Andersson et al 2006). Project selection for quality improvement in an organisation is a leadership responsibility as stated by Phzdek (2003). The employability of the engineering students in non-autonomous self-financing private engineering colleges in India is only 10%. Principals of engineering colleges and college managements have identified and want to improve the employability of their college students. Low employability of engineering students affected the students’ admission process and the image of the college. This chapter explains how six sigma DMAIC methodology can be implemented in such engineering colleges for improving the employability of the students. This chapter, divided into seven sections, the define phase is explained in the second section, followed by measure phase as third section. The fourth section reports the application of the quality tools and techniques for Analyze phase while the fifth section deals with the application of the appropriate tools and techniques for improvement. The sixth section explains the control phase and the last section functions as a fitting conclusion reporting the success of six sigma DMAIC approach for the improvement of the employability of the engineering graduates.
8.2  DEFINE PHASE

It is there to determine the project focus, clearly identifying the process and its customers and learning what is important to them. The following tools are used in define phase.

- Problem Statement
- Goal
- Critical to Quality (CTQ)
- Business case
- Project Charter

8.2.1 Problem Statement

Improving the number of students placed through on-campus drive from 10% to 50% for every branch of students in their final year by improving the employability skills of students.

8.2.2 Goal

The students placed through on-campus should be 50% in the year 2011-12.

8.2.3 Critical to Quality (CTQ)

Number of students placed

8.2.4 Business Case

Every engineering graduate wants to have at least one placement offer letter before he completes the course. For the three batches of the students passed in the year 2008, 2009 and 2010, the placement was less than
10% of total final year students. The college made more effort by organising a substantial number of placement training and development programmes but did not make any improvement. The low employability of the students of this college affected the students’ admission and spoiled the image of the college and hence the problem of low employability was recognised and measures were taken for improvement.

8.2.5 Project Charter

<table>
<thead>
<tr>
<th>Service Impacted</th>
<th>Engineering Educational Service</th>
<th>Expected Project Savings (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Belt</td>
<td>Prof. S. Narayana moorthy</td>
<td>Private Self-financing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-autonomous Engineering Colleges</td>
</tr>
<tr>
<td>Champion</td>
<td>Principal</td>
<td>Phone Number for Belt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9865180987</td>
</tr>
<tr>
<td>Master Black Belt</td>
<td>Prof. A. Rajagopal</td>
<td>Email for Belt</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:s_moorthy_cbe@rediffmail.com">s_moorthy_cbe@rediffmail.com</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Start Date</th>
<th>Target Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2010</td>
<td>May 2012</td>
</tr>
</tbody>
</table>

Element | Team Charter
---|---
1. **Process:** Employability Improvement of students through Placement Training Process
2. **Project Description:** Number of students placed through campus to be improved from 10% to 50%
3. **Objective:**
   - Metric 1: 10% to 50%
   - Metric 2: $/A
   - Metric 3: units/A
4. More than 50% of final year students to be placed in high pay reputed companies
5. **Team members:**
   - Champion: Principal
   - Process Owner: Placement officer
   - BB: Prof. S. Narayana moorthy
   - MBB: Prof. A. Rajagopal
6. **Project Scope:** Improving Placement Training Process and Top management involvement and commitment.
7. **Customers:** Students & Students’ Recruiters (Industries)
   - Key Measures: Number of students placed
   - Benefit: Improved Employability of students
8. **Key milestones/dates.**
   - Project Start: June 2010
   - M- Measurement Completion: June 2010 to July 2010
   - A- Analysis Completion: July 2010 to May 2011
   - I- Improvement Completion: June 2011 to Dec 2011
   - C- Control Completion: June 2011 to May 2012
   - Note: Schedule appropriate Safety Reviews, Every Month
   - Project Completion: December 2012
9. **Students Data software installed**
8.3 MEASURE PHASE

The objective of measure phase is to collect the actual data for estimating how capable the current process is and to what extent it is meeting the customer requirements. In this process the students and student recruiters are considered as customers. Their expectations are collected through Importance satisfaction survey and presented in Chapter 6. The present performance, ongoing placement training details have been collected from college records and the list is given below.

1. Placement statistics of ABC Engineering college is collected and tabulated as shown in Table 8.2
2. Identification and measurement of skills requirement for better placement
3. Employability of engineering graduates survey report
   b. FICCI & World Bank, November 2009
4. Students Importance –satisfaction survey report
5. Students feed back about placement and training
6. Placement officer/ placement coordinator feedback about students and facilities
7. Recruiters feed back
8. Alumni feed back
9. Heads of Departments / faculty advisors feed back
10. Placement trainers’ feed back report
11. Employment / Job opportunities for every branch of study
8.3.1 General Skills Requirement

Every engineering graduate should have acquired the following general skills for his /her better employability. They are listed based on their importance as per the survey report of FICCI & World Bank, November 2009.

1. Integrity (Most Important) – The quality of being honest with strong moral principles
2. Reliability – ability to perform the required function without degradation or failure
3. Team work – the combined action of a group, especially when effective and efficient
4. Willingness to learn
5. Self-discipline- the ability to control one’s feelings and overcome one’s weaknesses.
6. Self-motivated – Motivated to do or achieve something because of one’s own enthusiasm or interest without needing pressure from others
7. Leadership- the action of leading a group of people or an organisation, or the ability to do this.
8. Flexibility - willingness to change or compromise.
9. Responsibility – the state or fact of having a duty to deal with something
10. Creativity – the use of the imagination or original ideas especially in the production of an artistic work.
11. Empathy – the ability to understand and share the feelings of others, and

12. Contemporary issues (Least Important) – Living and occurring at the same time.

The present performance of these skills for every student were collected through the concerned faculty advisors by using the tables 5.8, .59, and 5.10.

### 8.3.2 Specific skills requirement

The following specific skills as per FICCI & World Bank, November 2009 are required for engineering students. They are

1. Entrepreneurship
2. Communication in English
3. Modern Tools
4. Knowledge of Mathematics / Science / Engineering
5. Written communication
6. Reading
7. Technical skills
8. Experiments / data analysis
9. Verbal communication
10. Problem solving
11. Basic computer skills
12. System designing skills
13. Advanced Computer knowledge and
14. Customer services
The actual performance of every student was collected through the faculty advisors as per Tables 5.8, 5.9 and 5.10.

8.3.3 Eligibility criteria for employability for students

Reputed companies have formulated certain criteria to be met for better employability of students. They are listed below

1. Percentage of marks in university examination should be more than 70%
2. No history of arrears or at least no standing arrears when they attend interview
3. Consistency of good academic performance in 10th standard, 12th standard or diploma
4. Good performance in the entrance examination
5. Satisfying general skills requirement
6. Satisfying specific skills requirement
7. Physical appearances, dressing, neatness and so on
8. Physical and mental health

These eligibility criteria of students for attending placements programmes had been collected for every student during the beginning of his/her fourth year of study.

8.3.4 Eligibility criteria of management for inviting companies for placement

Reputed companies have framed certain criteria to be met by college management. These are required to be satisfied by the Management
for bringing reputed companies to the college for recruitment process. They are

1. Establishment of separate placement cell
2. Availability of Placement Officer, assistants and faculty coordinators
3. Seminar hall
4. Interview hall
5. Transport
6. Hospitality
7. Computer facility
8. Stationery
9. Availability of competent, experienced, motivated faculty
10. Effectiveness of teaching – learning process
11. ISO certified Institution
12. NBA accredited Institutions

The eligibility criteria for the management had been collected through the feedback given by recruiters.

8.3.5 Placement Performance

The present placement performance of ABC Engineering College is given in Table 8.2. It is understood from this table that the number of students placed through interview is substantially increasing by implementing six sigma concept.
Table 8.2 Placement statistics of ABC Engineering College

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>No. of companies visited</th>
<th>No. of students placed</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-08</td>
<td>12</td>
<td>60</td>
<td>Before implementing Six Sigma</td>
</tr>
<tr>
<td>2008-09</td>
<td>15</td>
<td>48</td>
<td>Six sigma implementation initiated from 2009-10 onwards</td>
</tr>
<tr>
<td>2009-10</td>
<td>29</td>
<td>191</td>
<td>During implementation of six sigma</td>
</tr>
<tr>
<td>2010-11</td>
<td>44</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>2011-12</td>
<td>25</td>
<td>183</td>
<td></td>
</tr>
</tbody>
</table>

8.4 ANALYZE PHASE

In this phase, the reasons for low employability have been analysed through brainstorming, affinity diagram, cause and effect diagram, why-why Analysis.

8.4.1 Brainstorming

The ideas through brainstorming for reasons for low employability of engineering students are listed below

- Academic performance of students is not good enough to get employment
- General skills requirement of students is not sufficient
- Specific skills requirement is not sufficient
- Affiliating University curriculum and syllabus are not updated as per the present day industry requirements
- University examination process is not good
• Liberal admission policy like lowering cut-off marks for admitting students in engineering courses from 50% to 45% for general category candidates and 40% for reserved category candidates

• Students input quality lowered

• Incompetent faculty

• No motivation, no guidance from faculty

• Discouraging faculty, no support from faculty

• AICTE approval process is not good enough

• AICTE not preventing commercialisation of engineering colleges

• AICTE is encouraging / compelling / motivating commercialisation of engineering colleges by its way of functioning as against its vision and mission

• University is lowering eligibility criteria

• Students communication skills are not good enough

• Medium of instruction is English which is not mother tongue to Indian students

• World economy and Indian economy are in recession

• No fresh manpower requirement for industries

• Entrance examination system is demolished

• Automation of industries lead to less manpower requirement

• Political problems

• Government instability
• Government inference in approval process, affiliating process, admission process, lowering cut-off marks, reservation quota, and so on.

• Management is not providing sufficient infrastructure facility for placement

• No support, no motivation, no guidance from management

• Not willing to bring good companies for placement

• Prefer new faculty with no experience in teaching

• Old faculty may not aware of the latest contemporary requirement

• The usage of outdated teaching methodology and teaching aids

• Students not attending placement training programme

• Graduates output is more than requirement of industries

• Fake industries are brought to college for placement

• Engineering colleges run by political persons

• Privatisation of engineering colleges

• Starting unlimited colleges

• Increase in intake strength of students

• Starting popular but unemployment courses

Many of the final year students are not attending placement training programmes conducted by external experts organised by the placement cell in the campus and fail to attend placement classes and interviews because of the following reasons. They are

• Not interested in placement classes
● Placement not required
● Not eligible for attending placement interviews
● Placement training faculty is not competent enough
● Faculty is not motivating enough
● There is no placement opportunity for a particular branch of students
● Students unaware of placement training programmes
● Students may not be aware of the importance of placement
● Recruiting companies not giving the expected salary and other benefits
● Only small industries are coming for conducting campus interviews
● Well known reputed companies are not coming
● Own industry or own trading business – so there is no need for placement
● Parents are working in abroad. No need to have a job in India.
● Parents arrange for jobs in foreign countries
● Parents can influence the government for getting jobs to their wards
● Placement trainer is discouraging
● No time to attend placement programmes

8.4.2 Affinity Diagram for Low Employability

The scrambled ideas that were collected through brainstorming session were organised in groups and presented as affinity diagram as shown
in Figure 8.1. These ideas are grouped under students, faculty, management, parents, University, AICTE, Industries and Government.

<table>
<thead>
<tr>
<th>Students</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Academic performance of students is not good enough to get employment</td>
<td>• No motivation, no guidance from faculty</td>
</tr>
<tr>
<td>• General skills requirement of students is not sufficient</td>
<td>• Incompetent faculty</td>
</tr>
<tr>
<td>• Specific skills requirement is not sufficient</td>
<td>• Discouraging faculty, no support from faculty</td>
</tr>
<tr>
<td>• Students input quality lowered</td>
<td>• Old faculty may not aware of latest contemporary requirement</td>
</tr>
<tr>
<td>• Students communication skills is not good enough</td>
<td>• Outdated teaching methodology, teaching aids usage</td>
</tr>
<tr>
<td>• Students not attending placement training programme</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>University</th>
<th>Parent</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Affiliating University curriculum and syllabus is not updated as per present day industry requirements</td>
<td>• No motivation, no guidance</td>
</tr>
<tr>
<td>• University examination process is not good</td>
<td>• Fear factors</td>
</tr>
<tr>
<td>• University is lowering eligibility criteria</td>
<td>• No support</td>
</tr>
<tr>
<td>• Graduates output is more than requirement of industries</td>
<td>• Too much expectations</td>
</tr>
<tr>
<td></td>
<td>• Discouraging</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AICTE</th>
<th>Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>• AICTE approval process is not good enough</td>
<td>• World economy and Indian economy is in recession</td>
</tr>
<tr>
<td>• AICTE not preventing commercialisation of engineering colleges</td>
<td>• No fresh manpower requirement for industries</td>
</tr>
<tr>
<td>• AICTE is encouraging / compelling / motivating commercialisation of engineering colleges by its way of functioning as against its vision and mission</td>
<td>• Automation of industries lead to no manpower requirement</td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>• Starting unlimited colleges</td>
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<td>• Liberal admission policy like lowering cut-off marks for admitting students in engineering courses from 50% to 45% for general category candidates and 40% for reserved category candidates</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Starting popular but unemployment courses</td>
<td>• Entrance examination system is demolished</td>
</tr>
<tr>
<td>• Increase in intake strength of students</td>
<td>• Political problems</td>
</tr>
<tr>
<td>• Fake industries are brought to college for placement</td>
<td>• Government instability</td>
</tr>
<tr>
<td>• Engineering colleges run by political persons</td>
<td>• Government inference in approval process, affiliating process, admission process, lowering cut-off marks, reservation quota, and so on.</td>
</tr>
<tr>
<td>• Prefer new faculty with no experience in teaching</td>
<td></td>
</tr>
<tr>
<td>• Not willing to bring good companies for placement</td>
<td></td>
</tr>
<tr>
<td>• Management is not providing sufficient infrastructure facility for placement</td>
<td></td>
</tr>
<tr>
<td>• No support, no motivation, no guidance from management</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 8.1 Affinity Diagram For Low Employability**
8.4.3  Cause and Effect Diagram for Low Employability

![Cause and Effect Diagram for Low Employability of Students](image)

**Figure 8.2 Cause & Effect Diagram for Low Employability of Students**

8.5  IMPROVEMENT PHASE

It is realised that the intensive training is required to students as well as faculty members for better employability of students. The training module to each and every level is conducted as per the list given in Chapter 4 and Appendix 2. The improvement in employability is realised through the increase in the number of students placed. The college management has initiated a lot of improvement activities to improve the eligibility criteria for bringing good companies to the college for placing students.

8.6  CONTROL PHASE

The sustainable development of placement is achieved through continuous training and development activities. The schedule of placement and training activities to be followed is given in Table 8.3.
Table 8.3  Schedule of Placement Training Programmes for better employability

<table>
<thead>
<tr>
<th>Year</th>
<th>Semester</th>
<th>Branches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Aero</td>
</tr>
<tr>
<td>I</td>
<td></td>
<td>Technology Skills like Fundamentals of Computing, Soft Skills like English Language, Grammar, Communication Skills Development</td>
</tr>
<tr>
<td>I</td>
<td>II</td>
<td>AutoCAD with Auto LISP, Archi-CAD</td>
</tr>
<tr>
<td>III</td>
<td></td>
<td>Value Added Courses like AutoCAD, SolidWorks</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>JAVA with OCIP, Networking with CCNA</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>JAVA with OCIP, Networking with CCNA</td>
</tr>
<tr>
<td>V</td>
<td></td>
<td>JAVA with OCIP, Networking with CCNA</td>
</tr>
<tr>
<td></td>
<td>VI</td>
<td>JAVA with OCIP, Networking with CCNA</td>
</tr>
<tr>
<td></td>
<td>VII</td>
<td>JAVA with OCIP, Networking with CCNA</td>
</tr>
<tr>
<td></td>
<td>VIII</td>
<td>JAVA with OCIP, Networking with CCNA</td>
</tr>
</tbody>
</table>

8.7  CONCLUSION

The implementation of Six Sigma through its DMAIC methodology for the employability improvement of students in a private engineering college has revealed the accomplishment of significant improvements in placement. Six Sigma served as managerial concept in finding out the shortcomings of Management, faculty and students and eliminating them by its approach. Six Sigma has thus proved to be a business strategy and a systematic methodology, to yield breakthrough improvements by improving the involvement of Management, students, faculty and all other stakeholders. A case study reported in this research is one such evidence that shows Six Sigma efforts resulting in improved service quality, performance, productivity and customer satisfaction.