

TQM-IMPORTANT TOOL IN ENGINEERING EDUCATION

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ABSTRACT

This paper highlights the dramatic improvements made in business and industry by applying TQM , Benchmarking, and Re-engineering tools and techniques. Technical Education System is yet to take full advantage of these principles and improve quality so as to respond to the aspirations of students and expectations of the employers.

Keywords- TQM, Benchmarking, Re-engineering

1.INTRODUCTION

Japanese and American companies have improved the quality of their products and services by applying Total Quality Management that had further led to many managerial innovations like supplier partnership, just-in-time manufacture, zero defects, six-sigma and re-engineering. Benchmarking tool is being used by many companies for gaining competitive advantages. General Agreement on Trade in Services (GATS) is creating steep competition in the service sector particularly in Technical Education and Training. Institutions are now in search of management tools to achieve quality so as to continue to serve with pride and respect. The concept of TQM, Re- engineering and Benchmarking when applied to engineering and management education, may lead to dramatic results.

2. TOTAL QUALITY MANAGEMENT

The concept of quality originated from the skilled craftsmen producing high quality products who had pride in their work. The responsibility of quality became the role of quality control division in the standardized mass production system. The role of the shop floor people was to ensure that products were made to the set specifications. The quality control divisions were involved in detecting low quality parts arriving on the assembly lines, inspection of final products against standards, online inspection, statistical quality control, statistical process control, end - of - line inspection etc. The next quality era of quality assurance included concepts of cost of quality, total quality control, reliable engineering and zero defects. However, it was later argued that quality could not be achieved merely through inspection and policing. Quality control must start with the design of the product and end only when the product has been placed in the hands of a customer who remains satisfied. Juran (1989) while in consulting job in Japan introduced 'quality spiral' concept and suggested that quality was the concern of every department and could not be left to quality control department alone and Kaizen or continuous improvement was held to be the ultimate goal. Strategic Human Resource Management (HRM) and TQM have much in common. TQM implies the adoption of flexible organization structure, an open management style, emphasis on two way communication, devolution of responsibility and identifying problem solving team. HRM cycle suggests for quality culture, right selection of employees, their induction into quality idea, their performance, appraisal, reward and development.

3.RE- ENGINEERING

Re-Engineering, as applied to business requires that we question the entire existing operation and re- design to achieve dramatic improvement in performance in terms of quality, cost, service, speed etc. The difference between improvement and re-engineering is that level of change in the former is incremental while in the later the participation is Top-down, risk is high, expected gain is high, and the starting point is clean slate.

4.SIX-SIGMA AND RE-ENGINEERING

Six-si g ma is the most powerful management tool ever devised, promising increased market share, cost reduction, dramatic improvement in 'productivity and profitability, and moreover customer satisfaction. Six-sigma work culture has become the proven methodology and strategy initiative by world-class organizations like Motorola, GE, Honeywell, Polaroid, WIPRO, Dabbawala of Mumbai and many more to realize breakthrough benefits. Among the elements of

Six-sigma are Focus on Quality, Co-operation with suppliers and customers, continuous improvement and elimination of wasteful steps , empower employees and create conducive climate, use problem solving/problem prevention cycle, and use measurements to support decisions.

5. BENCH MARKING

In benchmarking, one analyses and exchanges knowledge with the best of other businesses, with an objective of validating the present processes and products and surpass those of the competitors. Benchmarking is a process of determining who is the Very Best, who sets the standards and what those standards are. For the purpose of benchmarking, one has to examine companies or organizations that do outstanding job of what they do and (earn from them). We have to focus our attention to companies and organizations within our own field or other fields that use similar processes. For many companies benchmarking has become a key component of their TQM programme. The benefits are change in the organizational culture, performance improvement, and human resource development. Table 1 provides an incomplete list of Bench marked companies known worldwide.

Table 1 : List of some companies noted for Best Practices

Company	Function
American Airlines	Information System (long line)
Benetton	Advertising
Domino's Pizza	Cycle time (order & delivery)
General Electric	Management Process
Honda	New Product Development
Motorola	Flexible manufacturing
Wall - Mart	Information System

Benchmarking is not an instant pudding, performance will improve only if the Organizational Culture for Quality and basic components of TQM such as Information Systems, Process Control, Resources Development and Product Marketing are taken care of.

6. RE-ENGINEERING AND BENCHMARKING FOR TECHNICAL EDUCATION

Application of TOM, Re-engineering and Benchmarking strategies has shown remarkable improvement in business and industry. Technical education system must employ some of the principles involved so as to get similar advantages in this sector also. The quality issues of technical education system are required to be identified and strategies for application of principles of TQM , Re-engineering and Benchmarking be considered

6.1 Quality issues of Technical Education

The important quality issues in the present context are listed below :

- i) The existing student evaluation and certification system do not reflect employability criteria.
- ii) The curriculum does not reflect the needs of industry.
- iii) Competent faculty is either not available or too expensive.
- iv) Inferior quality of student input.
- v) R & D culture in the institute missing.
- vi) University question papers mostly lay emphasis on memory learning and reproducing.
- vii) Teaching is mostly chalk and talk type.
- viii) Inferior quality of practical work done in the colleges,
- ix) One semester industrial training of students is poorly organized, monitored and evaluated.
- x) Project work of students is often done by others.
- xi) Industry-Institute linkage weak.
- xii) Curriculum does not provide for self-paced learning.
- xiii) Management has lukewarm attitude towards quality improvement; Quantity prevails over Quality.
- xiv) Faculty development programs are on adhoc basis.
- xv) Faculty retention is a problem,
- xvi) Inadequate infrastructure,
- xvii) Non-availability of young dynamic leadership.
- xviii) Inadequate opportunity for improvement of qualifications by faculty.
- xix) Inadequate Training, Placement, Guidance and Counseling Services.
- xx) Insufficient Academic Autonomy for innovation, experimentation and development.
- xxi) Temporary effect of External Regulating Agency on quality issues; Internal motivation is poor.
- xxii) No data-based educational management system in use.

- xxiii) Networking between similar institutions and with institutions of higher learning weak.
- xxiv) Hardly any bench markable institution in the vicinity; All are of the same type with cosmetic effect here and there
- xxv) No differential fee structure for quality institutions.
- xxvi) No minimum requirement of experience to become a faculty. .
- xxvii) No national - level eligibility test for faculty recruitment in engineering colleges; No criteria for initial training.

The above mentioned list of issues is not exhaustive as one can add a few more by analyzing their own experiences. However, all these issues can be grouped into eight major areas.

6.2 Major Areas of Concern

1. Intake Quality
2. Curriculum
3. Student Evaluation
4. Infrastructure
5. Faculty
6. Management
7. Employment
8. Information System

Issues related to serial number 1 and 2 can be addressed only if full Academic Autonomy is achieved by an institution. This is possible once one acquires Deemed to be University status. However, being under the technical Universities, institutes can still apply the benchmarking, re - engineering and TOM principles to have dramatic achievements. The issues that will be discussed now are Student Admission, Faculty Performance, Infrastructure, Employability and Employment, and Information Systems. These are represented in block diagram form in Figure 1. The ultimate purpose of Technical Education and Training is to produce technical manpower and place them in the hands of employers who should remain satisfied. The starting should therefore be to strengthen students employment activities. However, employment related efforts will be successful only when the students trained are employable i.e. they fulfill the employment criteria set by the employer in terms of knowledge, skill and attitude. Preparing employable students will require implementing curriculum such that the students not only prepare themselves for University examination but also develop their hard and soft skills which the employers look forward to in the students to be recruited. An integrated approach is required and the faculty requires to be trained to carry out this task of Total Personality Development of Students .To get desirable results, the control of input quality is required. The continuous Feedback Information and correction is required to make the system dynamic.

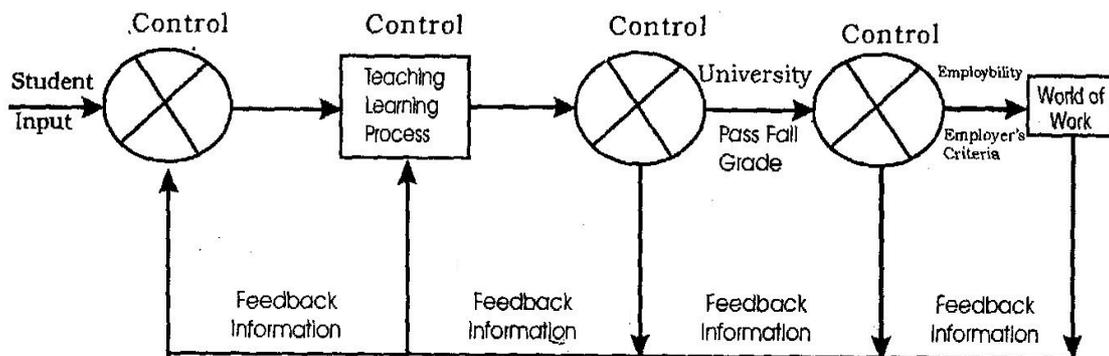


Fig. 1 : Block diagram of a Technical Education as a Dynamic System

6.3 Six Sigma For Technical Education

Similar to business and industry six sigma for Technical Education is related below. This has been arrived at purely on the basis of experience in the field of Technical Education.

1. Create Excellent Infrastructure Conducive Environment.
2. Recruit, Develop and Deploy best of Faculty.
3. Empower all participants of the System in terms of Autonomy & Accountability.
4. Focus on Quality Teaching and Student Learning.
5. Counsel students and Integrate Development of Soft & Hard skills.
6. Market Educational Products and Services and work on Feedback Information System.

7. STRATEGIC BENCH MARKING

Intrinsic motivation and commitment is necessary for achieving excellence. Pressure from Regulating Agencies will have only temporal effect .Bench marking has to be done not only by studying the sister institutes but also looking beyond the

system and take strategic decisions. Only total quality management approach will give the desired and dramatic results. For example, if we focus only on marketing of our products by interacting with potential employers and the quality of our trained students remains poor, the employers will back out sooner or later and the bad name will be spread. Employability and employment are directly related and hence is the need for taking a holistic view. If an existing institute wants to develop a strategic plan, it should work on "employability and employment" and the other factors will get corrected automatically.

8. CONCLUSION

Applications of principles of TQM, Bench marking, and Re-engineering has shown significant improvement in business and industry. Technical Education System, after becoming quite large, must improve its quality at the earliest. There is competition from within and outside. Only the fittest will survive with pride and respect in the years to come. The signal is getting clearer year after year, unless the quality of Technical Education and Training is improved, the market force will decide who should stay and who should close down.

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