

# Quality Measurement of various departments in Educational institute using DBA Method: A Literature Review

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## ABSTRACT

This paper is to focus on the effective implementation of the Quality Circle (QC) in educational institutes. In this case, study a group of seven students framed a quality circle in an educational institute and identified 52 problems related to teaching and learning process and their college premises. From those the “Improper laboratory conditions” is selected with the help of brainstorming, survey, feedbacks, categorization, stratification and Multi-voting. The problem analysis is done in multi dimensional aspects by flow-diagram, Benchmarking, 4W1H, Affinity diagram, Fishbone diagram and Pareto analysis. The solutions were found out by brainstorming and SMART Technique and implemented according to the planned Milestone chart. The implementation was supported with the tools such as PDCA cycle, 5W1H, FMEA analysis. The paper also highlights the results obtained. The case study witnessed the effective implementation of Quality Circle in an educational institute with positive results. This case study contributes to the mutual growth of institute and students.

**Keywords:** Quality Circle, Educational Institute.

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## INTRODUCTION

Today, industries have to face many challenges due to increase in product complexity and number of operations, stiff competition at national and international level, customer awareness etc. The progress of industrialization and consequently development of new techniques has led to the development of large industrial originality with multilevel operation. Today, industry has to face many challenges due to increasing product complexity and number of operations, stiff competition at national and international, levels, customer awareness etc.

To face these challenges, to strive for excellence, and grow in business, the responsibility for product quality has gradually shifted from operator to foreman to inspector to quality control department of quality control measures though sound quality management alone can help the company to withstand the increased competition in the global market.

Similarly while deciding about educational institute, a student have to face many challenges regarding teaching faculty, results, institute position, laboratories etc. Here in our thesis work we are applying total quality management in an educational institute. Based upon that quality we can compare different colleges. We are applying TQM by using DBA approach. By this approach we can give rank to different institute. Dba approach can also be applied in a single institute to compare educational aspects of different departments.

Based upon those aspects we can give rank to every department and many problems like standard of education, college faculty, system of education, results can be examined. In our thesis firstly we prepared a question are for students. It was distributed among students and they give rank to every question depend upon their choice. But firstly we check quality of that question and it is checked by using Minitab software. It is commonly used as an estimate of the reliability of a psychometric test for a sample of examinees. So we check reliability of question are by using this software. Firstly we will read about total quality management as TQM is mainly applied in industry. So here is a brief introduction about TQM.

## Total Quality Management

Total Quality Management (TQM) basically advocates the introduction and practice of a new culture. This is to be based on waste removal, maximizing organizational effectiveness and encouraging process of innovativeness and adding value by problem solving activity. This process encouraged by people interactions at different levels and continuous and effective communication process, which try to relay continually the need to focus organizational objectives.

In other words, TQM refers to the total involvement of staff in an organizational work together, which includes suppliers, distributors and even customers in bringing about quality satisfaction by promoting quality cultures through Quality Circles, job enrichment and effective purchasing. Workers and supervisors have to be trained to solve problems in product/process variations.

## INTRODUCTION ABOUT DBA

The Research method of Distance Based Approach (DBA) is applied for supporting the department selection is presented. It covers all phases in the department selection from initial problem definition, over the formulation of parameter, to the final choice among the departments. Moreover, the propose method for selection have not been suggested so far. So there is a need to develop a unified approach, which will enable department experts to consider all the attributes and their relative importance concurrently in an integrated manner for optimum selection of department. The salient features of the methodology in comparison to already available methods are discussed at the end in order to validate the methodology.

In order to evaluate the various parameter and sub-parameter of department selection, a model is developed using DBA. The selection of department can be considered as one of the most important aspects in the design process for the department. So there is a need to develop a unified approach, which will enable development team to consider all the attributes and their relative importance concurrently in an integrated manner for optimum selection of a department. The Distance Based Approach methodology that combines various attributes relevant to a department into single measures and hence the comprehensive ranking of the alternative department can be made which has been adopted for assessment, selection, evaluation, finally ranking of various departments used for particular department.

## LITERATURE REVIEW

In this chapter relevant literature has been reviewed on the basis of reviews from various articles and journals. The concepts of TQM work culture in India and other countries and various workplace problem-solving techniques using Total Quality Management concepts has been stated by survey and review of literature. A brief review of Total Quality Management techniques is also discussed from various articles in this section.

Geotsc D.L. and Davis S.B. (1995) have presented an article which deal in a model of training for TQM for Indian organizations in order to maximize the impact of TQM with predefined concentrated efforts. This paper is to explore the meaning of TQM implementation in India and its impact on the Indian organizations' overall performance. The proposed model is named TQMEF (TQM-efficiency model). Efficiency has emerged as a key issue in the Indian context. The paper identifies four pillars on which TQM implementations should yield positive results for Indian organizations, implying that these organizations can gain by concentrating efforts in these areas.

Eugene and Dror, (1998).In this paper, authors discuss how total quality management (TQM) could be applied to improve the effectiveness of a production-maintenance system. Authors suggest a general mathematical model providing a timely integration of production and maintenance. The model incorporates conflicting aspects of quality costs, reliability, and production quality. The problem is treated as a multi-criteria mixed-integer mathematical programming problem with network constraints, which is solved using a network analysis and computer-expert dialogue.

Brown M.G D.C. Hitclock and M.L Willard, (1998) have concluded that the performance of firms with TQM and ISO 9000 are significantly different over those without. It appears that firms are slow in implementing TQM after obtaining ISO 9000. Firms that have larger export markets have better quality management practices. Certainly more can be done to improve on the practices and performances of small and medium sized firms in particular indigenous firms by such things like automation, etc.

Grace and Ivan, (2002) pointed out in their article about the importance of IT in ensuring a successful Total quality management (TQM) implementation. This paper reports on the application of IT in the Total quality management (TQM) process and how it can support management decisions. For this purpose the authors have purposed TQMIS model.

Keswani and Lakhe, (2004) both have concluded that improvement in quality by reducing the number of defectives is a goal, every organization likes to pursue. However, reduction of demerits requires additional investment. But by using Taguchi techniques, it can be overcome. In this technique, main aim is to reduce defectives and to improve the quality without any additional investment. For this a case study of a small-scale industry is also presented.

Ghobadian and Gallea, (2006) stated that Total quality management (TQM) is considered by many as an important quality and business performance improvement tool. This paper reports the findings of a research project that empirically examined the process of TQM implementation in a sample of organizations widely regarded as leading exponents of TQM. The paper presents a non-prescriptive model of the TQM implementation process. A careful review of the literature suggests that most publications recount the experiences or perceptions of the authors or deal with single case organizations. Furthermore, there is a dearth of empirical research and literature dealing with TQM's implementation process.

Madhu & Shankar, (2009) stated that how the cultural aspect of TQM implementation should be handled in a high power distance country like India. This paper seeks to argue against the conventional wisdom in the current TQM literature that hierarchy is not conducive for TQM and shown how in the Indian context, hierarchy, operational through the guru-shishya relationship based on the nurturance of subordinates can aid the learning orientation of organizational members and facilitate TQM implementation.

Vinod. R Singhal and Kevin B., (2011) documented evidence on the relation between the financial performance from effective implementation of TQM to characteristics such as firm size, the degree of capital intensity, the degree of firm diversification, the maturity of the TQM implementation and the timing of the TQM implementation. It has been stated that smaller firms do better than larger firms. The results also indicate that it is never too late to invest in TQM. Finally, the results imply that the positive impact of TQM is widespread across a spectrum of firms with differing characteristics.

Debby Willar (2012) found that there is a significant correlation between a company's organisational culture and the quality performance of contractors. While research into this area has involved many researchers, there is no critical mass of information specifically related to the Indonesian situation. Studies based on contemporary perspectives of the characteristics of the Indonesian construction organisational culture using Cameron and Quinn's Organizational Culture Assessment Instrument (OCAI) and its relationship with the contractors ISO 9001 practices, have not been previously undertaken.

Suzana Vlasic et. al (2012), considered the current situation of the Croatian educational system and the quality of all its individual components, we can't help but notice that the awareness of the importance of education as a foundation for the growth and development of each country isn't strong enough. Education quality is becoming increasingly important for those who are involved in it either directly or indirectly, and for those who use its services. Access to education and quality education are to be regarded as mutually dependent and indivisible needs and rights. This is primarily achieved by developing creativity, civic and democratic values, as well as by knowledge, abilities and skills needed for everyday and professional life.

Vuyisile Mabindisa, (2013) focuses on the impact of staff turnover on organisational effectiveness and employee performance in the Department of Home Affairs in the Eastern Cape Province. High staff turnover rate may jeopardize efforts to attain organisational objectives. In addition, when an organisation loses a critical employee, there is negative impact on innovation, consistency in providing service to guests may be jeopardized and major delays in the delivery of services to customers may occur.

Pamela Kelley, (2013) found a positive relationship between teacher's educational attainment and classroom quality, but conventional reviews do not provide estimates of outcomes that are comparable across studies. This meta-analysis was conducted to provide a quantitative synthesis of research findings on the relationship of teacher educational attainment and measures of classroom quality and child development in center-based early childhood care and education (ECE) settings.

Mantz Yorke (2014) discusses a number of issues that need to be borne in mind when the desire is to embed (or embed more firmly) employability into a curriculum. It is therefore of particular relevance to colleagues who are designing new curricula or are considering how existing curricula might be 'tuned' in order to accentuate the potential of their programmes to develop students' employability. Further, it should be helpful to those whose curricula are coming up for review under an institution's (or some external body's) quality assurance processes.

Gupta Amit (2014) focuses on selection and ranking of alternative inventory policies. A deterministic quantitative model based on Distance Based Approach (DBA) method has been developed for evaluation and ranking of inventory policies.

We have employed this concept first time for this type of the selection problem. Four inventory policies economic order quantity (EOQ), just in time (JIT), vendor managed inventory (VMI) and monthly policy are considered. Improper selection could affect a company's competitiveness in terms of the productivity of its facilities and quality of its products. The ranking of inventory policies is a multicriteria problem.

Rishi Kumar et. al (2014) developed a deterministic quantitative model based on Distance Based Approach (DBA) method for evaluation, selection and ranking of robots, which is a concept hitherto not employed in selection problem of this kind. As a significant development over and above past approaches to robot selection, it recognizes the need for, and processes the information about, relative importance of attributes for a given application, without which inter-se-attribute comparison could not be accomplished. It successfully presents the results of this information processing in terms of a merit value which is used to rank the robots. In order to demonstrate the aptness of using DBA method as a decision aid, the results so obtained have been compared with other techniques and methods available in the open literature

Leonida D. Javillo et. al (2015) studied to assess the Leadership Commitment of Higher Education Institutions in Pangasinan with Accredited Programs: Basis for a Quality Assurance Model. This determined all the components needed for a quality program measures by the administrators, dean and programs heads. Thus, it sought to analyze the leadership commitment in higher education institution with accredited programs in the province of Pangasinan during the Academic Year 2009-2010 as basis for a proposed quality assurance model specifically the professional profile of the school administrators, deans and program heads of the Higher Education Institutions in terms of their Demographic Characteristics such as their age and civil status, as well as their Professional Qualifications which includes their highest educational attainment, number of years in the institution, rank and position, relevant-in-service trainings attended and their membership in professional organization. Also include are the problems met by the school administrators, deans and program heads that are adversely affecting their leadership commitment.

Marina Dobrota (2015) evaluated that there are many ways to measure educational performance and competitiveness and to evaluate countries accordingly. In this paper, countries educational performance is based on the PISA indicators, because it is the most exhaustive and rigorous international program to assess and explain differences in students' performance. The assessments scope, nature and collective background information are decided by leading experts in participating countries and are steered jointly by governments on the basis of shared and policy-driven interests. PISA focuses on young people's ability to use their knowledge and skills to meet real-life challenges.

### QUALITY TEACHING AND TQM

The TQM gurus are charismatic individuals whose concepts and approaches to quality within business, and life in general, have made a major and lasting impact.

- W. Edwards Deming (management philosophy) produces his 14 points for Management in order to help people understand and implement the necessary transformation. Furthermore, the Deming cycle and the System of Profound Knowledge are important considerations in quality improvement.
- Kaoru Ishikawa (1986) (simple tools, QCC, Company-wide quality) — Sees that quality does not only mean the quality of product, but also of after sales service, quality of management, the company itself and the human being.
- Joseph M. Juran (1988) (quality trilogy) — Develops quality trilogy of quality planning, quality control and quality improvement
- Yoshio Kondo (1989) (four step 3 for making creative and quality work)- Sees that there is no basic contradiction between CWQC activities and humanity).
- Philip Crosby (1992) (zero defects and cost of quality) — His goal is to give all staff training and the tools of quality improvement, to apply the basic precept of Prevention Management in every area.

### THE CASE INSTITUTE ANALYSIS

The case Institute is one of the repudiated institutes in **Haryana**. The institution has been always committed and responsive towards the needs of modern technical education. It has grown into a symbol of comprehensive education. It is like Bodhi tree—a source of knowledge and education. The group institutions offers school education from pre nursery to 12th, diploma courses, under graduate courses in engineering, Graduation and post Graduation courses in Professional and management studies through its team of experienced and competent professionals in their respective fields. This group endeavors to merge as a role model in the field of quality education. The future plans include providing quality education avenues by establishing institutions in various fields.



Fig.1

### **Mechanical Engineering Department**

Mechanical Engineering Department offers undergraduate program of Bachelor of Technology in Mechanical Engineering. The department is equipped with all latest Software's, Technology and Tools to impart high level of Education to the students. Under the guidance of highly qualified faculty members, who have worked with various highly prestigious corporate houses and research institutions in India as well as abroad, the department is dedicated to prepare each student for the tomorrow's difficulties and challenges. Well equipped classrooms, multimedia methods of teaching so that students understand all aspects of the subject in deep. Latest mechanical designing software's, fully equipped laboratories to give the students hand on experience of equipments and passion of faculty together provides an atmosphere to kindle the hidden potential and creativity of the students Innovation and creativeness comes through the novel minds of ambitious and enthusiastic students.

### **Electronic & Communication Engineering Department:-**

Electronic devices and communication systems are vital to modern society. They are central to almost all the new and fast-moving technological changes of the 21st Century.  
Department of Electronics & Communication

**Project and Laboratory Work:** A key characteristic of all our programmers is laboratory and project work supported by dedicated electronics, robotics, computing and Satellite Communication and Digital Signal Processing Lab laboratories. Advance Electronic Laboratories with ultra modern equipments of latest developments help our students to engage themselves in development of new projects & technologies. Because of this, Our students often win national Prizes for their projects.

**Research and Teaching:** We have an international reputation for our research in areas including advanced electronics, LEDs, Robotics and Satellite Communication and navigation systems, space weather and imaging. This research feeds into teaching through our group and individual projects in which you can join a research group, and in specialist modules that introduce students to cutting-edge engineering.



Fig. 2

## Computer Science Department

If we want to be in the middle of the intellectual excitement that is changing every other discipline and industry, then computer science is the place to be. Department of Computer science has a young and dynamic team with scientific approach to computing. The experienced faculty exposes the computer engineers to a rigorous and exhaustive curriculum designed to bring out the best in them, and to keep them in touch with the latest technologies. The CSE Department covers many areas of research/teaching: AI, algorithms, databases, software engineering, systems and networks, data visualization/imaging, security/privacy, embedded systems, and natural language processing etc. Excellent fully supported placement and study abroad provision for students in their third year. Through studying Computer Science, students will gain a theoretical knowledge and a practical experience of a wide range of emerging technical methods, theories and techniques. Themes contained within the Computer Science programmers include: Multimedia and Graphics Human Computer Interaction Software and Systems Engineering Foundations of Computation.



Fig. 3

## CONCLUSION

The literature study reveals that Computer science Department has the greatest level of gap and Electronics Department is with the least one. Also, the results of Total Quality Management in Educational organization by using DBA method reveal that respectively, Standard of Education, Teaching Staff, Laboratories / Library, System of Examination and Results & Reports parameter have the highest priority in the student's views. In the present study, it has been tested and confirmed that questionnaire is appropriate for TQM in Education organization and confirmed the validity and reliability of all five parameters in education system setting.

## SCOPE FOR FUTURE WORK

In following, some suggestions are proposed for the future studies.

- As this institute has eight departments and due to time limitations, it was impossible to measure Educational aspects among all departments, therefore, it is suggested to measure educational aspects in all the departments to determine total educational aspects of institute.
- As the results of this study are based on the sampling style in a given time, Educational Aspects can be measured in different time domains and then compare results with together.
- Since student's perceptions of educational aspects are generally expressed subjectively in linguistic terms, Fuzzy TOPSIS technique, SPSS software can be used for Total Quality Management in Educational Aspects and the results derived of this method can be compared to TOPSIS ones.
- In this we can take more aspects like **Administrative Facilities**. In this we study class rooms, residential facilities, transport facilities, sports facility, industries etc.

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