A Study on TQM and Statistical Tools are Very Essential to Improve the Quality in an Educational Institution

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Abstract: *The implementation of Total Quality Management (TQM) in education organizations enables market competitiveness, innovation, flexibility and financial potential. TQM consolidates the motivation and creativity of its employees through its organization and thus generates great potential for improvement. TQM enables better control of processes in planning, design, distribution and contributes to greater flexibility. This paper gives an overview of the research in the area of TQM implementation in education. The overall objective of this paper attempts to theoretically conceptualize and principles of TQM involved and how it can be used to improve the quality of an academic institution. Most of the principles of TQM can be implemented in the area of education and training. This paper highlights the essence of TQM and explains how higher education institutions can improve the quality by implementing TQM principles. This may result in a process of teaching and learning, which particularly emphasizes gaining good results in examinations. TQM is a vision, which the educational institution can only achieve through long-term planning, by drawing up and implementation annual quality plans, which gradually lead the firm towards the fulfilment of the vision.*

Keywords: Total Quality Management, Higher Educational Institutions, Technical Institutions, Schools, Knowledge management, Strategic Management, Quality, Statistical Tools, Continuous Improvement and Principle of TQM

1. Introduction

The quality of higher education is everybody's concern today. Various studies and commission reports at official level has recognized the same and given recommendations for its improvement.

Total Quality Management (TQM) aims at exchanging knowledge instead of one-way transmission and seeking sources of knowledge in the outside not in the classroom. It also promotes the constant tracking of the latest achievements in science and technology and encourages students to explore and failure not to condemn but to encourage re-attempt. Practical application of TQM in education is primarily to establish free dialogue with students instead of the formal relationship between teachers and students. A greater focus is placed on the students by directing and encouraging them to further improve during which they are not criticized but are led.

Academic institutions offering higher education in general and those offering professional education in particular are undergoing a process of change similar to what business organizations have undergone a few decades ago when they were confronted by competition. The speed of change is driven by multiple factors. Demands from industry, information-age mind set of the students, increased competition and the renewed quest among academic community are some of the factors driving this change. To ensure that higher education, particularly professional education, is able to deal with market and technological changes coupled with global requirements, it is important for institutions offering higher education to use appropriate curricula, course materials and teaching methodologies that are not only up-to-date, but also effective from learner's point of view.

The introduction of Total Quality Management (TQM) in classrooms will lead to certain changes in terms of improving the efficiency of knowledge transfer and quality of education. By applying total quality management, radical changes in the top management of higher education institutions will inevitably affect its students.

Students who compel a higher education in institutions which apply the TQM concept will develop kills in the field of communication, teamwork, problem solving and learning. Students will not be bored during the lectures; they will easier formulate and represent their thoughts and will strive for searching and testing. They will develop critical and analytical thinking which plays a major role in any sphere of future work and development.

Total Quality Management (TQM) represents a systematic approach to management with a view to continually improving quality that will exceed client expectations. This approach is based on the participation of all employees in order to meet the needs of the clients and thereby achieve the long-term success of the organization.

The main principle of TQM is: focus on customers and all interested parties, teamwork of all employees in the organization and focus on processes supported by continuous improvement and learning.

It is necessary to establish a quality management system to successfully integrate these institutions into the European educational space.

The application of TQM to educational institutions through measurement, analysis, achieving student satisfaction, continuous improvement and upgrading of the system leads to the excellence of such organizations. Compared to conventional concepts of education, TQM has great advantages in developing the education system and in creating qualified individuals that can respond to the demands of society.

Lack of experts in the business world can be solved by the constant improvement of the education system and this improvement seems to be impossible with a conventional education system that is very closed to the environment. The implementation of the TQM concept and its integration into the education system can be realized through different models and systems.

J.-K. Chen, I.-S. Chen provide a network hierarchical feedback system (NHFS) based on TQM and innovations in order to increase the operational performance of the university by introducing TQM and the university is thus competing for competitiveness and survival in the market. M. Militaru, G. Ungureanu, A. Ş. C .Creţu argue that when TQM is applied to education, it is necessary to consider not only the content but also the system, environment, style and processes that are necessary to emphasize. There is a wide variability of content and it differs from institution to institution, from country to country and therefore it is important that education management theory aligns with current system and social trends. Using TQM opens up new horizons in higher education in order to make transfer and dissemination to the industrial context.

TQM can be defined as a management system that consists of three units, which means a network of dependent units with a joint goal. The three units are the core values, technique and tools (Hellsten, H., Klefsjo, B., 2000), like in follow figure:
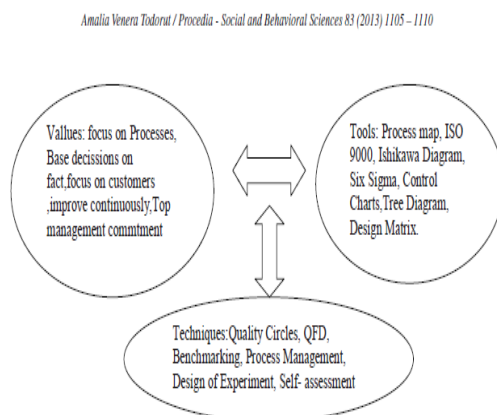

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Figure 1– TQM seen as a continuously evolving management system consisting of value, techiques, and tools.(After Hellsten,H., Klefsjo,B., 2000)

2. Total Quality Management in Education

The globalization of education, student's migration from one country to another are causes for concerns to educationists. The use of new teaching and learning methodologies, changing patterns of education delivery, course content, the concept of quality has become an essential component of the educational process for its success. Continuous improvement and self evaluation among stake holders such as top management, students, faculty etc is required and development and encouragement of leadership among the stake holders in the organization should be made as an ongoing process as well as a system. Synergistic relationship among faculty: students, Industry: Faculty and students: Industries to ensure the strategic quality among various combinations are required.

The main goal of TQM is to create within the organization a climate in which all the resources are used creatively and efficiently and which gives the staff confidence in management.

Some features of total quality management are considered to be essential (Vinni, R., 2011): change, customer orientation, communication, continuous improvement, corrective measures, cost of poor quality, the organizational structure of network type in the process or case management, imagination, creativity, IT, organizational culture, team, orientation towards the future.

Introducing base principles of TQM in a university depends on the existence of an adequate quality culture of the entire staff. The institutional culture from the universities affects the application procedures in the context of quality strategies, although it does not appear directly but through its consequences. The culture integrates values, beliefs and behaviour norms that have proved to be benefit for the university in its past and confer personality, fame and at the same time shape to the student life. That shape is the pleasure to learn. For example the well-known Oxford, Cambridge and Harvard universities have become famous not only through its academic results but also through its institutional culture. This shape matters a lot when appreciating those who have studied and have graduated from those universities.

The culture from a university represents its genetic environment, its unwritten but mandatory regulation. It is conservative through its nature and will oppose any innovation or major changes of management. And still, due to the major changes of our society even Harvard University is submitted to a continuous adaptation process which is done through a managerial system and through an adequate quality policy. Here where excellence in quality has represented and still represents the essence of university life. The re-establishment of a normal balance between the management of quality and institutional culture is done through:

- The implementation of new ways of thinking ;
- The implementation of strategic management;
- The implementation of quality management.

The new thinking models must be focused on dynamics intelligence and creativity. The development of new

thinking models leads to the acceptance of changes as normal and natural phenomena of permanent adaptation to the social and economic environment. Intelligence allows obtaining some more preferment solutions and therefore the creativity leads to new things. Using such models of thinking the knowledge can be assessed more and thus the models of behaviour allow the evolution of the values into an incentive and competitive climate. By implementing the strategic management activation of the university and a protection of the developing needs on a period from 3 to 5 years are produced. The mission of the universities is obvious, the fundamental objectives over which all its energies should be concentrated. The third direction is the implementing of quality management which has the role to arrange the specific activities of the university and to concentrate on the students requests who are clients. Applying the three ways of change an institutional culture will take place, meaning the passing from a culture based on mediocrity and bureaucracy to a culture which aims the excellence and the performance.(Hanson, J., 2003)

The following Figure shows the schooling process in which the students enter school as an input and go through a teaching process performed by teachers (Stigler and Hiebert 2009). The students have to sit for an examination (QC) before they enter the next level.
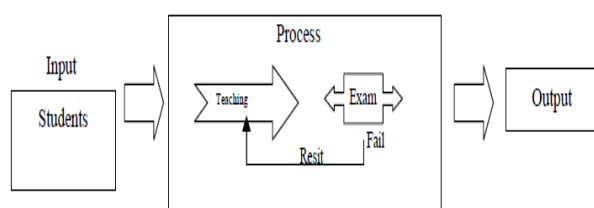
Figure 1: A simple model for schooling process
(Crawford and Shutler 1999)

However, those students who cannot pass the examination may either join the workforce as unskilled workers without any academic credentials, or re-sit the subjects they have failed (Ware and Vika 2009). This world-wide examination system is not effective because it allows the failing students to join the workforce and this is a waste of money and time already used in their education (Wolk 2011). Furthermore, it forces the students to re-sit their examinations. This also consumes even more money and time. Consequently, the overall costs of studying at an institution will go up, making it less competitive in the education market. In such a situation, the supporters of the Deming (1986) model believe that over-emphasis on final examinations bears some additional disadvantages which are as follows:

- It takes a great amount of time to examine every student on every single item they have studied and it also reduces the number of teaching periods. Moreover, since there is not sufficient time to examine each student carefully, the examination process may be unreliable.
- The time that the teachers spend on setting and marking the papers may not play any direct role in student learning.

In Deming's view, schools do not require to depend on examinations to guarantee quality. If the quality of the teaching system is sufficiently taken into consideration, it will not be necessary to examine every student on every single item they have studied. In this way, the examinations may just represent a sample of the students in depth; hence, time and effort are saved and more accurate results are obtained. Therefore, examinations will turn into a diagnostic tool to assure the quality of the system rather than the quality of every single student. Finally, the teacher can now allocate more time to teaching the students who will be able to cover more material earlier and at lower tuition fees. Schools, hereby, can make even better competition in the education market (Wolk 2011). However, the followers of the Crosby (1995) model support the TQM in education and offer the following strategies:

1. Emphasize the quality of the teaching system rather than the results of the examinations.
2. As the name "total" implies, pay attention to all the constituents of the system.
3. Look for the factors affecting the exam failures and try to eliminate them at source.

Following the above teaching strategies can produce students who can pass their examinations. Hence, the number of failures will be down which means that less time and money will be wasted. Instead, the saved money can make the schools better compete in the education market.

Deming also pointed out in educational standard there is nothing absolute. So, it is not enough for schools only to reach "zero defects", i.e. no examination failures, just by competing successfully in the education market. Without regular progress in the curriculum itself, students' educational needs cannot be fulfilled. The modifications to the curriculum should not be restricted to boosting the technical content, but there should be a dramatic move towards creative thinking and skills as well as independent learning.

Organization of remaining papers is as below: section 2 details significant implications for the application of TQM in education. As study is based on literature review so it contains detailed review. Section 3 concludes review.

3. Need for Quality Management in Higher / Technical Education

Higher education cannot function properly unless there is high quality in the standard of teaching, materials available, teaching methods and proper evaluation of students in the program. The assessment of quality teaching is an ongoing, multi-dimensional process which should be based on process and product.

Successful implementation of any education program and the effectiveness in achievement of set goals depend very much on adequate materials and resources available. Input on individuals and institutions of learning can determine to

a large extent the realization of the philosophy of higher education.

Quality can be described as standards of something as compared to other things that is the degree of excellence. High quality teaching/instruction can be regarded as the goodness or effectiveness in teaching/instruction which can result in student learning and satisfaction. Quality teaching and learning in higher education, therefore, ensures that students acquire the knowledge, skills and competencies that are appropriate for their area of responsibility.

There is the need to have teaching standards and develop challenging examinations to document and recognize accomplished teaching. Quality assurance is an essential tool required to ensure efficient higher educational programs in our institutions for the achievement of manpower development and skill acquisition in our societies.

TQM implementation in education has been useful both on administrative as well as academic side. Wild, (1995) has reported that the implementation of TQM at the institution has resulted in debugged administration, motivated staff to take responsibility for innovation, sharing of ideas regarding teaching, mutual problem solving approach, customer focused course contents, increased student's enrolment and marked overall performance improvement.

TQM is a statistical process control (Mahesh and Prabhuswamy 2010). It was originally developed by Edwards Deming after World War II to improve the quality of products and it was first introduced to the Japanese industrial leaders (Svensson and Klefsjo 2006). Americans did not use TQM seriously until 1950 when the Japanese renewed their business activities and industry after the war.

Although TQM was first designed for the industry and was not appropriate for education, many educators maintained that the TQM could also be applied to education especially for bringing educational reforms (Dheeraj 2004) and reducing waste school resources and increasing productivity (Cunningham 2007). There are some TQM theorists such as Deming, Crosby, Juran, Oakland and Ishikawa that developed TQM and set up the principles of TQM (Liang 2010).

4. Significant Implications for the Application of TQM in Education

The teachers who attempt to apply the Deming model believe that examinations are not an end, but a means to an end. They mostly pay attention to constantly promoting the methods of instruction; they maintain that in this way more efficient curriculum results can be obtained. In fact, the supporters of the Crosby model concentrate on getting better grades, whereas the supporters of the Deming model emphasize the improvement of the curriculum (Crawford and Shutler 1999).

On the contrary, the teachers who like to apply the Crosby model modify the process of teaching and learning in order to stop examination failures. To do so, they strongly emphasize getting better results in the examination. When all the students passes the examination at their first attempt, the teacher achieves "zero defects" However, there is a problem which lies in the fact that the entire content of the syllabus and its presentation become subordinate to the purpose of achieving the desired results in examinations.

According to Ronald Barnett (1992) there are four predominant concepts of higher education.

1) Higher education as the production of qualified human resources
2) Higher education as training for a research career
3) Higher education as the efficient management of teaching profession
4) Higher education as a matter of extending life chances

5. Higher education in the Society

Higher education is generally understood to cover teaching, research and extension. Scientific and technological advancement and economic growth of a country are as dependent on higher education as they are on the working class. Higher education also provides opportunities for lifelong learning, allowing people to upgrade their knowledge and skills from time to time based on societal needs. The Kothari Commission (1966) listed the following roles of the universities (Higher education institutions in the modern society)

1. To seek and cultivate new knowledge, to engage vigorously and fearlessly in the pursuit of truth, and to interpret old knowledge and beliefs in the light of new deeds and discoveries;
2. To provide the right kind of leadership in all walks of life, to identify gifted youth and help them develop their potential full by cultivating physical fitness, developing the powers of the mind and cultivating right interests, attitudes and moral and intellectual values;
3. To provide the society with competent men and women trained in agriculture, arts, medicine, science and technology and various other professions, who will also be cultivated individuals, imbibed with a sense of social purpose;
4. To strive to promote quality and social justice, and to reduce social cultural differences through diffusion of education; and
5. To foster in the teachers and students and through them in the society generally, the attitudes and values needed for developing the "good life" in individuals and society (GOI, 1966, p. 497-8)

## 6. Why Higher Education Institutions should worry about Quality?

As teachers, principals, heads of the department and policy makers in education we should worry about quality of

teaching, programmes, and institution because of the reasons;

1) **Competition:** We are entering a new regime, where competition among educational institutions for students and funds will be highly significant. With globalization and GATS (Global Agreement on Trade in Services), the educational environment will be seized by increased competition. In order to survive in such situation, educational institutions need to worry about their quality

2) **Customer satisfaction**: Students, parents or sponsoring agencies as customers of the educational institutions are now highly conscious of their rights or getting value for their money and time spent. They are now demanding good quality teaching and receiving employable skill set and thus we should constantly worry about the relevance of our courses and programmes to the needs of the market.

3) **Maintaining standards**: As educational institutions, we should always concern about setting our own standard and maintaining it continuously year after year. In order to maintain the standard, we should continuously make efforts to improve quality of educational facilities

4) **Accountability**: Every institution is accountable to its own stake holder in terms of the funds (public or private) used on it. Concern for quality will ensure accountability of funds utilized and inform the stake holders about taking appropriate decisions. Thus quality can be considered as a monitoring mechanism.

5) **Improve employee morale and motivation**: Concern for quality as an institution will improve the morale and motivation of the staff in performing their duties and responsibilities. If quality system is in place, the internal process would be systematic making every department complementing each other's service domain and helping in developing internal customer satisfaction leading to high morale and motivation.

6) **Credibility, prestige and status**: If institutions are concerned about quality, continuously and not once in a while. It will bring credibility to institutions and individuals because of consistency leading to practice, status and brand value.

7) **Image and visibility**: Quality institutions have the capacity to attract better stake holder support, like getting merit students from far and near, increased donation / grants from funding agencies and higher employer interest for easy placement of graduates.

TQM begins with the knowledge provided by gurus of quality: Shewhart, Deming, Juran, Feigenbaum, Ishikawa, Crosby and Taguchi. The following figure shows the framework for the **TQM** systems.
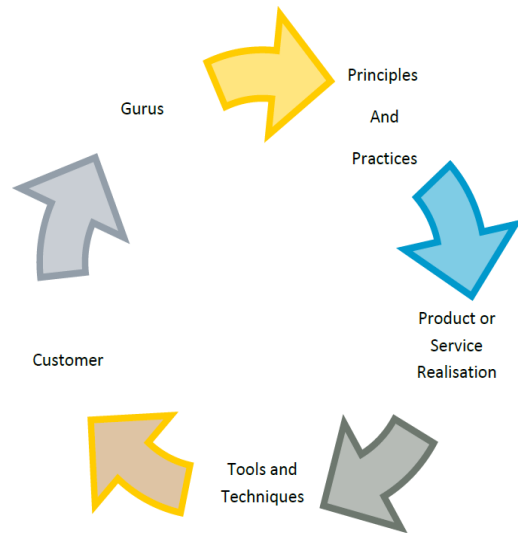
Source: Besterfield, D., C. Besterfield-Michna, G.H. Besterfield., and

Besterfield-Sacre, M.. 1999. Total Quality Management. New Jersey:

Prentice Hall.

TQM has been adopted as a management paradigm by many organizations worldwide. Quality movement in across the word start with quality improvement project at manufacturing companies. But later it spread to other service institution including banking, insurance, non profit organizations, healthcare, government and educational institutions.TQM models based on teaching of quality gurus, generally involve a number of principles such as teamwork, top management leadership, customer focus, employee involvement, continuous improvement tool, training, etc, (Murad, A., Rajesh, K, 2010) Total quality management means the management of all the elements of an organization processes, practices, systems, methodologies and of all those who are involved or damage in any way the quality of product or service. (Stanciu, I, 2003)

Total quality management is a philosophy that was started in 1951 and was designated after W. Edwards Deming; the Deming Prize has long been known as an indicator of excellence in business (Walton, 1986). Depending on Sagar, (2007) the essential objective of total quality management is to culminate (if not advancement) customer satisfaction by continuous amelioration, which is achieved by systematic process for problem solving, breakthrough realization and livelihood of good results (standardization). Izadi et al., (1996) showed that increased price to producers, customers, and countries due to poor quality have promoted renewed estimate of the quality confirmation function. They further stated that educational program such as vocational and technical education can be improved by implementing the quality criteria. In corroboration to this position, Sagar added that with little modifications, the total quality management principles which can be applied to education.

The present growth of economic growth can be substantially increased if India becomes super power in knowledge sector. A conceptual TQM model for

excellence is Higher Education Institutes is based on the following five variables which lead to student satisfaction is proposed.

1. Commitment of top management: Top management, through their supervision of all processes, should ensure that everybody is committed to achieving quality
2. Course delivery: Expert knowledge must be matched with expert skill to transmit that knowledge – the fervor to acquire knowledge must be matched with fervor to transmit it.
3. Campus facilities: Utmost attention is to be shown in providing excellent infrastructure and physical facilities in the campus for student learning, co-curricular and extracurricular activities.
4. Courtesy: An emotive and positive attitude towards students will lead to congenial learning environment.
5. Customer feedback and improvement: Constant feedback from the students leading to continuous improvement in the process is the key to achieving excellence.

The technical education and vocational training sector in the developing countries, especially the modern developing countries, faces many challenges. The most notable challenge is the acute shortage of well qualified human resources to lead and manage this vital sector, which forms the cornerstone of the foundation of the development process. Such shortage leads to the inability of the sector to help in graduating technical and professional cadres with the specifications and quality required by the development plans of many of these countries or to perform various professions needed by the labour market and the various institutions of society. Despite the significant fiscal spending allocated by the governments and unlike what has been achieved by other educational institutions of the relative success in regard to securing the needs of their countries of functional cadres, the technical education and vocational training sector in developing countries are still unable to meet the desired requirement (Bartel and Lichtenberg, 1987).

In the past, little try were made to improve the quality of management in higher education, and aims were scarcely identified (Kerr, 1991). Recently, there is so much concern among managers of vocational and technical education over the need for accountability, high cost of running the program in the face of dwindling economy, shortage of qualified personnel, decreased revenue allocation to education, high rate of unemployment amongst graduates, and the need to embankment the blank between aims and employment necessarily in the country. Similarly, Ojo, (2008) supported that it has become highly needful that vocational and technical education administrators heading themselves to those management performance that would lead to improvement of activities, thereby leading to academic excellence in the program. Okunamiri, (2002) had the view that the situation tends to explain the current trend of using various management techniques and the adoption of various planning design and models such as total quality management which before were the monopoly of the business industries in vocational and technical education planning and administration.

7. Conclusion

The implementation of TQM in student education results in optimization of all processes, both in the teaching and in the management and support processes. The application of effective management for work procedures allows for solving a number of problems: developing academic programs for reasonable and competitive compensation in the education market; the ability to meet student needs, the ability to attract more applicants, the development and implementation of innovative information technology for education and document management optimization for planning and lecturing. Continuous improvement of the process based on student needs leads to improvement of the educational system as a whole. TQM tools allow predicting opportunities in the future and finding adequate solutions to overcome the current problems.

The strategic outcomes of the TQM concept also include supporting academic programs with all types of resources, increasing student academic performance, and quality of education as a whole. In this way, TQM principles implemented in education are effective instruments of long-term strategic management and should be applied in order to obtain the appropriate competitive outcomes. Based on the analytical literature review of the implementation of the overall quality management (TQM) in educational institutions, we can confirm the existence of a positive link between the application of the principles of overall quality management (TQM) to the promotion of the higher education system at national level as well as the improvement of the quality of overall education, thereby confirming the research hypothesis as well work. Institutional activities based on the TQM system provide all the necessary conditions to meet the needs of students in education and other closely related activities. If the educational system experiences failure and produces a cadre of unsatisfactory quality, it would mean tracing all the resources of a society.

Total Quality Management has qualifications that will significantly contribute to global competitiveness. In order for TQM to be successfully implemented in educational institutions, all knowledge carriers and management members are the first to be educated in this area and most importantly, they must have a strong motivation to apply that knowledge.

The notion of Total Quality Management (TQM) developed by Deming is a management philosophy that is now attracting growing attention among educational practitioners and theorists. However, various interpretations of TQM may result in extremely different educational outcomes and processes. The successful application of either by adapting to the Deming model of TQM or Crosby model of TQM in schools probably rests upon certain criteria relevant to the intention or the learning outcomes of the curriculum, regardless of the chosen model, TQM in the education sector should first and foremost fulfil the principles of TQM. It most also relates to the teacher's training programs.

Taking it for granted, achieving the principles of total quality management does not come suddenly, but takes time and more effort. It also requires the full commitment of all members of the institution. The total quality management does not mean quick remedies and changes that can be easily done in the organization on a day, but the process takes a long time. The higher Education system needs to be strengthened which will be capable of honing the system to attain all-round, multifaceted personality; to acquire leadership qualities, to sharpen communication and interpersonal skills, to acquire knowledge of the latest trends in technology, to have exposure to industrial climate and to gain confidence to face changes in the highly competitive and ever changing world.

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