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The Impact of Total Quality Management in E-Learning of Higher Education

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Abstract: Information system plays an important role in the higher education process. However, there is always a need to provide better services to the primary customers. Therefore, Total Quality Management (TQM) is critical in the information system domain. TQM is a philosophy of modern management that is recently entered the educational field after it has proved its success and effectiveness in other fields such as a business field. Thus, higher education institutions continue to invest heavily in ensuring the TQM of their information systems. This paper aims to highlight the importance of TQM in higher education as a whole, as well as in the field of e-learning. The paper offers an elaboration that may help those who are interested in the quality assurance and evaluation of information systems specifically in e-learning systems of higher education. Since a considerable effort has been made in the TQM at higher education. However, overall e-learning was not enough. Therefore, this paper will address this by providing recommendations to guide the successful quality management implementation.

Keywords: E-learning; Total Quality Management (TQM); Higher Education; Universities.

1. INTRODUCTION

In higher education institutions, TQM is not limited to management philosophies adopted and applied by the educational departments [1]. However, it has become a comprehensive, interrelated, and integrated strategy and approach that reaches remarkable results in the application when it became a strategic priority that corresponds to its comprehensive and integrated strategies [2]. Is still in place, specifically in the field of higher education, in which all the users should be ready to reach the goals of the relevant websites. Higher education institutions should ensure the overall quality of the system through several means, in particular, the development of e-learning. It is one of the important factors of success in linking the organization's vision and mission at the strategic level because the educational system now faces a challenge regarding the need to provide additional educational opportunities without the need to increase additional budgets [3]. Mainly, this paper focuses on the concept of adopting TQM in e-learning systems of higher educational institutions to guarantee continuous improvement and higher quality. Also, discuss the advantages of TQM implementation within higher education institutions as well as the limitations of the most important elements of the educational process and provides recommendations to improve the overall quality management aspect. The rest of the paper is organized as follows: Section 2 illustrates a background discussion of the field. Section 3 discusses the problems founded based on the literature. Section 4 proposed solution and findings are presented. Section 5 discusses the advantages and disadvantages of TQM in general. The paper ends with a discussion, recommendations, and conclusions in Section 6 and Section 7.

1.1 THE CONCEPT OF TQM

The Total Quality Management (TQM) concept has been used as a comprehensive term that focuses on the continuous improvement of organizations and satisfying the customer's needs. TQM is an integrated management method, involving many aspects that must be applied in the management of organizations. According to Houn Chen & Waiman Cheung [2], the term "Quality" is used to measure the degree of excellence. The word "Total" means everything in the organization. It includes all services, processes, resources, products, people, and even time. Also, TQM is defined as a management approach that focuses on customer satisfaction. There are many approaches defined by quality leaders such as W. Edwards Deming, Joseph Juran, Kaoru Ishikawa, and Philip B. Crosby[4]. Therefore, TQM is the application of quantitative methods and human resources to improve the material and services supplied to an organization, and the degree to which the needs of the customers are met, now and in the future. TQM integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach focused on continuous improvement[4].

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1.2 TQM IN HIGHER EDUCATION

Quality management was originally established for businesses, manufacturing, and industries. In the area of higher education, the adoption of TQM has been diluted by the exercise of academic freedom [5]. Also, when considering the implementation of TQM, it is important to ensure that differences between higher education and the industry were taken into consideration. The educational sector differs from industry sectors in many ways, so the quality features and approaches might not be directly applicable to education. Therefore, it is usually hard to implement the main features of quality in higher education institutions taking into account the fact that quality always requires teamwork [1]. However, the adoption of TQM will help higher education institutions eliminate inefficiencies in the organization and maintain their competitiveness, achieve higher performance in all areas, satisfy the needs of all stakeholders and raise focus on all market needs[6]. The action taken to address these challenges and overcome them is very important since it will improve their ability to compete, survive, and continuity. Therefore, those institutions need proper adoption and implementation of the concept of TQM to enable them to excellence and improve quality standards through the achievement of many benefits such as decreasing the cost of performance, improving the quality of the product or service provided, and increasing production capacity [2]. However, many institutions believe that applying the concept of TQM will lead to lower productivity and further costs. Consequentially, this will lead to many managerial problems; bad products and services; and therefore, not achieving customer satisfaction. Recently, the majority of higher education realize that It became urgent that educational institutions must satisfy these demands and show high levels of quality [7][9].

1.3 TQM IN E-LEARNING

Total Quality Management (TQM) can be integrated into an e-learning system to succeed in combining the mission and vision of an educational sector. The approach of TQM has given a massive result to many enterprises. However, with the rapid enhancement in the teaching methods, from in-person to online, course materials, and teachers' qualifications. Therefore, the TQM concept has affected the e-learning system positively as it became a significant factor in its success. In general, integrating TQM in the e-learning industries certainly will have a strategic advantage in making continuous development [6]. Several key elements must be considered by higher education institutions to enhance TQM in the educational process as well as improve the quality, Which includes continuous improvement, administration, and information management [7]. The TQM works on introducing quality management systems easily in any industry. For instance, providing planning for e-learning in phases, a quality checklist for teachers, and digital materials. Furthermore, it will help the organization to build a framework for planning and implementing e-learning correctly. Certainly, TQM gives support to the improvement of capabilities [8].

2. BACKGROUND

2.1 A BRIEF HISTORY OF TQM MOVEMENTS

This study acknowledges that TQM will provide an outstanding impact on the institution's objective and produce significant value in improving the educational value. Earlier in 2006 [3], Margarida and Elizabeth implemented TQM principles in two Portuguese high education institutions, which are ISCTE and the University of Evora. They verified that the techniques could be applied similarly in Portuguese high education institutions by using separate questionnaires. They showed in their paper a set of difficulties and benefits in the other hand regarding the implementation of TQM that could be a consequence of the cultural environment of the institutions. Finally, they concluded their paper by presenting that the institutions can still enhance the application of the 14 principles proposed by Deming [8]. The proper implementation of these principles may permit them to evolve to the excellence level. The study admitted that TQM implementation using the principles of Deming in Portuguese higher education needs some adoption in the high education system. Some principles should be modified so that the process of quality succeeds. Other principles cannot simply be applied, and another principle is not adaptable to the Portuguese higher education institutions.

However, in 2008 [9] Hossein, Sanaz, and Pouya highlighted in their paper the general principles of TQM and how it can be used to improve the quality of any academic institution. The study covered the whole institutions and administrative structure for higher education at the University College of Boras. In addition, the authors aimed to facilitate the university college to improve the quality of its higher education by providing full documentation in the field of TQM. They discussed the overall findings of the quality work of the university college of Borås in their investigation as follows. First, not all people working in the context of quality, in general, are familiar enough with the concept and its related terms and issues. There is a need for this institution to define the concept of TQM i.e. quality of higher education. Furthermore, there are some concerned groups of people about applying tasks in the context of quality, however, not all of them know about their tasks well enough. In addition, some tasks have not been defined clearly for those who are responsible for them.

In 2012 [10], Sabet et al. reviewed how TQM has been operated in the industrial field and they clarified how it can be translated into the educational field. The study has targeted 112 lecturers from five famous universities in Malaysia and

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also the authors designed a questionnaire to ensure how the lecturers implement the TQM processes and concepts in their classrooms. The results showed that the high role of commitment and teamwork in TQM, implementation, and representation of sharing ideas and decision making are two key elements in Malaysian universities that can lead to so many benefits. Therefore, many lecturers mentioned that there is a relationship between rewards, recognition, motivation, and high performance. It shows with suitable teamwork, universities can improve their creativity, satisfaction, skills, speed, and finally their support.

Abdurahman in 2013 [2] offered a TQM conceptual model that reflects the interaction between quality aspects in higher education, customers of higher education, benefits of various sectors of implementing TQM in educational institutions that might satisfy the customers, and led to educational system enhancement. Typically, the higher education customers could be students, companies, communities, universities, and governments. Whereas the quality dimensions include the value of money, fitness of purpose, transformation, raising awareness, and so forth. Finally, the model could result in increasing the satisfaction of customers, employees, and societal impact achieved through leadership which facilitates and simulates institutional strategies and the management of personnel, resources, and processes. In 2014 [11], Mohammad and Amer analyzed the TQM in higher education and outlined the literature on Critical Success Factors (CSF) and its performance in all areas. The authors aimed in their paper to determine how quality is recognized by various groups of people, for instance, students, parents, faculty members, and employers about the effectiveness of TQM in higher education. They defined TQM as a perception that any educational institution can only achieve through long-term planning, with the formulation and implementation of an annual quality program, which ultimately moves across the vision accomplishment. The paper discussed the three general approaches of TQM in higher education. The main focus in the first approach is on the customers, where the ideas and concepts provided for the students are supported through staff training and development, and that results in students' encouragement in self-reliance. The second approach is the staff focus, where the share of all staff members should be raised to appraise and evaluate them regarding the efficiency of the institutions' procedures as well as setting the rules and priorities. Lastly, the third approach focuses on the positions of service agreement and the attempt to ensure acquiescence to stipulation at sealed access measurable degree of the educational policy. (see Table 1).

TABLE I A BRIEF HISTORY OF TQM MOVEMENTS

Authors	Findings
Margarida Saraiva & Elizabeth Reis (2006)	TQM implementation using the principles of Deming in Portuguese higher education need some adoption in the high education system. Some principles should be modified so that the process of quality succeeds. Other principles cannot simply be applied and another principle is not adaptable to the Portuguese higher education institutions.
Hossein Nadali Najafabadi, Sanaz Sadeghi & Pouya Habibzadeh (2008)	At the University College of Boras, not all people working in the context of quality are familiar enough with the concept and its related terms and issues. There is a need for this institution to define the concept of quality i.e. quality of higher education.
Hani Samimi Sabet, Zeinab Seyed Saleki, Benoush Roumi & Amin Dezfoulian (2012)	The high role of commitment and teamwork in TQM implementation and representation of sharing ideas and decision making are two key elements in Malaysian universities that can lead to so many advantages.
Abdulraheem M. A. Zabadi (2013)	Representation of TQM conceptual model that reflect the interaction between quality aspects in higher education, customers of higher education, benefits of various sectors of implementing TQM in educational institutions that might satisfy the customers and led to educational system enhancement.
Mohammed Hasan In'airat & Amer Hani Al-Kassem (2014)	Determine how quality is recognized by various groups of people, for instance, students, parents, faculty members, and employers about the effectiveness of TQM in higher education. Also, there are three generic approaches to TQM in higher education.

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3. STATEMENT OF THE PROBLEM

In the past few years, the growing demand for higher education may have had a negative impact on maintaining and managing the educational information system quality. Therefore, several environmental factors are driving change in higher education institutions [12]. These changes have served to put out the problems of TQM on the agenda of much higher education quality management. However, the problems of quality management have been given considerable attention in the business, commerce, and industry field. On the other hand, there are no considerable efforts have been made in the exposure to TQM in higher education, especially in the field of e-Learning. Quality in higher education as a whole is underdeveloped as a concept. There is still no consensus on how best to manage quality within higher education institutions, despite many approaches being adopted, because quality is a dependent process and the success of any process is dependent on how others are working well. Therefore, this research aims to highlight the general principles and approaches of TQM involved in academic institutions in higher education, especially in the field of e-learning, and to point out how this approach can be used to improve the overall quality. Also, the paper offers an elaboration that may help those who are interested in the quality assurance and evaluation of information systems specifically in e-learning systems of higher education. So, it would be useful to address this and may be of interest to those interested.

4. PROPOSED SOLUTION

The comprehensive higher education quality implementation must include the basic components required, including:

4.1 IMPORTANT FACTORS TO ENSURE TQM PHILOSOPHY IN HIGHER EDUCATION

TQM is a collaborative and unified way of formulating and managing continuous organizational improvement processes[1]. As it approaches depends on exceeding customer expectations, determining where the problem lies, and building trust. The following are the main steps of TQM [2, 11, 13]:

• The Employee's Commitment and Understanding

All employees within higher education institutions must be familiar with TQM laws and make them an integral part of their work. The employees must have sufficient knowledge of the organization's objectives as well as the importance of these objectives in the comprehensive achievement of the organization [14]. The employees should know what tasks are expected from them and why it is required. This is not an easy task and it is often not verified by management. When all employees try to understand and share the same perception many possibilities will be produced. If they are not aware, the responsibility will be diminished, and policies will not be published correctly.

• The Continuous Enhancement

The employees must be constantly improving. TQM is a steady progression rather than a program. There must be a marked improvement in all areas of policies, procedures, and controls organized by the department. All organizations must work to improve efficiency, which in turn will lead greatly to the improvement.

• The Culture of Quality Enhancement

Organizational culture is an essential part of TQM and must be renewed consistently for employee evaluation. Where beneficial monitoring for the employees will lead them to pay more attention to actions that lead to continued work. Employees need to know how to get better processes and provide their ideas to get the benefits.

4.2 CRITICAL SUCCESS FACTORS IN TQM

Many concerns are considered substantial matters in the e-learning systems which will lead to difficulty in identifying what matters to success. The e-learning systems in higher education have some technological factors which will affect the use of appearance structure efficiency, security, reliability, and technical support for both students and lecturers. Moreover, the most important and challenging concern is to make all team members follow the same path until they reach the main goals. This is where CSF comes into the rescue process. CSF is the key training area that we need to carry out well if we want to achieve our main goals. By understanding CSF, we can create a reference point to guide us in dealing with and evaluating the progress we have made so far. CSF also guides the team members about critical parts of the work. This method will motivate members to perform their tasks perfectly and correctly. A sufficient CSF will ensure the competitive and exhaustive procedures for the organization. Also, it is considered a group of activities that must be treated accurately and systematically by management [11]. These activities can be carried out to regulate quality management policy. Providing a quality system structure, involving all employees, disseminating information on quality, and finally organizing a day of quality. The top management with the technical team must collaborate, create and organize an environment that ensures continuous improvement. Also, they must motivate the employees to do their best to facilitate the activities of the organization to achieve better quality. CSF is closely related to the mission and core goals of the business. While goals and mission focus on the objectives to be achieved. However, every organization has different CSF, which means, the TQM model will not be the same for all organizations. Also, it has been confirmed that all TQM models have common tools that can be used widely. In the context of e-learning, TQM can help to ensure scalability and reliability and delivers services with high value. E-learning can achieve its benefits to both users and the organization by

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implementing the PDCA (Plan-Do-Check-Act) cycle, one of Edward Deming's practices for continuous improvement as discussed in the following section.

4.3 Implement PDCA Cycle for Quality Enhancing

The PDCA (Plan-Do-Check-Adjust or Plan-Do-Check-Act) cycle, also known as the Deming Cycle (see Fig. 1) [8], was invented in the 20s by W. Edwards Deming. It is a four-step model built to carry out the change. Just as a circle with no end, the PDCA cycle should be repeated again and again for continuous improvement. It covers all the organizational elements including services, processes, and products. Therefore, leads to improvement of all aspects of the organization and places the organization closer to achieving its objective. It consists of four steps [15]:

1. Plan: This phase is important since it eliminates future failures and saves a lot of time. Also, it focuses on planning objectives and processes according to the vision, mission, and values of the organization, setting goals and objectives, and defining the best way to achieve them.

2. Do: After the careful planning phase, put it into practice by executing the plan. The stage of implementation is divided into three sub-steps: training of all staff and participants involved in the project, followed by the process itself, and collecting the data and analyzing it for later evaluation.

3. Check: This is the phase of the PDCA cycle that is used to identify possible gaps that could occur in the project. The results and achievements are measured from the collected data until the end of the process. The evaluation and check processes should be done in two ways in parallel with the implementation, to ensure that the goal is achieved or at the end of it, to get a more comprehensive statistical analysis that allows the necessary changes and successes to be discussed.

4. Act: This is the final stage where all corrective actions are applied to improve the project. It should be done at the end and the beginning of the project.

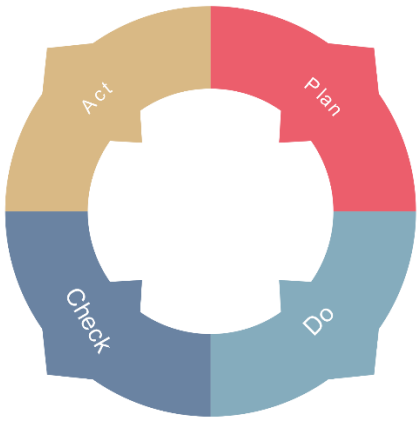

Fig.1 The PDCA Cycle

4.4 Implement Six Sigma for Quality Enhancing

In the context of e-learning development, applying the Six Sigma methodology might be the solution. Six Sigma is a business management strategy intended to minimize the number of deviations and defects [16]. The principles mainly apply to industrial processes. However, recently it starts to be applied in higher educational processes. Six Sigma, as shown in Fig. 2 [15] is a highly controlled process that helps associations to concentrate on creating and conveying close flawless items and services. The word "Sigma" is a term referred to measuring how far a given procedure turns off from "perfection." The important principle behind Six Sigma is that, if you

can quantify what number of deviations and defects you have, you can exercise how to dispense with them and get as near-zero defects as conceivable. The phases of Six Sigma [15, 16]:

1. The "define" phase: the goals and the objectives must be clearly defined. Six Sigma can be effectively used in higher education institutions since the first step is understanding all processes to develop a process map for higher education and then evaluate the effect of input variables on the output process.

2. The "measure" phase: all measurements related to the process are calculated.

3. The "analyze" phase: after the development of the process map, it is essential to identify the sources of poor quality in higher education using fitting information examination apparatuses.

4. The "improve" phase: the sources of failure or poor quality must be identified with a solution that will reduce defects in the process.

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5. The "control" phase: requires institutionalization of the improvement results obtained from the Six Sigma process. The key to success in achieving quality is to standardize the improvement process and foster a six sigma or continuous improvement process in the organizational culture.

Fig.2 Six Sigma Steps

5. ADVANTAGES & DISADVANTAGES

5.1 ADVANTAGES OF IMPLEMENTING TQM IN E-LEARNING

The implementation of TQM in higher education especially in the field of e-learning has many benefits that are quite significant [3, 11]. Therefore, the possible advantages of TQM in educational institutions are very clear such as:

1. TQM will help the educational institutions to create promoted information systems services for their customers including students and staff.
2. TQM will help higher education to focus on the market needs.
3. Implementing TQM properly will produce information systems that lead to high-quality performance.
4. The continuous improvement of TQM is a crucial element for the satisfaction and reformation of education.
5. Implementing TQM might offer more challenges to students and staff as well, to empower the concept of cooperation and teamwork with each other.
6. Increases the productivity and the involvement levels of all members of the institutions.
7. Reduce barriers inside the institutions in general.
8. Enhances communications between all institutions' levels.
9. Improve the overall work environment by implementing useful tools and methods that will create motivation among all members and increase customer satisfaction.
10. Adoption of TQM will help institutions of higher education to maintain their competitiveness, eliminate inefficiencies in the organization, help focus on the market needs, achieve high performance in all areas, and satisfy the needs of all stakeholders [5].
11. According to Kelncher [17], TQM is a system of continuous development that includes all workers from top management to production line workers. Implementing TQM in e-learning could lower production costs since the TQM program reduces defects and waste which eliminates production costs in a business. As the team gathers to recognize issues and weaknesses in the organization, the company continues to enjoy eliminating costs and higher profits.

5.2 LIMITATIONS OF IMPLEMENTING TQM IN HIGHER EDUCATION

Despite all advantages of implementing TQM in higher education institutions, it is important to consider the limitations that are likely to appear initially in the implementation process [15, 18]. Examples include:

1. The negative approach associated with the terminology of TQM is that some educators consider TQM as an administrative philosophy not concerned with an education field especially because it uses terms such as "customer" and "value ".

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2. The rotation in the upper management can represent a barrier to the implementation of TQM, not only because of adoption issues of the new administration but also because it might like some privacy regarding TQM. Therefore, this will affect the pledge of the other members of the institutions about the certainty of the full implementation of TQM or if they are wasting their time and efforts on something that will be ignored later.

3. The computer is the essential component in this process, where all customers will communicate and do their processes through it; it is quite important to make the learning process attractive and easy to use for the learner.

4. Lack of time of upper management.

5. High cost of the continuous system follows up and development.

6. Insufficient training time regarding information systems services for all users.

7. The design of the system should be secure and user-friendly to improve the design aspect.

8. Teachers' matters about the changes might impair their future career including their acceptance to use the technology in the educational process.

6. RECOMMENDATIONS

According to the literature reviews, possible solutions, and limitations of the previous studies, the following recommendations are presented:

1. E-learning in higher education faces many challenges from the continued development of the quality of academia, as well as the increasing number of participants from all sectors of the society, and the establishment of new relationships between higher education and all stakeholders [2]. Educational institutions, especially universities, are more interested than others since they have complicated information systems. So, they must be more distinguished in the establishment of high-quality institutions in various fields.

2. Evaluation process should get a high priority since it is the core of the TQM process in all stages of development, which is incomplete unless there is an impact of e-learning. Because of the nature of higher education service and the core focus on knowledge, the evaluation process will be more important and more difficult to measure and identify.

3. Higher education institutions must consider their clients, especially students, and what has been provided to them. Also, they should ignore the old, long-term method.

4. Universities and institutions need an education that follows the new regulations of higher education, In terms of increasing the efficient participation of various sectors of society. Also, the establishment of new relationships depends on the cooperation between higher education and society.

5. The educational institutions must promote fair practices and eliminate unethical practices that have a negative impact on society.

6. TQM is a key part of the higher education strategy, in general.

7. CONCLUSION

Even though implementing the principle of TQM started in the business first, it has shown its effectiveness in other fields such as e-learning systems. We can conclude that the quality concept is strengthening teamwork, customer satisfaction, leadership, and continuous improvement. The E-learning of higher education can adopt the TQM but must be modified to completely understand the several aspects of education. Since education does not have a tangible product but it is a service industry. The advantages of TQM include the increase in employee confidence, best cooperation from various sections, and finally the continuous development of information systems for higher education. Also, we conclude that the quality of e-learning in higher education is a difficult topic. This is due to the number of parties involved in addition to the changes in modern life. If the members of the education institution implement TQM, this will result in greater accuracy, and better performance and thus take all important actions for development and excellence. In this paper, we have highlighted the aspects of the implementation of TQM in e-learning and the challenges that may occur. In the end, there is a lot to gain if the organizations can combine our proposed solution and findings since they are complementary.

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